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., Wednesday, August 28, 2024,** and then opened and read publicly at that time by the Procurement Staff for the following project:

Bid # 24-35-2 – Diversified Water Well Pretreatment System

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 & Public Work Construction

This bid package is available online at www.bidexpress.com or LaPAC https://wwwcfprd.doa.louisiana.gov/osp/lapac/pubmain.cfm. It is the Vendor's responsibility to check Bid Express, or LaPAC frequently for any possible addenda that may be issued. The Parish is not responsible for a Vendor's failure to download any addenda documents required to complete a submission.

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.

A Non-Mandatory pre-bid meeting will be held at St. Tammany Parish Government Office Complex, Building "B" 21454 Koop Dr. Mandeville, LA 70471, 3rd Floor Staff Conference Room on Wednesday, August 7, 2024, from 2:00 PM to 4:00 PM. Attendance is strongly encouraged.

Procurement Department

BID PROPOSAL

ST. TAMMANY PARISH
GOVERNMENT

BID PACKAGE FOR

Diversified Water Well Pretreatment System

BID NO.: 24-35-2

July 2 , 2024

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 **240 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. Contractor shall be liable without limitation to the Parish for any and all injury, death, damage, loss, destruction, damages, costs, fines, penalties, judgments, forfeitures, assessments, expenses (including attorney fees), obligations, and other liabilities of every name and description, which may occur or in any way arise out of any act or omission of Contractor, its owners, agents, employees, partners or subcontractors.

22. Upon notice of any claim, demand, suit, or cause of action against the Parish, alleged to arise out of or be related to this Contract, Contractor shall investigate, handle, respond to, provide defense for, and defend at its sole expense, even if the claim, demand, suit, or cause of action is groundless, false, or fraudulent. The Parish may, but is not required to, consult with or assist the Contractor, but this assistance shall not affect the Contractor's obligations, duties, and responsibilities under this section. Contractor shall obtain the Parish's written consent before entering into any settlement or dismissal.

23. It is understood and agreed that neither party can foresee the exigencies beyond the control of each party which arise by reason of an Act of God or force majeure; therefore, neither party shall be liable for any delay or failure in performance beyond its control resulting from an Act of God or force majeure. The Parish shall determine whether a delay or failure results from an Act of God or force majeure based on its review of all facts and circumstances. The parties shall use reasonable efforts, including but not limited to, use of continuation of operations plans (COOP), business continuity plans, and disaster recovery plans, to eliminate or minimize the effect of such events upon the performance of their respective duties under this Contract.

24. Contractor shall fully indemnify and hold harmless the Parish, without limitation, for any and all injury, death, damage, loss, destruction, damages, costs, fines, penalties, judgments, forfeitures, assessments, expenses (including attorney fees), obligations, and other liabilities of every name and description, which may occur or in any way arise out of any act or omission of Contractor, its owners, agents, employees, partners or subcontractors. The Contractor shall not indemnify for the portion of any loss or damage arising from the Parish's act or failure to act.

25. Contractor shall fully indemnify and hold harmless the Parish, without limitation, from and against damages, costs, fines, penalties, judgments, forfeitures, assessments, expenses (including attorney fees), obligations, and other liabilities in any action for infringement of any intellectual property right, including but not limited to, trademark, trade-secret, copyright, and patent rights.

    When a dispute or claim arises relative to a real or anticipated infringement, the Contractor, at its sole expense, shall submit information and documentation, including formal patent attorney opinions, as required by the Parish.

    If the use of the product, material, service, or any component thereof is enjoined for any reason or if the Contractor believes that it may be enjoined, Contractor, while ensuring appropriate migration and implementation, data integrity, and minimal delays of performance, shall at its sole expense and in the following order of precedence: (i) obtain for the Parish the right to continue using such product, material, service, or component thereof; (ii) modify the product, material, service, or component thereof so that it becomes a non-infringing product, material, or service of at least equal quality and performance; (iii) replace the product, material, service, or component thereof so that it becomes a non-infringing product, material, or service of at least equal quality and performance; or, (iv) provide the Parish monetary compensation for all payments made under the Contract related to the infringing product, material, service, or component, plus for all costs incurred to procure and implement a non-infringing product, material, or service of at least equal quality and performance. Until this obligation has been satisfied, the Contractor remains in default.

    The Contractor shall not be obligated to indemnify that portion of a claim or dispute based upon the Parish's unauthorized: i) modification or alteration of the product, material or service; ii) use of the product, material or service in combination with other products not

furnished by Contractor; or, iii) use of the product, material or service in other than the specified operating conditions and environment.

26. 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.

27. 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.

28. 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.

29. 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.

30. 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.

31. In accordance with Louisiana Law, all Corporations (See LA R.S. 12:26.1) and Limited Liability Companies (See LA R.S. 12:1308.2) must be registered and in good standing with the Louisiana Secretary of State in order to hold a contract.

32. 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 ensure that bids are delivered in a timely fashion. **Late bids, regardless of reason, will not be considered, and will be returned to bidder.**

33. 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

34. See Notice to Bidders for availability of Drawings, Specifications and Contract Documents via electronic methods.

35. 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.

36. 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 and qualifications 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.

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

38. Failure of the successful Bidder to execute the Contract and deliver the required Bonds within ten (10) 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.

39. 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.

40. 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.

41. 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.

42. 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.

43. 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.

44. 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.

45. 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.

46. 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.

47. Contractor authorizes Parish to deduct from any payment due herein costs and service fees for recordation of this Contract in full or an excerpt hereof, or any revisions or modifications thereof as required by law. Contractor agrees to execute an excerpt or extract of this agreement for recordation purposes. If Contractor fails to execute such an excerpt, then the Parish shall file and record the entire Contract and all attachments at the expense of Contractor and Parish is hereby authorized to deduct all related costs from any proceeds due to the Contractor.

48. 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.

49. 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.

50. 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.

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

52. 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.

53. 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.

54. 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.

55. 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.

56. 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.

57. 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).

58. 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.

59. 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 Procurement@stpgov.org. Any questions or inquiries received after the required deadline to submit questions or inquiries will not be answered.

Schedule of Events

	Date	Time (CT)
Bid Due Date	August 28, 2024	2:00 PM
Inquiry Deadline	August 19, 2024	2:00 PM
Addendum Deadline	August 23, 2024	2:00 PM

NOTE: The Parish reserves the right to revise this schedule. Any such revision will be formalized by the issuance of an addendum to the Bid Request.

60. 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.

61. 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).

62. Failure to complete or deliver within the time specified or to provide the services as specified in the bid or response will constitute a default and may cause cancellation of the contract. Where the Parish has determined the contractor to be in default. The Parish reserves the right to purchase any or all products or services covered by the contract on the open market and to charge the contractor with the cost in excess of the contract price. Until

such assessed charges have been paid, no subsequent bid or response from the defaulting contractor will be considered.

63. 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:

Contractor to furnish and install potable water filtration system, piping, equipment, controls, and accessories. Furnish and install chemical feed equipment and pumps. Construction of steel and concrete masonry unit filter/chemical storage building. Replacement of existing water well pumps and piping.

II. Location of Work:

Diversified Water Well Site, located at 329 Diversified Blvd. Madisonville, LA 70447.

III. Documents: Bid Documents dated July 2, 2024 and entitled:

Diversified Water Well Pretreatment System

BID No. 24-35-2

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 (2016 Edition of Louisiana Standard Specifications for Roads and Bridges).

This project is federally grant funded and therefore requires the Contractor to have a Unique Entity Identification number (UEI). The Contractor should submit with their response their UEI number. If the Contractor does not have a UEI already, then they must register at the below link before an award can be made.

https://sam.gov/content/entity-registration

Special Provisions

-BIDDERS TO EXAMINE LOCATION AND PLANS

Each Bidder shall make a personal examination of the location of the proposed work and of the surrounding area. He/she shall thoroughly acquaint themselves with the details of the work to be done and all the conditions and obstacles likely to be encountered, including soil conditions, in the performance and completion of work. Bidders shall inform themselves as to the facilities for the transportation, handling, and storage of equipment and materials.

Each bidder shall carefully study the plans, specifications, and other contract documents and thoroughly satisfy themselves as to the conditions under which the work is to be done, and as to the character, qualities, and quantities of work to be performed, and materials to be furnished, and be prepared to execute a finished job in every particular.

-LONG LEAD ITEMS

Due to long delivery of certain items specified in this contract work, it is strongly recommended that the Contractor to order those long delivery items as soon as NTP has been issued.

Contract substantial completion date shall not be extended due to contractor's negligence in ordering material and/or equipment in timely manner.

• SITE CONDITION

The location of the work of this contract is on the grounds of Diversified Water Well Site which is adjacent to Diversified Wastewater Treatment plant site. The Contractor shall perform all his work in a way that minimizes interferences with the Parish's Department of Utility's (DU) operation of the facility and the public. All schedules and methods of work are subject to approval by the Engineer. It will be assumed that all prospective bidders have inspected the site(s) and have acquainted themselves with the local conditions.

Because of the location of the job site on the grounds of the Diversified Water and Wastewater Sites, it is imperative that the Contractor schedule and conduct his work in such a manner so as not to interfere in any way with the operation of both facilities.

Trucking through the facility, delivering and storing materials and equipment, shall be done with the approval of the engineer. The Contractor's personnel will be required to park private vehicles off-site. However, he will be allowed to bring equipment and company vehicles only into the facility as necessary in the execution of this contract but may be required to remove them if their presence interferes with the operations of the Department of Utilities, all at the discretion of the Engineer.

All work of this contract MUST be coordinated with the Department of Utilities (DU) through the Engineer, with proper advanced notice.

The existing water well and wastewater treatment sites MUST remain fully operational throughout the length of this contract. Any outage of this facility and/or other damages due to the contractor's negligence shall be repaired immediately by the Contractor at no additional cost to the contract. Contractor shall inform the DU at least 72 hours in advance for any coordination required for tie-in the existing facility to the new facility, weather permitting. No work shall begin without express written approval of the DU. Waste water, and chemical spillages, if any, shall be remediated immediately to the satisfaction of DU at no additional cost to the contract.

• UTILITY LOCATION

The locations of all utilities shown on the plans are approximate. Contractor shall field verify all utilities and their tie-in prior to any work commences.

Any damages to any utility line due to lack of the contractor's field verification shall be repaired immediately to the satisfaction of the Engineer, all at no cost to the contract.

• CONNECTIONS TO EXISTING FACILITIES

The location and condition of each tie-in is approximate. It is the contractor's responsibility to field verify the location and the conditions of each tie-in prior to ordering any materials and inform the Engineer of the findings.

Additionally, once the tie-ins are exposed, the contractor MUST notify the DU to operate and exercise the isolation valves at either end to see if they are operable and lines are flushed and cleaned **(ALL existing valves shall be operated by operations personnel of DU <u>only</u>)**. In the event that the existing valves are not operable as determined by the Engineer, new valves may be installed at the discretion of DU through the Engineer.

• NOISE and SOUND CONCERNS AND LIMITATIONS

Contractor's attention shall be given specifically to St. Tammany Parish Ordinance, Article IV - Noise and Sound, which in part states that the sound measured by a performer taken at least 25 feet from the source of the noise cannot exceed 70 decibels between Noon and 9 p.m., between 9 p.m. and noon, the sound measurement taken at least 25 feet from the source of the noise cannot exceed 55 decibels.

• NIGHT, WEEKEND OR HOLIDAY WORK

Normal work hours are 7:00 a.m. to 6:00 p.m. Monday through Friday. Hours requested outside normal work hours must be requested in writing at least 72 hours in advance.

Contractor shall be required to pay resident inspection fees for work outside normal working hours. Night, weekend or holiday work requiring the presence of an Engineer or inspector will be permitted only in cases of emergency, and then only to such an extent as is absolutely necessary and with the written permission of the DU through the Engineer. In the event such work becomes necessary, no extra payment will be made therefore.

• JOB SITE DRAWINGS AND SPECIFICATIONS

A complete and current set of contract drawings and specifications (including any addenda) shall be maintained on the job site by the Contractor.

One copy of all approved shop drawings, equipment or material drawings, etc. shall be maintained on the job site by the Contractor.

• CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS

In case of the conflict between the drawings and the specifications, the Engineer shall be the sole authority in determining which of the two shall take precedence in the Contract Documents. Such conflict shall not be a basis for an extra expense to the Parish.

The Contractor is hereby cautioned to base his/her price and work upon the costlier item in event of conflict as no claim for extra expense will be entertained on this basis.

• AS-BUILT DRAWINGS

The Contractor shall furnish one (1) neat and legibly marked blue line set of contract drawings to depict actual "as-built" conditions.

Table 3.1

Liquidated Damages	
Original Contract Amount	**Daily Charge**
Dollars	Dollars
0 - 250,000	500
250,000 – 1 Million	1,000
> 1 Million – 5 Million	1,500
> 5 Million – 10 Million	2,000
> 10 Million	3,000

- Parish reserves the right to increase the Daily charge rate due to additional provisions required in order to complete the project as described in the specifications

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: Diversified Water Well Pretreatment System
BID No. 24-35-2
(*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: Barowka and Bonura Engineers and Consultants, LLC and dated: July 2, 2024.
(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:

_____Dollars ($ _____)

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

_____Dollars ($ _____)

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

_____Dollars ($_____)

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.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO:

St. Tammany Parish Government

21454 Koop Drive, Suite 2F

Mandeville, LA. 70471

(OWNER TO PROVIDE NAME AND ADDRESS OF OWNER)

BID FOR:

Diversified Water Well Pretreatment System

Bid No. 24-35-2

(OWNER TO PROVIDE PROJECT NAME & OTHER IDENTIFYING INFO)

UNIT PRICES: This form shall be used for any & all work required by the Bidding Documents & described as unit prices. Amounts shall be stated in figures & only in figures.

Description:	☑ BASE BID OR	☐ ALT #	MOBILIZATION	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
1	1	LS		
Description:	☑ BASE BID OR	☐ ALT #	EARTHWORK & SITE IMPROVEMENTS	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
2	1	LS		
Description:	☑ BASE BID OR	☐ ALT #	SEWER LIFT STATION & FORCE MAIN	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
3	1	LS		
Description:	☑ BASE BID OR	☐ ALT #	YARD PIPING & WELL PUMPS	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
4	1	LS		

Wording for "description" is to be provided by the Owner. All Quantities Estimated. The Contractor will be paid based upon actual quantities as verified by the Owner.

UNIT PRICES: This form shall be used for any & all work required by the Bidding Documents & described as unit prices. Amounts shall be stated in figures & only in figures.

Description:	☑ BASE BID OR	☐ ALT #	CHEMICAL FEED SYSTEM	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
5	1	LS		
Description:	☑ BASE BID OR	☐ ALT #	FILTER BUILDING	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
6	1	LS		
Description:	☑ BASE BID OR	☐ ALT #	SITE ELECTRICAL & CONTROLS SYSTEM	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
7	1	LS		
Description:	☑ BASE BID OR	☐ ALT #	EXPLORATORY EXCAVATION	
REF NO.:	**QUANTITY**	**UNIT OF MEASURE**	**UNIT PRICE**	**UNIT PRICE EXTENSION (Quantity times unit price)**
8	5	EACH		

Wording for "description" is to be provided by the Owner. All Quantities Estimated. The Contractor will be paid based upon actual quantities as verified by the Owner.

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: _____

Section 06

INSURANCE REQUIREMENTS*

Construction Project: Diversified Water Well Pretreatment System

Project/Quote/Bid#: 24-35-2

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. 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 $4,000,000 CSL each occurrence / $4,000,000 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 as an "all-risk" policy providing coverage in an amount at or greater than one hundred percent (100%) of the completed value of the contracted project. 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 named as a Loss Payee 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 named as a Loss Payee 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: 985-898-5226
Email: riskman@stpgov.org

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.

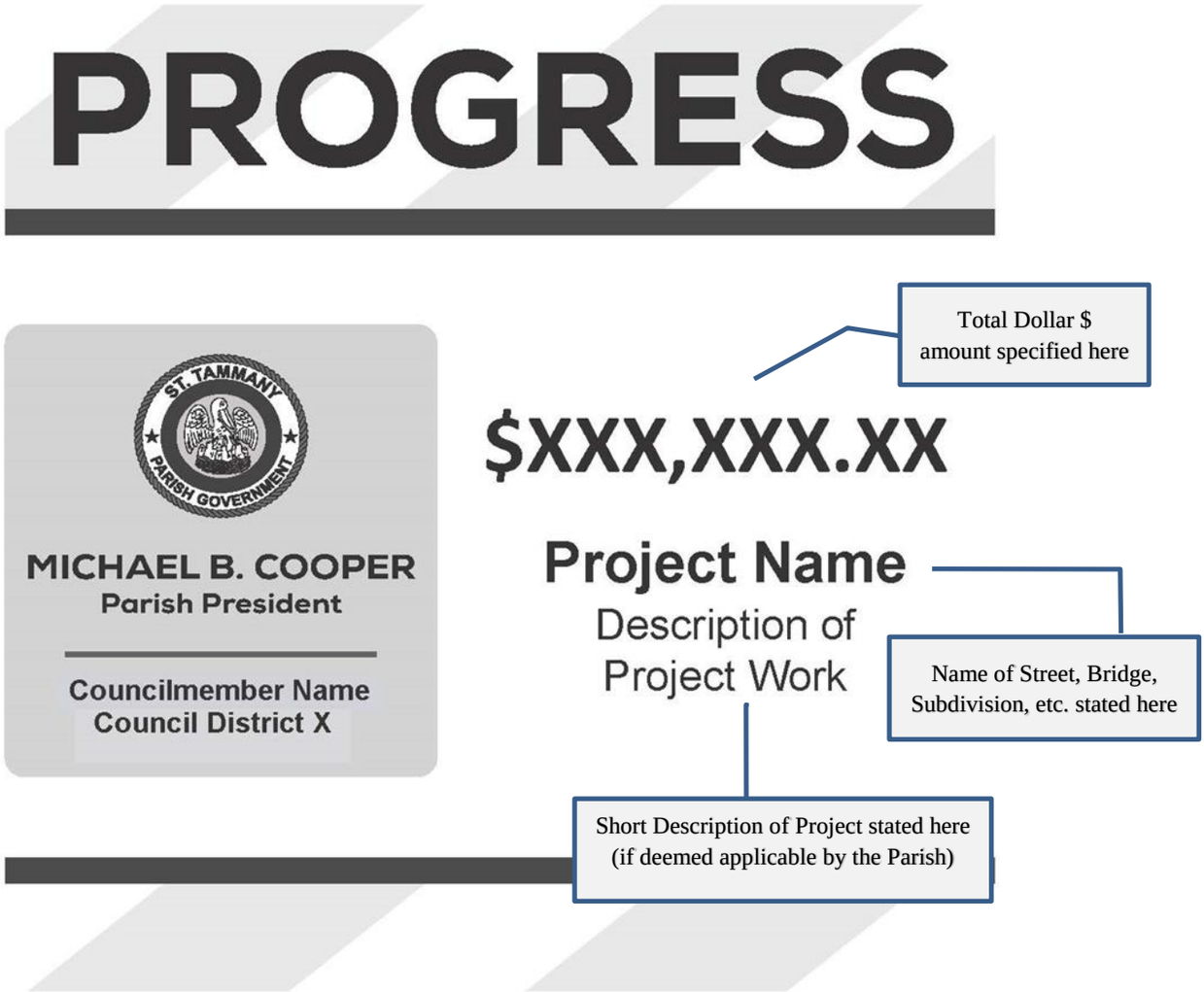
d. The sign(s) is to be installed such that the bottom of the sign is a minimum of 5' above the existing ground elevation.

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:

PROGRESS

MICHAEL B. COOPER
Parish President

RYKERT O. TOLEDANO, JR
Council District 5

$514,444.40

Dove Park
Subdivision Drainage
Drainage Improvements along
Swallow St., Sparrow St.,
Partridge St. and Egret St.

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.

GENERAL CONDITIONS INDEX

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 Contractor with whom the Owner has executed the Agreement.

01.16 Defective Work When 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 See Notice to Bidders for availability of Drawings, Specifications and Contract Documents via electronic methods.

02.24 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.

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 based on **Table 3.1** 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 per **Table 3.1** 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 Contractor, 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/$2,000,000 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, Department of Legal, 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 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 Procurement@stpgov.org. Any questions or inquires received after the required deadline to submit questions or inquires will not be answered.

CORPORATE RESOLUTION

EXCERPT FROM MINUTES OF MEETING OF THE BOARD OF DIRECTORS OF _____ INCORPORATED.

AT THE MEETING OF DIRECTORS OF _____ INCORPORATED, DULY NOTICED AND HELD ON _____, A QUORUM BEING THERE PRESENT, ON MOTION DULY MADE AND SECONDED. IT WAS:

RESOLVED THAT _____, BE AND IS HEREBY APPOINTED, CONSTITUTED AND DESIGN ATED AS AGENT AND ATTORNEY-IN-FACT OF THE CORPORATION WITH FU LL POWER AND AUTHORITY TO ACT ON BEHALF OF THIS CORPORATION IN ALL NEGOTIATIONS, BIDDING, CONCERNS AND TRANSACTIONS WITH THE PARISH OF ST. TAMMANY OR ANY OF ITS AGENCIES, DEPARTMENTS, EMPLOYEES OR AGENTS, INCLUDING BUT NOT LIMITED TO, THE EXECUTION OF ALL BIDS, PAPERS, DOCUMENTS, AFFIDAVITS, BONDS, SURETIES, CONTRACTS AND ACTS AND TO RECEIVE ALL PURCHASE ORDERS AND NOTICES ISSUED PURSUANT TO THE PROVISIONS OF ANY SUCH BID OR CONTRACT, THIS CORPORATION HEREBY RATIFYING, APPROVING, CONFIRMING, AND ACCEPTINGEACH AND EVERY SUCH ACT PERFORMED BY SAID AGENT AND ATTORNEY-IN-FACT.

I HEREBY CERTIFY THE FOREGOING TO BE A TRUE AND CORRECT COPY OF AN EXCERPT OF THE MINUTES OF THE ABOVE DATED MEETING OF THE BOARD OF DIRECTORS OF SAID CORPORATION, AND THE SAME HAS NOT BEEN REVOKED OR RESCINDED.

SECRETARY-TREASURER

_____

DATE

_____

Certificate of Insurance Instructions

The below information is intended to guide Contractors on what information is needed to be listed on the Certificate of Insurance. All Insurance limit requirements can be found in Attachment D.

- **Certificate Holder** – STPG must be listed as the certificate holder, and it must include our address of: P.O. Box 628, Covington, LA 70434
    - Reason: the certificate holder is where cancellations of coverage, or updated certificates are mailed. If a vendor terminates a policy, we will be notified.
- **Additional Insured** – We must be named as an additional insured so that if there is a lawsuit against the vendor for a project, their coverage will cover STPG as well if we are named in the lawsuit.
    - We must be named in the Description of Operations box – reason: there could be other additional insureds, and we want to have no doubt that we are one of the additional insureds.
    - We must be named as additional insured on the following coverages: General liability, Auto Liability, Umbrella/Excess Liability, Environmental/Pollution Liability.
    - Professional Liability policies do not allow for an additional insured by most carriers.
- **Project Name & Contract #** - We need this listed in the Description of Operations, again so that if there is a lawsuit, we have proof that coverage was active for that project.
- **Waiver of Subrogation –** This can either be listed in the Description of Operations or checked off in the appropriate columns.

    From the Insurance Requirement form:

    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.
- **Owners Protective Liability (OPL) or (OCP)** – Certificate of Insurance for OCP names St. Tammany Parish Government as the Insured and the Certificate Holder.

- Sample of Certificate of Insurance (COI) can be found on page 2.

- Please refer to this section in the package labeled "Insurance Requirements" for limits required for this project

Any questions regarding insurance requirements please contact the Risk Department at 985-898-5226 or email riskman@stpgov.org

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED	INSURER A :	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
	☐ CLAIMS-MADE ☐ OCCUR						MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
							GENERAL AGGREGATE	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG	$
	☐ POLICY ☐ PRO-JECT ☐ LOC							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ ALL OWNED AUTOS ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ☐ NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
								$
	☐ **UMBRELLA LIAB** ☐ OCCUR						EACH OCCURRENCE	$
	☐ **EXCESS LIAB** ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N						☐ WC STATU-TORY LIMITS ☐ OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ N / A **(Mandatory in NH)**						E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Project Name:
Contract #:

(Name St. Tammany Parish Government as an additional insured).

CERTIFICATE HOLDER

St. Tammany Parish Government
P.O. Box 628
Covington, LA 70434

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Bond No.:_____

CONTRACT AGREEMENT

BETWEEN PARISH AND CONTRACTOR

BY: ST. TAMMANY PARISH GOVERNMENT

WITH:

UNITED STATES OF AMERICA

STATE OF LOUISIANA

ST. TAMMANY PARISH

This agreement is entered into this_____day of_____, 20___, by and between: «txtREQCompanyName», hereinafter called the "Contractor", whose business address is «txtREQAddress», «txtREQCity», «txtREQState» «txtREQZip» and the St. Tammany Parish Government, hereinafter called the "Parish", whose business address is P.O. Box 628, Covington, LA 70434 (collectively, the "Parties") for «txtPROJECTNAME» project. Witnessed that the Contractor and the Parish, in consideration of premises and the mutual covenants, consideration and agreement herein contained, agree as follows:

1. SCOPE OF SERVICES

The Contractor shall furnish all labor and materials and perform all of the work required to build, construct and/or complete in a thorough and workmanlike manner:

«txtScopeSummary»

2. CONSTRUCTION DOCUMENTS

It is recognized by the Parties herein that said Construction Documents, including by way of example and not of limitation, the plans and Specifications, General Conditions, Supplementary General Conditions, any addenda thereto, the drawings (if any), and the bid, quote or other procurement documents impose duties and obligations upon the Parties herein, and said Parties thereby agree that they shall be bound by said duties and obligations. For these purposes, all of the provisions contained in the aforementioned Construction Documents are incorporated herein by reference with the same force and effect as though said Construction Documents were herein set out in full. Copies of the aforementioned Construction Documents are in the possession of both the Contractor and the Parish for reference.

3. TIME FOR COMPLETION

The work shall be commenced on a date to be specified in a written order of the Parish and shall be completed within «intCompletionTime» calendar days from and after said date.

4. COMPENSATION TO BE PAID TO THE CONTRACTOR

The Parish will pay and the Contractor will accept in full consideration for the performance of the Contract the sum of «curREQGrandTotal» dollars.

5. PERFORMANCE AND PAYMENT BOND

To these presents personally came and intervened _____,
(Name of Attorney in Fact)
herein acting for _____, a corporation organized
(Surety)
and existing under the laws of the State of _____, and duly authorized to transact business in the State of Louisiana, as surety, who declared that having taken cognizance of this Contract and of the Construction Documents mentioned herein, he hereby in his capacity as its Attorney in Fact obligates his company, as surety for the said Contractor, unto the said Parish, up to the sum of «curREQGrandTotal». The condition of this performance and payment bond

shall be that should the Contractor herein not perform the Contract in accordance with the terms and conditions hereof, or should said Contractor not fully indemnify and save harmless the Parish from all costs and damages which he may suffer by said Contractor's non-performance or should said Contractor not pay all persons who have fulfilled obligations to perform labor and/or furnish materials in the prosecution of the work provided for herein, including by way of example, workmen, laborers, mechanics, and furnishers of materials, machinery, equipment and fixtures, then said surety agrees and is bound to so perform the Contract and make said payment(s).

Contractor and Parish specifically agree to and recognize (1) the statutory employer relationship existing between the Parish and any employees performing work under this Contract as employees of the Contractor or employees of the "Sub-Contractor", and (2) that the work performed by the employees of the Contractor and the employees of the "Sub-Contractor" is part of the Parish's business, occupation or trade and is essential to the ability of the Parish to generate their products or services, all of which is in accordance with LSA-R.S. 23:1061, and as may be amended.

6. LIABILITY AND INDEMNIFICATION

A. Duty to Defend

Upon notice of any claim, demand, suit, or cause of action against the Parish, alleged to arise out of or be related to this Contract, Contractor shall investigate, handle, respond to, provide defense for, and defend at its sole expense, even if the claim, demand, suit, or cause of action is groundless, false, or fraudulent. The Parish may, but is not required to, consult with or assist the Contractor, but this assistance shall not affect the Contractor's obligations, duties, and responsibilities under this section. Contractor shall obtain the Parish's written consent before entering into any settlement or dismissal.

B. Contractor Liability

Contractor shall be liable without limitation to the Parish for any and all injury, death, damage, loss, destruction, damages, costs, fines, penalties, judgments, forfeitures, assessments, expenses (including attorney fees), obligations, and other liabilities of every name and description, which may occur or in any way arise out of any act or omission of Contractor, its owners, agents, employees, partners or subcontractors.

C. Force Majeure

It is understood and agreed that neither party can foresee the exigencies beyond the control of each party which arise by reason of an Act of God or force majeure; therefore, neither party shall be liable for any delay or failure in performance beyond its control resulting from an Act of God or force majeure. The Parish shall determine whether a delay or failure results from an Act of God or force majeure based on its review of all facts and circumstances. The parties shall use reasonable efforts, including but not limited to, use of continuation of operations plans (COOP), business continuity plans, and disaster recovery plans, to eliminate or minimize the effect of such events upon the performance of their respective duties under this Contract.

D. Indemnification

Contractor shall fully indemnify and hold harmless the Parish, without limitation, for any and all injury, death, damage, loss, destruction, damages, costs, fines, penalties, judgments, forfeitures, assessments, expenses (including attorney fees), obligations, and other liabilities of every name and description, which may occur or in any way arise out of any act or omission of Contractor, its

owners, agents, employees, partners or subcontractors. The Contractor shall not indemnify for the portion of any loss or damage arising from the Parish's act or failure to act.

E. Intellectual Property Indemnification

Contractor shall fully indemnify and hold harmless the Parish, without limitation, from and against damages, costs, fines, penalties, judgments, forfeitures, assessments, expenses (including attorney fees), obligations, and other liabilities in any action for infringement of any intellectual property right, including but not limited to, trademark, trade-secret, copyright, and patent rights.

When a dispute or claim arises relative to a real or anticipated infringement, the Contractor, at its sole expense, shall submit information and documentation, including formal patent attorney opinions, as required by the Parish.

If the use of the product, material, service, or any component thereof is enjoined for any reason or if the Contractor believes that it may be enjoined, Contractor, while ensuring appropriate migration and implementation, data integrity, and

minimal delays of performance, shall at its sole expense and in the following order of precedence: (i) obtain for the Parish the right to continue using such product, material, service, or component thereof; (ii) modify the product, material, service, or component thereof so that it becomes a non-infringing product, material, or service of at least equal quality and performance; (iii) replace the product, material, service, or component thereof so that it becomes a non-infringing product, material, or service of at least equal quality and performance; or, (iv) provide the Parish monetary compensation for all payments made under the Contract related to the infringing product, material, service, or component, plus for all costs incurred to procure and implement a non-infringing product, material, or service of at least equal quality and performance. Until this obligation has been satisfied, the Contractor remains in default.

The Contractor shall not be obligated to indemnify that portion of a claim or dispute based upon the Parish's unauthorized: i) modification or alteration of the product, material or service; ii) use of the product, material or service in combination with other products not furnished by Contractor; or, iii) use of the

product, material or service in other than the specified operating conditions and environment.

7. MODIFICATION OF CONTRACT TERMS

Provided that any alterations which may be made in the terms of the Contract or in the work to be done under it, or the giving by the Parish of any extensions of time for the performance of the Contract, or any other forbearance on the part of either the Parish or the Contractor to the other shall not in any way release the Contractor or the Surety from their liability hereunder, notice to the Surety of any such alterations, extensions or other forbearance being hereby waived.

8. TERMINATION, CANCELLATION, AND SUSPENSION

A. Termination

The term of this Contract shall be binding upon the Parties hereto until the work has been completed by the Provider and accepted by the Parish, and all payments required to be made to the Provider have been made. But, this Contract may be terminated upon thirty (30) days written notice under any or all of the following conditions:

1) By mutual agreement and consent of the Parties hereto;

2) By the Parish as a consequence of the failure of the Provider to comply with the terms, progress, or quality of the work in a satisfactory manner, proper allowances being made for circumstances beyond the control of the Provider;

3) By either party upon failure of the other party to fulfill its obligations as set forth in this Contract;

4) By the Parish with less than thirty (30) days' notice due to budgetary reductions and changes in funding priorities by the Parish;

5) In the event of the abandonment of the project by the Parish.

Upon termination, the Provider shall be paid for actual work performed prior to the Notice of Termination, either based upon the established hourly rate for services actually performed, or on a pro-rata share of the basic fee based upon the phase or percentage of work actually completed, depending on the type of compensation previously established under this Contract.

Upon Termination, the Provider shall deliver to the Parish all original documents, notes, drawings, tracings, computer files, and other files pertaining to this Contract or the Work performed, except for the Provider's personal and administrative files.

B. Cancellation

The continuation of this Contract is contingent upon the appropriation of funds to fulfill the requirements of the Contract by the Parish. If the Parish fails to appropriate sufficient monies to provide for the continuation of this or any other Contract, or if such appropriation is reduced by the veto of Parish President by any means provided in the appropriations Ordinance to prevent the total appropriation for the year from exceeding revenues for that year, or for any other lawful purpose, and the effect of such reduction is to provide insufficient monies for the continuation of the Contract, the Contract shall terminate on the date of the beginning of the first fiscal year for which funds are not appropriated. It is understood and agreed that paragraph (9)(C) below may preempt this paragraph, all at the exclusive and unilateral option of the Parish.

C. Suspension

Should the Parish desire to suspend the work, but not definitely terminate the Contract, the Parish shall supply the Provider with thirty (30) days' notice. The Parish will also

supply Provider thirty (30) days' notice that the work is to be reinstated and resumed in full force. Provider shall receive no additional compensation during the suspension period. The Parties may revisit the terms of this Contract during the suspension period. The suspension shall not exceed six (6) months, unless mutually agreed upon between the Parties.

D. Failure to complete or deliver within the time specified or to provide the services as specified in the bid or response will constitute a default and may cause cancellation of the contract. Where the Parish has determined the contractor to be in default. The Parish reserves the right to purchase any or all products or services covered by the contract on the open market and to charge the contractor with the cost in excess of the contract price. Until such assessed charges have been paid, no subsequent bid or response from the defaulting contractor will be considered.

E. In the event of a default and/or breach of this agreement and this matter is forwarded to legal counsel, then the prevailing party may be entitled to collect a reasonable attorney fees and all costs associated therewith whether or not litigation is initiated. Attorney fees shall be based upon the current, reasonable prevailing rate for counsel in the private

sector. The Parties agree to be responsible for such attorney fees, together for all with legal interest from date of agreement breach, plus all costs of collection.

F. Termination or cancellation of this agreement will not affect any rights or duties arising under any term or condition herein.

G. As to the filing of voluntary or involuntary bankruptcy by Provider, Provider agrees that if any execution or legal process is levied upon its interest in this Contract, or if any liens or privileges are filed against its interest, or if a petition in bankruptcy is filed against it, or if it is adjudicated bankrupt in involuntary proceedings, or if it should breach this Contract in any material respect, the Parish shall have the right, at its unilateral option, to immediately cancel and terminate this Contract. In the event that Provider is placed in any chapter of bankruptcy, voluntarily or involuntarily, or otherwise triggers any provision of the preceding sentence herein, it is understood and agreed that all materials, goods and/or services provided shall be and remain the property of the Parish. All rights of Provider as to goods, wares, products, services, materials and the like supplied to Parish shall be deemed forfeited.

9. RECORDATION OF CONTRACT

Contractor authorizes Parish to deduct from any payment due herein costs and service fees for recordation of this Contract in full or an excerpt hereof, or any revisions or modifications thereof as required by law.

10. AUTHORITY TO ENTER CONTRACT

The undersigned representative of Contractor warrants and personally guarantees that he/she has the requisite and necessary authority to enter and sign this Contract on behalf of the corporate entity, partnership, etc. The undersigned Parties warrant and represent that they each have the respective authority and permission to enter this Contract. In the event that Contractor is a member of a corporation, partnership, L.L.C., L.L.P., or any other juridical entity, the Parish requires, as an additional provision, that Contractor supply a certified copy of a corporate resolution authorizing the undersigned to enter and sign this Contract. Another option to fulfill this additional provision he/she can supply Louisiana Secretary of State Business filings confirming that he/she is a managing member of a

corporation, partnership, L.L.C., L.L.P., or any other juridical entity which authorizes the undersigned to enter and sign this Contract.

In Witness thereof, the Parties hereto on the day and year first above written have executed this Contract in **One (1)** counterparts, each of which shall, without proof or accountancy for the other counterparts, be deemed an original thereof.

WITNESSES:

_____
Signature

_____
Print Name

_____
Signature

_____
Print Name

CONTRACTOR:

_____
Signature

_____
Print Name

_____
Title

_____
Date

Bond No.:_____

WITNESSES:

_____
Signature

_____
Print Name

_____
Signature

_____
Print Name

ST. TAMMANY PARISH GOVERNMENT:

_____
Michael B. Cooper
Parish President

_____
Date

APPROVED BY:

_____
Assistant District Attorney- Civil Division

_____
Date

_____
(Surety)

_____
Signature

_____
Print Name

Section 12

Department of the Treasury (DOT) & American Rescue Plan Act (ARPA)
Federal Contract Clauses
WATER SECTOR PROGRAM
31 CFR Part 35 Subpart A

1. EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:
Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

(4) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.
The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided,* That if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.
The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.
The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon
contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

2. DAVIS-BACON ACT, as amended (40 U.S.C. 3141-3148). When required by Federal program legislation, all prime construction contracts in excess of $2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

3. COMPLIANCE WITH THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT.
(1) *Overtime requirements*. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less

than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
(2) *Violation; liability for unpaid wages; liquidated damages*. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
(3) *Withholding for unpaid wages and liquidated damages*. The Parish shall upon its own action or upon written request of an authorized representative of the Department of Labor or U.S. Treasury withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.
(4) *Subcontracts*. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

4. RIGHTS TO INVENTIONS MADE UNDER A CONTRACT OR AGREEMENT
If the Federal award meets the definition of "funding agreement" under 37 CFR § 401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

5. CLEAN AIR ACT
(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C.§ 7401 *et seq*.
(2) The Contractor agrees to report each violation to the Parish and understands and agrees that the Parish will, in turn, report each violation as required to assure notification to the federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
(3) The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by ARPA.

6. FEDERAL WATER POLLUTION CONTROL ACT
(1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 7401 *et seq.*
(2) The Contractor agrees to report each violation to the Parish and understands and agrees that the Parish will, in turn, report each violation as required to assure notification to the Federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
(3) The Contractor agrees to include these requirements in each subcontract exceeding $150,000 financed in whole or in part with Federal assistance provided by ARPA.

7. SUSPENSION AND DEBARMENT

(1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).

(2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

(3) This certification is a material representation of fact relied upon by the Parish. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to the Parish, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

(4) The bidder or proposer agrees to comply with the requirements of2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

8. BYRD ANTI-LOBBYING ACT

The Contractor will be expected to comply with Federal statutes required in the Anti-Lobbying Act. Contractors who apply or bid for an award of more than $100,000 shall file the required certification. Each tier certifies to the tier above that it will not and has not used federally appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the federal awarding agency.

9. PROCUREMENT OF RECOVERED MATERIALS

In the performance of this Contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired—

i. Competitively within a timeframe providing for compliance with the Contract performance schedule;

ii. Meeting Contract performance requirements; or

iii. At a reasonable price.

Information about this requirement, along with the list of EPA-designate items, is available at EPA's Comprehensive Procurement Guidelines web site, https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

10. PROHIBITION ON CONTRACTING FOR COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES.

(a) *Definitions.* As used in this clause, the terms backhaul; covered foreign country; covered telecommunications equipment or services; interconnection arrangements; roaming; substantial or essential component; and telecommunications equipment or services have the meaning as defined in Public Law 115-232, section 889, Prohibitions on Expending ARPA Award Funds for Covered Telecommunications Equipment or Services (Interim), as used in this clause—

(b) *Prohibitions.*

(1) Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of an executive agency on or after Aug.13, 2020, from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons.

(2) Unless an exception in paragraph (c) of this clause applies, the contractor and its subcontractors may not use grant, cooperative agreement, loan, or loan guarantee funds from a federal Agency to:
(i) Procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;
(ii) Enter into, extend, or renew a contract to procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system;
(iii) Enter into, extend, or renew contracts with entities that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system as described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities). (a) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities). (bi) Telecommunications or video surveillance services provided by such entities or using such equipment. (c) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country; or
(iv) Provide, as part of its performance of this contract, subcontract, or other contractual instrument, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.
(3) In implementing the prohibition under Public Law 115-232, section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.
(4) See Public Law 115-232, section 889 for additional information.
(5) See also § 200.471.
(c) *Exceptions.*
(1) This clause does not prohibit contractors from providing—
(i) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or
(ii) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.
(2) By necessary implication and regulation, the prohibitions also do not apply to:
(i) Covered telecommunications equipment or services that:
i. Are *not used* as a substantial or essential component of any system; *and*
ii. Are *not used* as critical technology of any system.
(ii) Other telecommunications equipment or services that are not considered covered telecommunications equipment or services.
(d) *Reporting requirement.*
(1) In the event the contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the contractor is notified of such by a subcontractor at any tier or by any other source, the contractor shall report the information in paragraph (d)(2) of this clause to the recipient or subrecipient, unless elsewhere in this contract are established procedures for reporting the information.
(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(i) Within one business day from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.
(ii) Within 10 business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.
(e) *Subcontracts.* The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments.

11. DOMESTIC PREFERENCES FOR PROCUREMENTS.
As appropriate, and to the extent consistent with law, the contractor should, to the greatest extent practicable, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States. This includes, but is not limited to iron, aluminum, steel, cement, and other manufactured products.
For purposes of this clause:
Produced in the United States means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
Manufactured products mean items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

12. COMPLIANCE WITH FEDERAL EXECUTIVE ORDERS
This is an acknowledgement that American Rescue Plan Act will be used to fund the Contract only. The Contractor will comply will all applicable federal law, regulations, executive orders, policies, procedures, and directives.

13. NO OBLIGATION BY THE FEDERAL GOVERNMENT
The Federal Government is not a party to this Contract and is not subject to any obligations or liabilities to the non-Federal entity, Contractor, or any other party pertaining to any matter resulting from the Contract.

14. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS OR RELATED ACTS
The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor's actions pertaining to this contract.

15. CONTRACTING WITH SMALL AND MINORITY BUSINESSES, WOMEN'S BUSINESS ENTERPRISES, AND LABOR SURPLUS AREA FIRMS.
(a) Any party to this contract must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. These steps are also required for the hiring of any subcontractors under this contract.
(b) Affirmative steps must include:
(1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
(2) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
(3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;

(4) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises; and
(5) Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.

16. COPYRIGHT AND DATA RIGHTS

The Contractor grants to the Parish, a paid-up, royalty-free, nonexclusive, irrevocable, worldwide license in data first produced in the performance of this contract to reproduce, publish, or otherwise use, including prepare derivative works, distribute copies to the public, and perform publicly and display publicly such data. For data required by the contract but not first produced in the performance of this contract, the Contractor will identify such data and grant to the Parish or acquires on its behalf a license of the same scope as for data first produced in the performance of this contract. Data, as used herein, shall include any work subject to copyright under 17 U.S.C. § 102, for example, any written reports or literary works, software and/or source code, music, choreography, pictures or images, graphics, sculptures, videos, motion pictures or other audiovisual works, sound and/or video recordings, and architectural works. Upon or before the completion of this contract, the Contractor will deliver to the Parish data first produced in the performance of this contract and data required by the contract but not first produced in the performance of this contract in formats acceptable by the Parish.

Note:

Davis-Bacon Act is NOT applicable to this project.

Section 13

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED

A. The work under this contract consists of Furnishing and installing potable water filtration system, piping, equipment, controls, and accessories. Furnish and install chemical feed equipment and pumps. Construction of steel and concrete masonry unit filter/chemical storage building. Replacement of existing water well pumps and piping.

B. The Contractor shall furnish all labor, materials, equipment, tools, services, and incidentals to complete all work required by these specifications and as shown on the drawings.

C. The Contractor shall perform the work complete, in place and ready for continuous service, and shall include repairs, replacements, and restoration required as a result of damages caused during this construction.

D. The Contractor shall furnish and install all materials, equipment, and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

1.02 RELATED REQUIREMENTS

Section 01000: Special Project Procedures

1.03 CONTRACTS

The Contract consists of lump sum bid items. The lump sum price shall include all labor, materials, equipment and incidentals required to construct the work complete in place. No extras shall be granted for any additional work unless specifically defined as a unit price item.

1.04 WORK SEQUENCE

A. All work to be done under this contract shall be done with minimum inconvenience to the users of the sewer system. The Contractor shall coordinate his work with private property owners such that sewer service is maintained to all users to the maximum extent possible.

B. Construct work in stages to accommodate the Owner's use of the premises

during the construction period; coordinate the construction schedule and operations with the Owner's representative.

C. Construct the work in stages to provide for public convenience. Do not close off public use of facilities until completion of one stage of construction will provide alternative usage.

1.05 CONSTRUCTION AREAS

A. Contractor shall limit his use of the construction areas for work and storage to allow for:

1. Work by other contractors.
2. Owner use.
3. Public use.

B. Coordinate use of work site under direction of Engineer.

C. Assume full responsibility for the protection and safekeeping of products under this contract, stored on the site.

D. Move any stored products, under Contractor's control, which interfere with operations of the Owner or separate contractor.

E. Obtain and pay for the use of additional storage or work areas needed for operations.

1.06 OWNER OCCUPANCY

A. Owner will have full access to and use of all existing pump stations during the entire period of construction for the conduct of his normal operations. Cooperate with Owner's representative in all construction operations to minimize conflict, and to facilitate Owner usage.

B. Contractor shall at all times conduct his operations as to insure the least inconvenience to the general public.

PART 2 - PRODUCTS

2.01 MATERIAL CERTIFICATION

A. All material and equipment that may come in contact with drinking water shall be NSF certified; and proof of said certification shall be submitted to Engineer prior to supplying the material and equipment.
B. All materials and equipment shall comply with the appropriate AWWA

standard.

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 22 00

MEASUREMENT AND PAYMENT

PART 1. GENERAL

Payment for the various items of the Form of Proposal, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various item of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction. The Contractor is hereby on notice that no separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.

1.01. Mobilization

A. MEASUREMENT AND PAYMENT

1. Payment of the lump sum item Mobilization includes preparatory work and operations, including those necessary for movement of personnel, equipment, supplies, and incidentals to the project site; the establishment of offices, buildings, and other facilities necessary for work on the project; costs attributable to providing and installing erosion control measures; the cost of bonds and any required insurance; the cost of required permits and any other preconstruction expenses necessary for start of the work, excluding the cost of construction materials included in other bid items; and all incidentals necessary for a complete and working project not included elsewhere in the bid.

1.02. Earthwork & Site Improvements

A. MEASUREMENT AND PAYMENT

1. Payment of the lump sum item Earthwork & Site Improvements shall be full compensation for furnishing all equipment, labor, and materials required for site demolition/site preparation, removal or site debris and obstructions, excavation and backfilling for new building, site grading, surface restoration, construction of entrance driveway culvert, ramp, and concrete apron, construction of limestone access drives, construction of chain-link fences and gates, and all incidentals

required. Payment shall include full compensation for all work as shown in the Drawings and all work incidental thereto.

1.03. Sewer Lift Station & Force Main

A. MEASUREMENT AND PAYMENT

1. Payment of the lump sum item Sewer Lift Station & Force Main shall be full compensation for furnishing all Equipment, Labor, and materials required for installation of sewer grinder pump station, limestone base, excavation, installation of sewer force main including all utility offsets and fittings required, tie-in sewer force main to existing sewer lift station, and all incidentals required for complete working system. Payment shall include full compensation for all work as shown in the Drawings and all work incidental thereto.

1.04. Yard Piping & Well Pumps

A. MEASUREMENT AND PAYMENT

1. Payment of the lump sum item Yard Piping & Well Pumps shall be full compensation for all new well pumps, pump supports, pipe suports, above-ground ductile iron flanged pipe, valves, and fittings, trench excavation and embankment, underground ductile iron water pipe, underground C-900 PVC water pipe, ductile iron valves and fittings, thrust restraints, thrust blocking, tie-ins to existing lines, horizontal and vertical offsets, and all incidentals required for a complete and working system. Payment shall include full compensation for all work as shown in the Drawings and all work incidental thereto.

1.05. Chemical Feed System

A. MEASUREMENT AND PAYMENT

1. Payment of the lump sum item Chemical Feed System shall be full compensation for furnishing all Equipment, Labor, and materials required for excavation and embankment, chemical feed pipe, joints, fittings, tie-ins, chemical feed pumps, equipment, chemical storage tanks, chlorine and turbidity analyzers complete with sample and drain tubing and all ancillary equipment, and all incidentals required for a complete working system.. Payment shall include full compensation for all work as shown in the Drawings and all work incidental thereto.

1.06. Filter Building

A. MEASUREMENT AND PAYMENT

1. Payment of the lump sum Item Filter Building item shall be full compensation for furnishing all labor, materials equipment, and incidentals required to complete the following: Construction of steel and CMU building, including foundation, building slab, and structural and architectural building components. furnish, install, and test Potable Water Filter system including four (4) filter tanks with associated controls, piping, valves, and appurtenances, all piping and connections; furnish and install building electrical system, including electrical feeders, panels, equipment, controls, and appurtenances; furnish and install building mechanical system, including exhaust fans, air compressors, ductwork, piping, equipment, controls, and appurtenances; Furnish and install all architectural systems and equipment, including doors, hardware openings, stairs, handrails, safety equipment; Remove and dispose or salvage existing equipment as specified, complete as specified. Payment shall include full compensation for all work as shown on the Drawings and all work incidental thereto.

1.07. Site Electrical & Controls System

A. MEASUREMENT AND PAYMENT

1. Payment of the lump sum item Site Electrical & Controls System shall be full compensation for all labor, equipment and materials required for all tie-ins to electric meters, underground feeders, SCADA controls, panels, junction boxes, receptacles, concrete pads, footings, excavation and embankment, and any incidentals required for a complete working system. See electrical drawings. Payment shall include full compensation for all work as shown in the Drawings and all work incidental thereto.

1.08. Exploratory Excavation

A. MEASUREMENT AND PAYMENT

1. Payment of the unit price item for Exploratory Excavation shall be per each per proposal based on the actual number of excavations performed. Payment shall include all equipment and labor, reporting, documentation, sheeting/bracing, and all incidentals thereto. Payment for each exploratory execution includes and excavation area up to 5 feet long by feet wide and 5 feet deep.

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, WORKING DRAWINGS AND SAMPLES

PART 1. GENERAL

1.01. REQUIREMENTS INCLUDED

A. The Contractor shall submit to the Engineer for review and exception, if any, such drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this article called data), and material samples (hereinafter in this article called samples) as are required for the proper control of work, including but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications.

B. The Contractor is to maintain an accurate updated submittal log containing the following information:

1. Submittal Description and Number assigned.

2. Date to Engineer.

3. Date returned to Contractor (from Engineer).

4. Status of Submittal (Approved/Resubmit).

5. Date of Resubmittal and Return (as applicable).

6. Date material released (for fabrication).

7. Projected date of fabrication.

8. Projected date of delivery to site.

9. Status of O & M manuals submittal.

1.02. CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check all drawings, data, and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned

to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents.

B. Determine and verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.
4. Conformance with Specifications and indicate all variance from the Specifications.

C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.

D. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the Engineer, approved.

E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than seven (7) calendar days for checking and appropriate action from the time the Engineer receives them.

F. The Contractor shall submit two (2) copies of descriptive or product data submittals to complement shop drawings for the Engineer plus the number of copies that the Contractor requires. The Engineer/Owner will retain two (2) sets. Digital copies may be used in lieu of paper copies. A single digital copy may be provided instead of the multiple copies.

G. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by Engineer of the necessary Shop Drawings.

H. The Contractor shall utilize a Sequential Numbering System for submittals (1-999). Resubmittals or confirming material shall be assigned a letter next to the submittal number, i.e. A = second submittal, B = third submittal, etc.

1.03. ENGINEER'S REVIEW AND APPROVAL OF SHOP DRAWINGS

A. The Engineer's review and approval of drawings, data and samples submitted by the Contractor will cover only general conformity to the Specifications, external connections, and dimensions which affect the installation.

B. The review and approval of drawings and schedules will be general and shall not be construed:

1. As permitting any departure from the Contract requirements;

2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the drawings or schedules as submitted describe variations per subparagraph 1.04.D, and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed Drawings without noting any exception.

D. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.

E. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

F. The Engineer will review a submittal/resubmittal a maximum of three (3) times after which cost of review will be borne by the Contractor. The cost of engineering shall be equal to the Engineer's charges to the Owner under the terms of the Engineer's agreement with the Owner.

G. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes except upon written instructions from the Engineer.

H. No partial submittals will be reviewed. Submittals not complete will be

returned to the Contractor and will be considered "Not Approved" until resubmitted.

1.04. SHOP DRAWINGS

A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, erection and setting drawings and schedule drawings, HDD drill plans, manufacturer's scale drawings, and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature, and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above.

B. Drawings and schedules shall be checked and coordinated with the work of all trades involved before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.

C. Each Shop Drawing shall have a blank area 3 1/2 inches by 3 1/2 inches, located adjacent to the title block. The title block shall display the following:

1. Number and title of the drawing.

2. Date of drawing or revision.

3. Name of project building or facility.

4. Name of Contractor and subcontractor submitting drawing.

5. Clear identification of contents and location of the work.

6. Specification title and number.

D. If Drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the work in accordance with the Contract, even though such drawings have been reviewed.

E. Data on materials and equipment include, without limitation, materials and

equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish, and all other pertinent data.

F. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.

G. All manufacturers or equipment suppliers who propose to furnish equipment or products shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and has been in operation for a period of at least one (1) year if requested by Engineer.

H. Only the Engineer will utilize the color "red" in marking Shop Drawings submittals. The Contractor shall use the color "green" for his markings.

I. Before final payment is made, the Contractor shall furnish to Engineer three (3) sets of record shop drawings all clearly revised, complete and up to date showing the permanent construction as actually made for all reinforcing and structural steel, miscellaneous metals, process and mechanical equipment, yard piping, electrical system, and instrumentation system. A single digital copy may be provided instead of the multiple paper copies.

1.05. WORKING DRAWINGS

A. When used in the Contract Documents, the term "Working Drawings" shall be considered to mean the Contractor's plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, groundwater control systems, forming and false work for underpinning and for such other work as may be required for construction, but does not become an integral part of the Project.

B. Copies of Working Drawings as noted in subparagraph 1.05(A) above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least seven (7) calendar days (unless otherwise specified by the Engineer) in advance of their being required for work. The Engineer shall not review Working Drawings; however, he will retain the drawings as a reference to the plan and progress of the work.

C. All risks of error in the Working Drawings are assumed by the Contractor; the Owner and Engineer shall have no responsibility therefore.

1.06. SAMPLES

A. The Contractor shall furnish, for the approval of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until approved by the Engineer.

B. Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integral related parts and attachment devices.

2. Full range of color, texture and pattern.

3. A minimum of two samples of each item shall be submitted.

C. Each sample shall have a label indicating:

1. Name of Project.

2. Name of Contractor and Subcontractor.

3. Material or Equipment Represented.

4. Place of Origin.

5. Name of Producer and Brand (if any).

6. Location in Project.

(Samples of finished materials shall have additional marking that will identify them under the finished schedules.)

D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required in sub paragraph 1.06.B above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

E. Approved samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Approved samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the approved samples. Samples which failed testing or were not approved will be returned to the Contractor at his expense, if so requested at time of submission.

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION

SECTION 01 40 00

CONTROL OF WORK

PART 1 - GENERAL

1.01 WORK PROGRESS

The Contractor shall furnish personnel and equipment which will be efficient, appropriate, and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Proposal. If at any time such personnel or equipment appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the personnel and equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

The Contractor shall not enter or occupy private land outside of easements, except by permission of the Owner.

1.03 WORK LOCATIONS

Work shall be located substantially as indicated on the drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

1.04 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary fences, barricades or caution signs, lights, coverings and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of open trench, prohibiting stacking

excavated material in the street, and requiring that the trench shall not remain open overnight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all times when construction is not in progress.

1.05 DISTRIBUTION SYSTEMS AND SERVICES

A. The Contractor shall interrupt water, telephone, Cable TV, sewer, gas, or other related utility services and disrupt the normal functioning of the system as little as possible. He shall notify the Engineer well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made with the appropriate agency.

B. If it appears that utility service will be interrupted for an extended period, the Engineer may order the Contractor to provide temporary service lines. Inconvenience of the users shall be the minimum, consistent with existing conditions. The safety and integrity of the system is of prime importance in scheduling work.

1.06 TEST-PITS

Test pits for the purpose of locating underground pipelines or structures in advance of the construction shall be excavated and backfilled by the Contractor prior to commencement of construction. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer. This work shall be considered incidental to the construction and no additional payment will be made for exploration.

1.07 CARE AND PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Engineer.

B. Along the location of this work all fences, walks, brushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated by the Engineer as soon as

conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be re-graded and seeded.

C. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification of the Engineer. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods, using only approved tools and materials.

D. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the contract, and all costs in connection therewith shall be included in the lump sum price.

1.08 DUST CONTROL

A. Contractor shall be solely responsible for dust control during construction. Contractor shall provide dust control at the project site to limit loss of soil from the site during construction so as to not create a nuisance on the site or to neighbors.

B. Full compensation for dust control measures is included in the prices paid for the various items of work involved and no additional compensation will be paid.

1.09 WATER FOR CONSTRUCTION PURPOSES

A. In locations where public water supply is available, the Contractor may purchase water for all construction purposes.

B. The express approval of the St. Tammany Parish Department of Utilities shall be obtained in writing. Hydrants shall only be operated under the supervision of the Water Department personnel of the Parish. Contractor shall obtain a water meter from the Water Department and pay all fees involved with obtaining and using the public water supply.

1.10 MAINTENANCE OF FLOW

The Contractor shall, at his own cost, provide for the flow of sewers, drains, and water courses interrupted during the progress of the work, and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

1.11 CLEANUP

During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

1.12 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this contract shall cooperate with the General Contractor and his subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling, and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.13 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from damage in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions damaged shall be reconstructed by the Contractor at his own expense.

B. All structures shall be protected in a manner approved by the Engineer. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the guarantee period described in the contract.

1.14 MAINTENANCE OF SEWER HOUSE SERVICES

At all times continuous sewer service must be maintained to all house connections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 29

TESTING LABORATORY SERVICES

PART 1. GENERAL

1.01. REQUIREMENTS INCLUDED

A. The Contractor shall employ and pay for the services of an Independent Testing Laboratory to perform specified testing upon the recommendation of the Engineer. This shall include retesting for confirmation of compliance of reworked areas. The testing lab services will be used to verify soil compaction and concrete mix requirements.

B. The Contractor shall cooperate with the laboratories to facilitate the execution of their required services.

C. Employment of the laboratories shall in no way relieve the Contractor's obligations to perform the Work of the Contract.

D. The Contractor shall give a minimum of 24-hour notice to the Engineer so that preparations can be made for the testing laboratory services.

1.02. LABORATORY DUTIES

A. Cooperate with Engineer and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards.

2. Ascertain compliance of materials with requirements of Contract Documents.

C. Promptly notify Engineer and Contractor of observed irregularities or deficiencies of work or products.

D. Promptly submit five (5) copies of written report of each test and inspection to Engineer. A single digital copy can be submitted instead of the multiple paper copies. Each report shall include:

1. Date issued.

2. Project title and number.

3. Testing laboratory name, address, and telephone number.

4. Name and signature of laboratory inspector.

5. Date and time of sampling or inspection.

6. Record of temperature and weather conditions.

7. Date of test.

8. Identification of product and specification section.

9. Location of sample or test in the Project.

10. Type of inspection or test.

11. Results of tests and compliance with Contract Documents.

12. Interpretation of test results, when requested by Engineer.

E. Perform additional tests as required by Engineer or the Owner.

1.03. LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:

1. Release, revoke, alter, or enlarge on requirements of Contract Documents.

2. Approve or accept any portion of the Work.

3. Perform any duties of the Contractor.

1.04. CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel and provide access to Work.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete and other materials mixes which require control by the testing

laboratory.

D. Furnish incidental labor and facilities:

1. To provide access to Work to be tested.

2. To obtain and handle samples at the Project site or at the source of the product to be tested.

3. To facilitate inspections and tests.

4. For storage and curing of test samples.

E. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.

F. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.

PART 2. PRODUCTS (NOT USED)

PART 3. EXECUTION (NOT USED)

END OF SECTION

SECTION 01 60 00

MATERIAL AND EQUIPMENT

PART 1. GENERAL

1.01. REQUIREMENTS INCLUDED

A. Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type, and quality specified, or as specifically approved in writing by the Engineer.

3. Manufactured and Fabricated Products:

   a. Design, fabricate, and assemble in accord with the best engineering and shop practices.

   b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.

   c. Two or more items of the same kind shall be identical, by the same manufacturer.

   d. Products shall be suitable for service conditions.

   e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.02. APPROVAL OF MATERIALS

A. Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.

B. Within fifteen (15) days after the effective date of the Agreement, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications. The data shall comply with Paragraph 1.06 of this Section.

1.03. MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including five (5) copies to the Engineer.

1. Maintain one (1) set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

2. Do not proceed with work without clear instructions.

C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.04. TRANSPORTATION AND HANDLING

A. Arrange deliveries of Products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver Products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that Products are properly protected and undamaged.

B. Provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

1.05. STORAGE AND PROTECTION

A. Store Products in accord with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weathertight enclosures.

2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

3. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.

4. Store loose granular materials in a well drained area on solid surfaces to prevent mixing with foreign matter.

B. All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft, or damage of any kind whatsoever to the material or equipment.

C. Cement, sand, and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All miscellaneous steel and reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Precast concrete sections shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block, and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking, and spilling to a minimum.

D. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

E. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored Products to assure that Products are maintained under specified conditions and free from damage or deterioration.

F. Protection After Installation:

1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove coverings when no longer needed.

G. The Contractor shall be responsible for all material, equipment, and supplies sold and delivered to the Owner under this Contract until final inspection of the work and acceptance thereof by the Owner. In the event any such material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Owner.

H. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven (7) days after written notice to do so has been given, the Owner retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and any other costs associated with making the necessary corrections.

1.06. SUBSTITUTIONS AND PRODUCT OPTIONS

A. Products List:

1. Within fifteen (15) days after the Effective Date of the Agreement, submit to the Engineer a complete list of major products proposed to be used, with the name of the manufacturer and the installing subcontractor.

B. Contractor's Options:

1. For Products specified only by reference standard, select any product meeting that standard.

2. For Products specified by naming several Products or manufacturers, submit the Products or manufacturers named in the Contractors Bid, which complies with the specifications.

3. For Products specified by naming one or more Products or manufacturers and "or equal", Contractor must submit a request as for substitutions for any Product or manufacturer not specifically named.

C. Substitutions:

1. After the Effective Date of the Agreement the Engineer will consider written requests from Contractor for substitution of Products.

2. Submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:

    a. Comparison of the qualities of the proposed substitution with that specified.

    b. Changes required in other elements of the work because of the substitution.

    c. Effect on the construction schedule.

    d. Cost data comparing the proposed substitution with the Product specified.

    e. Any required license fees or royalties.

    f. Availability of maintenance service, and source of replacement materials.

3. The Engineer shall be the judge of the acceptability of the proposed substitution.

D. Contractor's Representation:

1. A request for a substitution constitutes a representation that Contractor:

    a. Has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified.

    b. Will provide the same warranties or bonds for the substitution as for the Product specified.

    c. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects.

    d. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

1.07. SPECIAL TOOLS

A. Manufacturers of equipment and machinery shall furnish any special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use. The Contractor shall preserve and deliver to the Owner these tools and instructions in good order no later than upon completion of the Contract.

1.08. (NOT USED)

1.09. (NOT USED)

1.10. (NOT USED)

PART 2. PRODUCTS (Not Used)

PART 3. EXECUTION (Not Used)

END OF SECTION

SECTION 01 89 13

SITE PREPARATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section covers clearing, grubbing, and stripping along the construction sites.

B. The Contractor shall clear and grub all of the area within the limits of construction or as required, which includes, but is not limited to, utility easements (servitudes). The width of the area to be cleared shall be reviewed by the Engineer prior to the beginning of any clearing.

C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances in force in the Parish. The contractor shall comply with all applicable sections of these ordinances.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 33: Earth Excavation and Backfill in Trenches

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CLEARING

The surface of the ground, for the area to be cleared and grubbed, shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish, and all other objectionable obstructions resting on or protruding through the surface of the ground. However, those trees which are designated by the Engineer shall be preserved as hereinafter specified. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, so as to provide for the safety of employees and others.

3.02 GRUBBING

Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs, and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding

through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

3.03 STRIPPING

In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all work is in place shall be disposed of by the Contractor.

3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris off site. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the contract prices for the various classes of work.

3.05 PRESERVATION OF TREES

Those trees which are designated for preservation by the Engineer shall be carefully protected from damage. The Contractor shall erect such barricades, guards, and enclosures as may be considered necessary for the protection of the trees during all construction operations.

3.06 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property along the route of the construction. Trees, shrubbery, gardens, lawns, and other landscaping, which in the opinion of the Engineer must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.

B. Improvements to the land, such as fences, walls, outbuildings, and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.

C. The Contractor shall clean up the construction site across developed private property directly after construction is completed, upon approval of the Engineer.

3.07 PRESERVATION OF PUBLIC PROPERTY

The appropriate paragraphs of Articles 17.01, 17.02 and 17.03 of these specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements, servitudes, and all other damaged areas.

END OF SECTION

SECTION 02 21 13.13

DISK BENCHMARK MONUMENTS

PART 1: GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and install in the locations as shown on the Drawings, the disk-type elevation benchmark monument as specified herein.

1.02 DESCRIPTION OF THE WORK

Disk benchmark shall be installed in the locations as shown on the Drawings.

1.03 QUALIFICATIONS

Disk benchmark and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The materials shall be installed in accordance with the best practices and methods and shall comply with these Specifications.

1.04 SUBMITTALS

A. Shop drawings shall be submitted to the Engineer and Owner for approval.
B. Submit to the Engineer, for approval, samples of all materials specified herein.

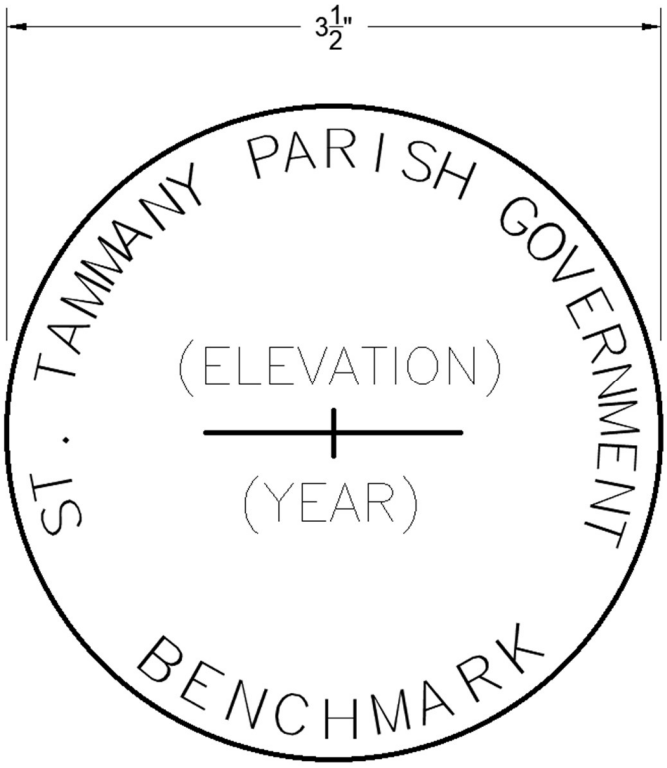
PART 2: PRODUCTS

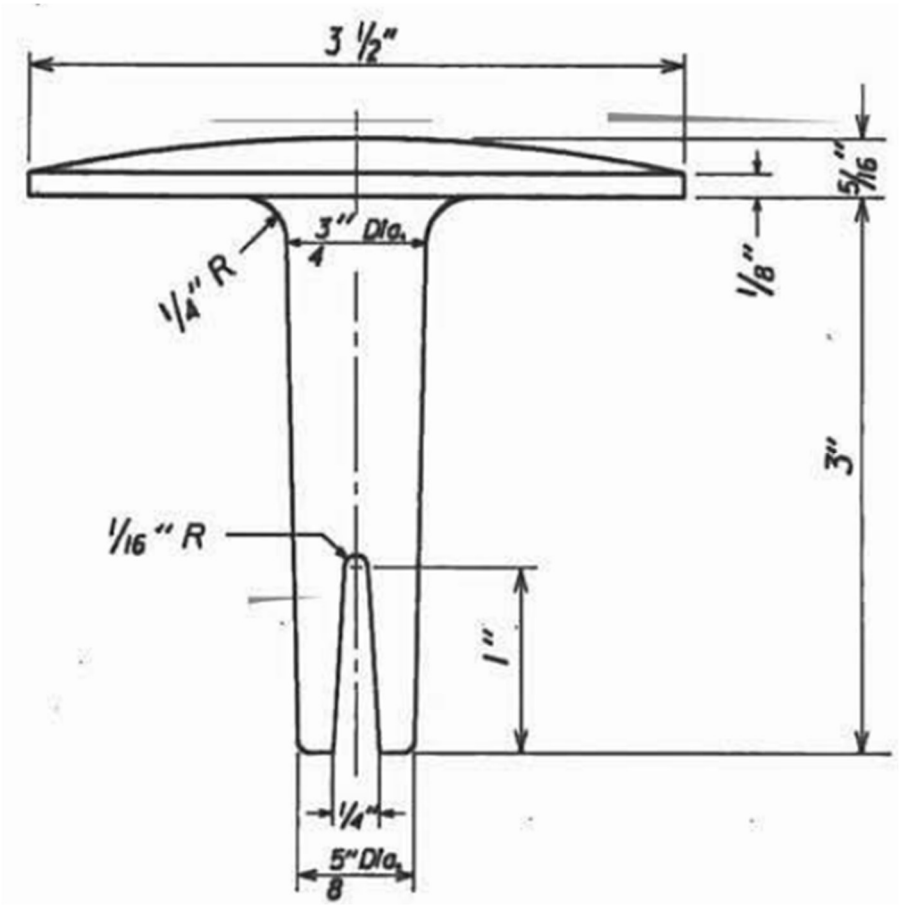
2.01 BENCHMARK MONUMENT

A. 3.5” diameter disk-type benchmark monument

1. Permanent benchmark disk with 3” stem (cast in concrete slab).
2. Disk Material: Aluminum.
3. At a minimum, the benchmark disk shall include the following lettering: St. Tammany Parish Government, Elevation of the benchmark in NAVD 88 datum, and the year of installation.
4. All lettering and lines shall be recessed into the disk so that it does not interfere with placement of a leveling rod.
5. Refer to sample drawings on the following page.

DISK BENCHMARK EXAMPLE DRAWINGS
N.T.S.



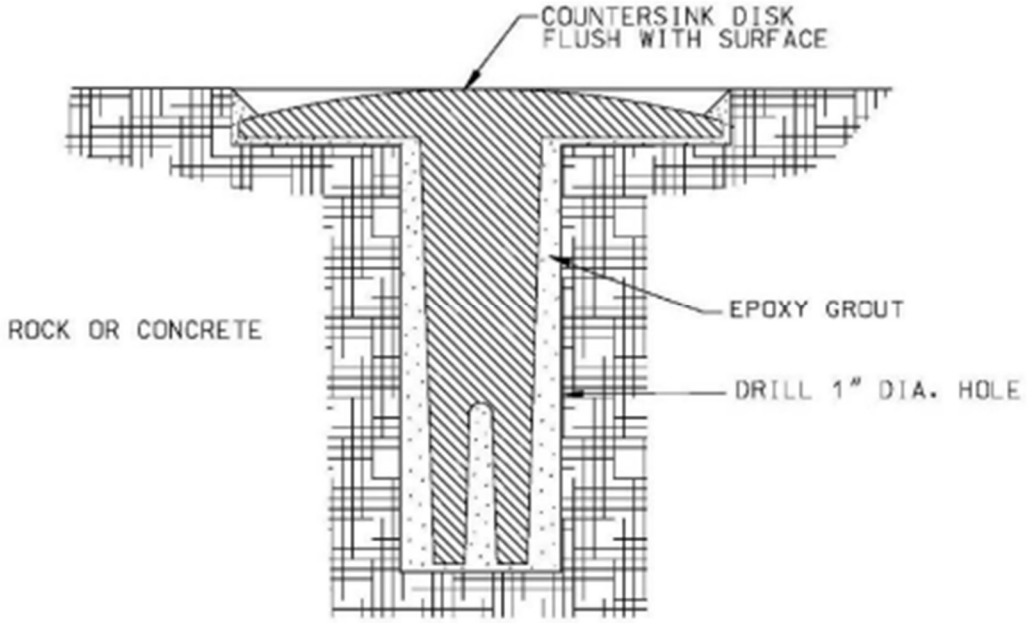


PART 3: EXECUTION

3.01 INSTALLATION

Set benchmark disk into concrete slab of building at location shown in the drawings and per the installation detail below. The monument shall be positioned and set by or under the responsible charge of a Louisiana licensed professional land surveyor.

Installation shall be in accordance with U.S. Army Corps of Engineers, Survey Markers and Monumentation Engineer Manual No. EM 1110-1-1002, and LADOTD Standard Specifications.



Typical Benchmark Disk Installation Detail

3.03 MEASUREMENT AND PAYMENT

No measurement will be paid. Payment for survey monuments will be included in the contract lump sum price for Filter Building.

END OF SECTION

SECTION 02 32 19

EXPLORATORY EXCAVATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and provide exploratory excavations as directed by Owner or Engineer and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 3 12 30: Earth Excavation and Fill

B. (Reserved)

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer an excavation plan for review prior to excavation.

B. Locations of existing utilities and all pertinent information obtained from performance of this work shall be reported to the Owner and Engineer timely and also depicted on the final as-built plans.

1.04 GENERAL REQUIREMENTS

A. This work consists of exploratory excavation at select locations determined by the Owner or Engineer within or near the project area, to determine the exact location, size, and type of existing water lines or utilities.

B. Exploratory excavation shall be performed immediately after permission has been granted to allow ample time for the Project Engineer to resolve any unforeseen conflicts. In addition, the Project Engineer and Owner will have the authority to modify and direct the timing, order, number and location of excavations to be performed.

PART 2 - PRODUCTS

2.01 MATERIALS (Not Used)

PART 3 - EXECUTION

3.01 EXPLORATORY EXCAVATION

A. Approval to proceed with each individual excavation shall be obtained in writing from the Project Engineer. Upon completion of the excavation and receipt of all pertinent data by the Project Engineer, a maximum of five (5) working days will be allowed to provide the Contractor with a resolution to any conflict.

B. The Contractor shall be solely responsible for providing accurate information obtained from the excavations to the Owner and Engineer. If inaccurate information provided by the Contractor causes delays or additional cost to the project, the Contractor will be solely responsible for such delays and additional cost.

C. Exploratory excavations shall be performed by open excavation and backfill with native excavated material or Vac-tron vacuum/pot-hole equipment. The Contractor will be responsible for determining if sheeting and bracing will be necessary for the excavation to ensure stability. Any sheeting placed shall be removed or cut off to an elevation 3 feet below finished ground elevation and left in place.

D. The Contractor shall be responsible for properly securing and marking the excavation site to maintain public safety at all times, in accordance with all applicable laws, regulations, and the contract plans and specifications. The Contractor shall be responsible for restoring the excavation site to original conditions as necessary as quickly as possible.

3.03 MEASUREMENT AND PAYMENT

A. Payment for exploratory excavations shall be per each per Proposal based on the actual number of excavations performed. Payment for exploratory excavations shall include all equipment and labor, reporting, documentation, sheeting/bracing, and all incidentals required. Payment for each exploratory excavation includes an excavation area up to 5 feet long by 5 feet wide, and up to 5 feet deep.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMS & ACCESSORIES

PART I - GENERAL

1.01 WORK INCLUDED

A. Wood formwork for cast-in-place concrete, complete with shoring, bracing, and anchorage.

B. Coordinate installation of items supplied by other sections of work.

1.02 RELATED WORK

A. Section 5 51 00: Structural Metal Framing

1.03 QUALITY ASSURANCE

Construct and erect concrete formwork in accordance with ACI 347-14 and applicable construction safety regulations for place of work.

1.04 REFERENCES

A. ACI 318 - 19 - Building Code Requirements for Reinforced Concrete.

B. ACI 347-14 - Recommended Practice for Concrete Formwork.

PART 2 - PRODUCTS

2.01 WOOD FORM MATERIALS

A. Plywood: Douglas Fir species; solid one side sheathing grade; sound undamaged sheets with clean true edges.

B. Lumber: Southern Pine species; No. 7 grade; with grade stamp clearly visible.

C. Nails, spikes, lag bolts, through bolts, anchorages: Sized as required; of sufficient strength and character to maintain formwork in place while pouring concrete.

2.02 PREFABRICATED FORMS

A. Steel type: Minimum 4 gage well matched, tight fitting, and adequately stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

B. Pan type: Removable of sizes and profiles required.

2.03 FORMWORK ACCESSORIES

A. Form ties: Snap-off metal type of fixed length; minimum working strength of 3000 psi when assembled; free of defects that will leave holes larger than one inch in concrete surface.

B. Form release agent: Colorless mineral oil which will not stain concrete or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Fillets of chamfered corners: Rigid foam plastic or wooden type; ¾" x ¾" size; maximum possible lengths.

2.04 ACCEPTABLE MANUFACTURERS

A. Acceptable manufacturers shall be an approved product listed in LADOTD QPL 29.

PART 3 - EXECUTION

3.01 FORMWORK ERECTION

A. Verify lines, levels, and centers before proceeding with formwork. Verify that dimensions agree with drawings.

B. Construct formwork, shoring and bracing to meet design and code requirements, so that resultant finished concrete conforms to required shapes, lines, and dimensions.

C. Arrange and assemble formwork to permit dismantling and stripping, so that concrete is not damaged during its removal.

D. Align joints and make watertight, to prevent leakage of mortar disfigured appearance of concrete. Keep form joints to minimum.

E. Obtain Engineer's review for use of earth forms. When using earth forms, hand-trim sides and bottoms, and remove loose dirt prior to placing concrete.

F. Arrange forms to allow stripping without removal of principal shores, where and when these are required to remain in place.

G. Obtain Engineer's review before framing openings in structural members, which is not indicated on drawings.

H. Provide bracing to ensure stability of formwork. Prop or strengthen previously constructed formwork liable to be overstressed by construction loads.

I. Provide chamfer strips on external corners of beams.

J. Construct formwork to maintain following maximum tolerances.

1. Deviation from horizontal and vertical lines.

a. 1/4 inch in 10 feet.
b. 3/8 inch in 20 feet.
c. 3/4 inch in 40 feet.

K. Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

L. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.02 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for pipes, conduits, sleeves, and other work embedded in and passing through concrete members.

B. Locate and set in place items which will be cast directly into concrete.

C. Coordinate work of other sections and cooperate with trade involved in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts. Do not perform work unless specifically indicated on drawings or reviewed prior to installation.

D. Install concrete accessories in accordance with manufacturer's recommendations; straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Place formed construction joints in pattern pouring sequence. Set top screed to required elevations. Secure to resist movement of wet concrete.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close temporary ports or openings with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

3.03 FIELD QUALITY CONTROL

A. Inspect and check completed formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and parts are secure.

B. Inform Engineer when formwork is complete and has been cleaned, to allow for inspection. Obtain review prior to placing concrete.

C. Allow Engineer to inspect each section of used formwork prior to reuse.

3.04 CLEANING

Clean forms as erection proceeds, to remove foreign matter. Remove cuttings, shavings, and debris from within forms. 'Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.05 FORM REMOVAL

A. Notify Engineer prior to removing formwork.

B. Do not remove forms, shores, and bracing until concrete has gained sufficient strength to carry its own weight, construction and design loads which are liable to be imposed upon it. Verify strength of concrete by compressive test results.

C. Remove formwork progressively and in accordance with code requirements and so that no shock loads or unbalanced loads are imposed on structure.

D. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.

E. Leave forms loosely in place, against vertical surfaces, for protection until complete removal is reviewed by Engineer

F. Store removed forms, for exposed architectural concrete, in manner that surfaces to be in contact with fresh concrete will not be damaged. Marked or scored forms will be rejected.

G. Re-shore structural members where required due to design requirements or construction conditions and as required to permit progressive construction. Remove load supporting forms only when concrete has attained 75 percent of required 28-day compressive strength, provided construction is re-shored.

H. Remove forms not directly supporting weight of concrete as soon as stripping operations will not damage concrete.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Reinforcing steel bars, welded steel wire fabric, and fabricated steel bar or rod mats for cast in place concrete, complete with tie wire.

B. Support chairs, bolsters, bars supports, spacers for reinforcing.

1.02 RELATED WORK

A. Section 3 30 00: Cast-in-Place Concrete

B. Section 3 35 00: Concrete Finishing

1.03 QUALITY ASSURANCE

A. Perform concrete reinforcing work in accordance with CRSI PRB unless specified otherwise in this section.

1.04 REFERENCES

A. ACI 318-19 Building Code Requirements for Reinforced Concrete

B. CRSI PRB Placing Reinforcing Bars

C. ASTM A185 Welded Steel Wire Fabric for Concrete Reinforcement

D. ASTM A615 Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

E. ASTM A616 Rail Steel Deformed and Plain Bars for Concrete Reinforcement

F. ASTM A617 Axle Steel Deformed and Plain Bars for Concrete Reinforcement

G. ASTM A497 – Steel Welded Wire Reinforcement, Deformed, for Concrete.

H. AWS D1.4 – Structural Welding Code, Reinforcing Steel.

I. ACI 315 - American Concrete Institute – Details and Detailing of Concrete Reinforcement.

1.05 SHOP DRAWINGS

A. Submit shop drawings in accordance with Section 01 61 00.

B. Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.

C. Prepare shop drawings under seal of Professional Structural Engineer registered in the State of Louisiana.

PART 2 – PRODUCTS

2.01 REINFORCING

A. Reinforcing steel: Comply with ASTM A615, Grade 60.

B. Welded steel wire fabric: Comply with ASTM A185.Submit shop drawings in accordance with Section 01 61 00.

2.02 ACCESORY MATERIALS

A. Tie wire: minimum 16 gauge annealed type, or patented system accepted by Engineer.

B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcing during construction conditions.

C. Special chairs, bolsters, bar supports, spacers (where adjacent to architectural concrete surfaces) plastic coated type; sized and shaped as required.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI 315-99.

B. Locate reinforcing splices, not indicated on drawings, at points of minimum stress. Location of splices shall be reviewed by Engineer.

C. Where indicated, weld reinforcing bars in accordance with AWS D1.4.

PART 3 – EXECUTION

3.01 CONCRETE PROTECTION FOR REINFORCEMENT

A. Place and hold steel reinforcement in position so the concrete cover, as measured from the surface of the bar, will be the following, except as otherwise specified or indicated on the Drawings:

Cast-in-place concrete (nonprestressed). The following minimum concrete cover shall be provided for reinforcement:

		Minimum Cover (inches)
a.	Concrete cast against and permanently exposed to earth	3
b.	Concrete exposed to earth or weather:	
	#6 Through #18 Bars…	2
	#5 bar, W31 or D31 wire, and smaller…	1 ½
c.	Concrete not exposed to weather or in contact with ground: slabs, walls, joints:	
	#14 and #18 bars…	1 1/2
	#11 bar and smaller	1 1/2
	Beams, columns: Primary reinforcement, ties, stirrups, spirals	1 1/2

Precast concrete (manufactured under plant control conditions) The following minimum concrete cover shall be provided for reinforcement:

a. Concrete exposed to earth or weather	
Wallpanels:	
#14 and #18 bars	1 1/2
#11 bar and smaller	3/4
Other Members:	
#14 and #18 bars	2

#6 through #11 bars	1 1/2
#5 bar, W31 or D31 wire, and smaller	1 1/4

b. Concrete not exposed to weather or in contact with ground:

slabs, walls, joints:	
#14 and #18 bars	1 1/4
#11 bar and smaller	5/8
Beams, columns:	
Primary reinforcement	Nominal Diameter of Bar, Wire
or	
	Strand but not less than 5/8 and need not exceed 1
Ties, stirrups, spirals	3/8

3.02 PLACING

A. Support and wire all reinforcing bars together to prevent displacement by construction loads or the placing of concrete beyond the tolerances specified. Use supporting concrete blocks on ground surfaces. Use concrete, metal, or plastic bar chairs, over forms. The portion of all accessories in contact with the formwork shall be plastic, galvanized or plastic coated where the concrete surface will be exposed to the weather in the finished structure, or where rust would impair architectural finishes.

B. Furnish and set templates for all column dowels to insure proper placement.

C. Splices, when approved by the Engineer, may be used at locations not shown on the Drawings. All splices shall comply with Standard Structural Details.

D. Reinforcement shall not be bent after being embedded in hardened concrete unless approved by the Engineer.

E. Bars may be moved as necessary to avoid interference with other reinforcing 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 subject to approval by the Engineer.

3.03 FIELD QUALITY CONTROL

A. Contractor shall furnish reinforcing steel mill certificates to Engineer for review.

B. The Contractor shall give the Engineer twenty four (24) hour notice of the completion of reinforcing steel setting, and sufficient time before the start of concrete placement to inspect the layout and for Contractor to make any required corrections.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

Contractor shall furnish all labor, materials, tools, equipment and related items required to do the cast-in-place concrete work as specified herein.

1.02 RELATED WORK

A. Section 03 10 00: Concrete Forming and Accessories

B. Section 03 20 00: Concrete Reinforcing

C. Section 5 50 51: Metal Fabrications

D. STP Gravity Sanitary Sewer General Standards Notes

E. STP Sanitary Sewer Force Main Standard Notes

F. STP Water Distribution System Standard Notes

1.03 QUALITY ASSURANCE

Perform cast-in-place concrete work in accordance with ACI 318-19, unless specified otherwise in this section.

1.04 TESTING LABORATORY SERVICES

A. Testing shall be performed in accordance with Section 03 30 53 of these Specifications.

1.05 REFERENCES

A. ASTM C33 - Concrete Aggregates

B. ASTM C150 - Portland Cement

C. ACI 318 - Building Code Requirements for Reinforced Concrete

D. ASTM C260 - Air Entraining Admixtures for Concrete

E. ASTM C494 - Chemical Admixtures for Concrete

F. ASTM C94 - Ready-Mixed Concrete

G. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

H. ACI 305 - Recommended Practice for Hot Weather Concreting

I. ACI 306 - Recommended Practice for Cold Weather Concreting

J. ACI 301 - Specifications for Structural Concrete

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement: Normal-Type II, High early strength-Type III, Portland type, ASTM C150.

B. Fine and Coarse Aggregates: ASTM C33. At the time of its use, the aggregate shall be free from all foreign material or dirt which may become mixed with the aggregate stockpile. If less than 2% of the fine aggregate passes a No. 100 sieve, limestone dust shall be added to provide this minimum percentage.

C. Water: Clean, fresh and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

2.02 ADMIXTURES

Each of the following admixtures shall be used when required and shall be used when so instructed by the Owner. They shall comply with the appropriate specifications as indicated.

A. Air Entrainment: ASTM C260.

B. Chemical: ASTM C494 Type A - water reducing and Type B - retarding admixture.

2.03 ACCEPTABLE MANUFACTURERS

The Acceptable Manufacturers of ready mix concrete must have sufficient plant capacity and ready mix transportation trucks to insure a continuous delivery to the job site; the rate should be such that the interval between batches shall not exceed 20 minutes. The methods of delivering the concrete shall be such that they will

facilitate its placing with a minimum of rehandling and without damaging the concrete or its forms.

2.04 ACCESSORIES

A. Bonding Agent: Two component modified epoxy resin; Non-solvent two component polysulphide-epoxy; Mineral filled polysulphide polymer epoxy resin. Acceptable manufacturers shall be an approved product listed in LADOTD QPL 32.

B. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 2 days and 7000 psi in 28 days.

2.05 CONCRETE MIXES

A. Mix concrete in accordance with ASTM C94.

B. Provide concrete of following strength:

1. Compressive strength 4,000 psi.

2. Select proportions for normal weight concrete in accordance with ACI 301 3.8 by Method 1, Method 2, or Method 3. Add air entraining agent to concrete to entrain air as indicated in ACI 301-2021 Table 3.4.1.

C. Add air entraining agent to concrete mix for concrete work exposed to exterior.

D. Weather Conditions

1. Cold Weather

a. The minimum temperature of the concrete when delivered at the site of the work shall conform to the following temperature limitation:

Minimum Concrete
Temperature, Degrees F.

Air Temperatures Degrees F.	For Sections Less than 12 in. thick	For Sections 12 in. to 36 in. thick
30 to 45	60	50
0 to 30	65	55
Below 0	70	60

2. Provisions shall be made for maintaining concrete moist and at a minimum temperature of not less than 50°F for a period of at least 7 days.

3. Hot Weather

a. The maximum temperature of the concrete when delivered at the site of the work shall not exceed 85 degrees Fahrenheit.

b. The ingredients shall be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for all or part of the mixing water if necessary to maintain the temperature of the concrete below 85 degrees Fahrenheit.

c. A retarding agent complying with ASTM C-494 Type B shall be used under the following circumstances:

i. If the temperature of the air is above 85 degrees Fahrenheit.

ii. If the temperature of the concrete as placed is above 80 degrees Fahrenheit.

iii. Where large pours are permitted, to allow all portions to remain plastic until adjacent concrete is placed.

2.05 CIP CONCRETE SANITARY SEWER STRUCTURES

A. CIP concrete used in sewer structures shall be waterproofed with a crystalline concrete waterproofing additive. The concrete waterproofing admixture shall be of the cementitious crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete.

B. The design shall include the use of the crystalline waterproofing repair materials that generate a non-soluble crystalline formation in the concrete.

C. The waterproofing product shall be Xypex Admix C-1000R at a rate of 20 lbs. per cubic yard containing red dye, to ensure detection in the final concrete product, as manufactured by Xypex Chemical Corporation, Richmond, B.C., Canada, or an equivalent material as approved by the Engineer. For finishing of cut outs, repairs and patching, Xypex Concentrate or an approved equivalent shall be applied as indicated below. Concrete used in wet wells, structures within one hundred feet (100’) of wet wells, structures eight feet (8') or greater in depth and structures

with force main discharges shall be additionally fortified with Conshield.

D. For exposed concrete Xypex Admix C1000 at a rate of 15 pounds per cubic yard, no dye shall be used. The Contractor shall supply documentation that Xypex was added at the plant. Concrete used in wet wells, structures within one hundred feet (100') of wet wells, structures eight feet (8') or greater in depth and structures with force main discharges shall be additionally fortified with Conshield.

E. Fiberglass, polymer concrete by; "U.S. COMPOSITE PIPE, INC." or approved equal, or concrete "fortified with Conshied" (in addition to Xypex), is required for lift station wet wells.

PART 3 - EXECUTION

3.01 PLACING CONCRETE

A. Place concrete in accordance with ACI 304-2022.

B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

C. Verify anchors, seats, plates, and other items to be cast into concrete are placed, held securely, and will not cause hardship in placing concrete. Rectify same and proceed with work.

D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

E. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.

F. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.

G. Conform to ACI 305.1-14 when concreting during hot weather.

H. Conform to ACI 306-2021 when concreting during cold weather.

3.02 PATCHING

Allow Engineer to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed.

3.03 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required lines, details and elevations.

B. Repair or replace concrete not properly placed resulting in excessive honeycombing and other defects. Do not patch, fill touch-up, repair, or replace concrete except upon express direction of Engineer for each individual area.

3.04 CURING AND PROTECTION

Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

END OF SECTION

SECTION 03 30 53

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install cast-in-place concrete complete as shown on the drawings and as specified herein.

B. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Sidewalks
2. Driveways

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 3 23 00: Earth Excavation and Fill

B. (Reserved)

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast- furnace slag, and silica fume; subject to compliance with requirements.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Engineer.

E. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement
6. Waterstops.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Semirigid joint filler.
12. Joint-filler strips.
13. Repair materials.

F. Material Test Reports: For the following, from a relevant testing agency, indicating compliance with the requirements. Compliance reports shall be admissible and should be sent to the Engineer for approval before starting any work under the contract.

1. Aggregates.

G. Field quality-control reports.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI- certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete,"
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: The contractor will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS

1.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

1.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

C. Deformed-Steel Wire: ASTM A 496/A 496M.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.02 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless- steel bar supports.

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II, gray:

a. Fly Ash: Not Allowed
b. Ground Granulated Blast- Furnace Slag: Not Allowed

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.3 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be

compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
c. Euclid Chemical Company (The), an RPM company; [ARRMATECT] [EUCON BCN] [EUCON CIA].
d. Grace Construction Products, W. R. Grace & Co.; DCI.
e. Sika Corporation; Sika CNI.
f. Scofield, L. M. Company.
g. Solomon Colors, Inc.

2.4 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: Monofilament or fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long. For interior first floor and second floor slabs. Not required for spread footings or grade beams that are not poured monolithically with the slab at the foundation. Add to mix at a rate of 2 lbs/CY

2.5 VAPOR RETARDERS

Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10

mils (0.25 mm) thick

2.6 CURING MATERIALS

A. Water: Potable.

B. **Slab pours shall require a 7 day continuous wet cure**.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

C. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

D. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.8 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling

product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate,

conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use high-range water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete and concrete with a water- cementitious materials ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings & Grade Beams: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.44
3. Slump Limit: 4 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.

2. Minimum Cementitious Materials Content 540 lb/cu. yd.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 0%, plus or minus 1 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Maximum Water- Cementitious Material Ratio: 0.44
6. Syntheic Micro-Fiber: Uniformly dispersed in concrete mixture at a rate of 2 lb/cu. yd..

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size,

shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place

concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

D. Provide adequate reshoring to support construction without excessive stress or deflection.

3.4 STEEL REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute’s (CRSI) "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing

bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints with 5/8" diameter smooth dowels x 24" @ 18" OC or as indicated on the drawings. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam- girder intersection.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Slab Pours shall be limited to 10,000 square feet.

B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straight edge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open- textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing

antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view. Retain rubbed finish in first paragraph below with smooth-formed finish in paragraph above.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular

texture.

1. Apply float finish to surfaces to receive trowel finish to be covered with fluid- applied or sheet waterproofing.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:

   a. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.

D. Slip-Resistive Finish (If called for): Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, exterior platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in- place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.10 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-

weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.

   b. Continuous water-fog spray.

3.11 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's

durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written

instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4- inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used,

subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: The contractor will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing and Inspections:

1. Steel reinforcement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

a. When frequency of testing will provide fewer than five compressive-

strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens

    for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory- cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from

    a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory- cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and

materials, compressive breaking strength, and type of break for both 7- and 28- day tests.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.14 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer

3.15 MEASUREMENT AND PAYMENT

A. Payment for cast-in-place concrete shall be included in applicable lump sum pay items.

END OF SECTION

SECTION 03 35 00

CONCRETE FINISHING

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment, and incidentals required to finish cast-in-place concrete surfaces as specified herein.

1.02 RELATED WORK

A. Patching and repair of defective and honeycombed concrete is included in Section 3 33 00.

1.03 SUBMITTALS

Submit to the Engineer as provided in the General Conditions and Section 3 30 00, the proposed chemical hardener manufacturers' surface preparation and application procedures.

1.04 SCHEDULE OF FINISHES

A. Concrete for the project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another section.

B. The base concrete for the following conditions shall be finished as noted and as further specified herein:

1. Concrete to receive waterproofing and dampproofing - Off-form finish.

2. Exterior exposed concrete slabs, walkways and stairs - broomed finish.

3. Concrete on which liquids flow - steel trowel finish.

4. Concrete where not exposed in the finished work and not scheduled to receive an additional applied finish or material - Off-form finish.

1.05 RESPONSIBILITY FOR CHANGING FINISHES

A. The surface finishes specified for concrete to receive additional applied finishes or materials are the finishes required for the proper application of the actual products specified under other sections. Where different products are approved for use, it

shall be the Contractor's responsibility to determine if changes in finishes are required and to provide the proper finishes to receive these products.

B. Changes in finishes made to accommodate products different from those specified shall be performed at no additional cost to the Owner. Submit the proposed new finishes and their construction methods to the Engineer for approval.

PART 2 - PRODUCTS

2.01 MATERIALS

Portland cement and component materials required for finishing the concrete surfaces shall be as specified in Section 3300.

PART 3 - EXECUTION

3.01 FORMED SURFACES

A. Forms shall not be stripped before the concrete has attained a strength of at least 30 percent (30%) of the ultimate design strength. This is equivalent to approximately "100-day degrees" of moist curing.

B. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers or corners when removing the forms or doing any work or work adjacent thereto.

C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.

D. Off-form finish. Fins and other projections shall be removed as approved. Tie cone holes and other minor defects shall have been filled under Section 3300.

3.02 FLOORS AND SLABS

A. Floors and slabs shall be screeded to the established grades and shall be level with a tolerance of 1/8" when checked with a 12' straightedge, except where drains occur, in which case floors shall be pitched to drains as indicated. Failure to meet either of above shall be cause for removal, grinding, or other correction as directed by the Engineer.

B. Following screeding as specified above, power steel trowel as follows:

1. Immediately after final screeding a dry cement/sand shake in the proportion of two (2) sacks of portland cement to 350 pounds of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 pounds per 1,000 square feet of floor. Neat,

dry cement shall not be sprinkled on the surface. This shake shall be thoroughly floated into the surface with an approved disc type power compacting machine weighing at least 200 pounds if a 20" disc is used or 300 pounds if a 24" disc is used. A mechanical blade-type float or trowel is not acceptable for this work.

Note: This operation (application of the cement/sand shake) may be eliminated at the discretion of the Engineer if the base slab concrete exhibits adequate fatness and homogeneity, and the need is not indicated.

2. In lieu of power steel troweling, small areas as defined by the Engineer shall be compacted by hand steel troweling with the dry cement/sand shake as ordered.

3. The floor or slab shall be compacted to a smooth surface and the floating operation continued until sufficient mortar is brought to the surface to fill all voids. The surfaces shall be tested with a straightedge to detect high and low spots which shall be eliminated.

4. Compaction shall be continued only until thorough densification is attained and a small amount of mortar is brought to the surface. Excessive floating shall be avoided.

C. After Paragraph 3.02-A and B procedures are accomplished, floors and slabs for particular conditions shall be completed as scheduled in one of the following finishes:

1. Wood float finish. Hand wood float, maintaining the surface tolerance to provide a grained, non-slip finish as approved.

2. Broomed finish. Hand wood float maintaining the surface tolerance and then broom with a stiff bristle broom in the direction of drainage to provide a non-slip finish as approved.

3. Steel trowel finish. Hand steel trowel to a perfectly smooth, hard even finish free from high or low spots or other defects as approved.

3.03 APPROVAL OF FINISHES

A. All concrete surfaces will be inspected during the finishing process by the Engineer.

B. Surfaces which, in the opinion of the Engineer, are unsatisfactory shall be refinished or reworked until approved by the Engineer.

END OF SECTION

SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Section Includes:

1) Concrete masonry units (CMU's).
2) Steel reinforcing bars.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315 R-18, "Details and Detailing of Concrete Reinforcement."

C. Samples: For each type and color of masonry unit.

1.03 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.

B. The contractor shall include in his bid price the cost of all testing as required by the plans and the specifications.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1) Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M-2007 for compressive strength, ASTM C 1506-2022 for water retention, and ASTM C 91 for air content.

2) Include test reports, according to ASTM C 1019-2018, for grout mixes required to comply with compressive strength requirement.

1.04 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1-2023/ASCE 6-2005/ TMS 402/602-22 unless modified by requirements in the Contract Documents.

B. Contractor shall include in his bid price the cost of all testing as required by the plans and the specifications.

C. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.

1) Build sample panels for each type of exposed unit masonry construction.

1.05 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1-23/ASCE 6-2005/TMS 602-22.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1-23/ASCE 6-2005/TMS 602-22.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.02 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Integral Water Repellent: Provide units made with liquid polymeric, integral water repellent admixture that does not reduce flexural bond strength for exposed units.

1) Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:

a. ACM Chemistries, Inc.; RainBloc.
b. BASF Aktiengesellschaft; Rheopel Plus.
c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block.

C. CMUs: ASTM C 90.

1) Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,150 psi (f'm = 2,150 psi)
2) Density Classification: Normal weight.

2.03 MASONRY LINTELS

A. General: Provide the following:

1) Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength of 2,750 psi (f'm = 3900 psi)

2.04 MORTAR AND GROUT MATERIALS

A. Mortar shall be Type "M"

B. Grout for CMU Blocks: 5,000 psi (min.)

C. Grout for lintels, headers, U-blocks: 5,000 psi (min.)

D. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement.

E. Hydrated Lime: ASTM C 207, 5000 psi.

F. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

G. Masonry Cement: ASTM C 91.

1) Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

a. Capital Materials Corporation; Flamingo Color Masonry Cement.
b. Cemex S.A.B. de C.V.; Essroc, Italcementi Group
c. Holcim (US) Inc.; Lafarge North America Inc.
d. Lehigh Cement Company; National Cement Company, Inc.; Coosa Masonry Cement.

H. Mortar Cement: ASTM C 1329-05.

1) Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

a. Lafarge North America Inc.

I. Coatings

1) Interior of Chemical Feed Room: All concrete Unit Masonry walls and concrete ceiling inside chemical feed room shall be coated with 2 coats of Tneme-Liner Series 61 chemical resistant coating by Tnemec, or approved equal. Minimum dry film thickness shall be 12 mils per coat. Color to be selected by Owner.

2.2 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M-22 or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M-22.

1) Interior Walls: Mill, carbon steel.

2) Exterior Walls: Mill, carbon steel.

3) Wire Size: W1.7 (9 gage)

4) Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.

5) Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

2.3 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1) Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
2) Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
3) Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1) Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
2) Metal Sealant Stop: Fabricate from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.

B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and

designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.6 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1) Do not use calcium chloride in mortar or grout.
2) Use portland cement-lime mortar unless otherwise indicated.
3) For exterior masonry, use portland cement-lime mortar.
4) For reinforced masonry, use portland cement-lime mortar.
5) Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1) Type M

D. Grout for Unit Masonry: Comply with ASTM C 476.

1) Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2) Proportion grout in accordance with ASTM C 476, for specified 28-day compressive strength indicated, but not less than 2000 psi.
3) Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 – EXECUTION

3.1 TOLERANCES

A. Dimensions and Locations of Elements:

1) For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2) For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3) For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1) For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2) For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3) For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4) For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5) For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1) For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2) For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3) For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.2 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

C. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

G. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1) With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2) With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3) With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4) With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.4 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1) Space reinforcement not more than 16 inches (406 mm) o.c.
2) Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.5 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:

1) Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2) Anchor masonry with anchors embedded in masonry joints and attached to structure.
3) Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.6 FLASHING

A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:
   1) Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
   2) At lintels, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
   3) Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
   4) Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.7 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

   1) Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2) Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1) Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2) Limit height of vertical grout pours to not more than 60 inches.

3.8 FIELD QUALITY CONTROL

A. Testing and Inspecting: Contractor will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the "International Building Code."

1) Begin masonry construction only after inspectors have verified proportions of site- prepared mortar.
2) Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3) Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, sampled and tested to verify conformance with ASTM C90

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.9 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1) Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2) Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.10 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil- contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1) Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 05 00

MISCELLANEOUS METAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install covers, grates, frames, manhole rungs, catch basin castings, lift station access hatches and other miscellaneous metal as shown on the drawings and specified herein. The miscellaneous metal items include, but are not limited to, the following:

1. Anchors or anchor bolts except those specified to be furnished with all equipment.

2. Cast iron frames, covers, grates.

3. Steel plates, angle frames, plates, and miscellaneous angles and channels as shown on the drawings.

4. Lift Station Access Hatches

1.02 RELATED WORK

(NOT USED)

1.03 COORDINATION

A. The work of this section shall be completely coordinated with the work of other sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this section before fabrication and installation of items herein specified.

B. Furnish to the pertinent trades all items included under this section that are to be built into the work of other sections.

1.04 SHOP DRAWINGS

Detail drawings, as provided for in the General Conditions and Section 01340, showing sizes of members, method of assembly, anchorage, and connection

to other members shall be submitted to the Engineer for approval before fabrication.

1.05 FIELD MEASUREMENTS

Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items. Contractor must coordinate access hatch opening and submersible pump configuration so that the pumps can be installed and removed through the hatch along the guide rails without any interference from the access hatch.

1.06 REFERENCE SPECIFICATIONS

Unless otherwise specified, materials shall conform to the following:

Anchor Rods & Threaded Rods	ASTM A36 / A573
Structural Steel	ASTM A529 / A529M
Welded and Seamless Steel Pipe	ASTM A53
Gray Iron Castings	ASTM A48, Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
MSS	ASTM A529 / A529M
Aluminum (extruded shapes)	ASTM B209, 6063 T5 (Alum. alloy)
Aluminum (extruded pipe)	ASTM B209, 6063 T6 (Alum. alloy)
Aluminum Sheet and Plate	ASTM B209, 6061 T6 (Alum. alloy)
Bolts and Nuts	ASTM A354 / A307 & ASTM A194
Stainless Steel Bolts, Bars, Shapes	AISI, Type 302
Stainless Steel Plate and Sheet	AISI, Type 304
Welding Rods for Steel	AWS Spec. for Arc Welding

PART 2 - PRODUCTS

2.01 ANCHORS, BOLTS, AND FASTENING DEVICES

A. Anchors, bolts, etc., shall be furnished as necessary for installation of the work of this section.

B. The bolts used to attach the various members to the anchors shall be the sizes shown or required.

C. For structural purposes, unless otherwise noted, expansion bolts shall be Wej-it "Ankr-Tite", Phillips Drill Co. "Wedge Anchors", or Hilti "Kwik-Bolt".

When length of bolt is not called for on the drawings, the length of bolt provided shall be sufficient to place the wedge portion of the bolt a minimum of one inch (1") behind the reinforcing steel within the concrete. Material shall be as noted on the drawings. Unless otherwise noted, all bolts and fasteners below grade or within the wet well shall be 316 stainless steel; all others shall be hot-dipped galvanized steel.

2.02 STEEL ITEMS

A. All hardware, chains, and cables shall be 316 stainless steel.

B. Miscellaneous steel pipe for sleeves and lifting attachments and other uses as required shall be Schedule 40 pipe fabricated according to the details as shown on the drawings.

C. Miscellaneous steel shall be fabricated and installed in accordance with the drawings and shall include; angles, support brackets, splice plates, anchor bolts; and any other miscellaneous steel called for on the drawings and not otherwise specified.

2.03 CAST IRON FRAMES AND COVERS

A. Heavy duty manhole frame and cover shall be as manufactured by East Jordan Iron Works, Inc., Pattern V-1402 or V1503 standard size or approved equal. Covers to have letters "SEWER" or "DRAIN" embossed on top, as required.

B. Valve Boxes

(NOT USED)

C. Catch Basins

Catch basin frames and covers shall be Vulcan Foundry No. V-4311-1 or approved equal, unless otherwise shown on the Drawings.

2.04 HATCHES

A. Direct Traffic Condition

The floor access doors shall be galvanized steel, AASHTO H20-44 wheel load rated. Manufacturer must provide structural calculations, stamped by a registered professional engineer, that certify that the door design meets the requirements of AASHTO H20-44.

Galvanized steel hatches shall be a minimum 1/2 inch thick slip resistant plate

reinforced to an AASHTO H20-44 wheel load with 30% impact factor. The frame shall be a minimum ½" inch thick steel angle with welded nelson stud anchors or other approved embedment anchors. The entire frame shall be supported by concrete or other material designed to support the cover loading. The frame and cover shall have recessed 316 SS special bolting to allow for Direct Continuous H20 Traffic Loading. The floor access door shall be equipped with a flush steel lifting handle that does not protrude above the cover. The floor access doors shall be equipped with 316 SS lifting assist mechanism(s) and automatic locking hold open arms. The doors shall have a watertight stainless steel slam lock operated by a removable key from the outside and by a fixed handle inside. The doors shall have a recessed staple for padlock consisting of a fabricated steel box and a hinged lid with bolt lock for access to the padlock. A steel skirt shall be welded to the frame to provide a combined height equal to the depth of the concrete slab. The floor access doors and frame shall be hot-dipped galvanized after fabrication. The Hatch Access unit shall also incorporate a fall through protection system consisting of hinged aluminum safety grating with lifting handle(s) and 316 SS hardware. The Installation shall be in accordance with the manufacturer's attached instructions. Manufacturer shall guarantee against defects in materials and workmanship for a period of five (5) years.

B. In Direct Traffic Condition

The floor access doors and frame material shall be aluminum and AASHTO H-20 wheel load rated. Approved manufactures are U.S.F Fabrication, Inc., Babcock Davis, LW Products or approved equal. Manufacturer must provide structural calculations, stamped by a registered professional engineer, that certify that the door design meets the requirements of AASHTO H20. Door leafs shall be a minimum ¼ inch thick aluminum slip resistant plate reinforced to an AASHTO H-20 wheel load. The frame shall have sufficient anchors for concrete embedment. The entire frame shall be supported by concrete or other material designed to support the cover loading. The floor access door shall be equipped with a flush 316 SS lifting handle that does not protrude above the cover. The floor access doors shall be equipped with 316 SS lifting assist mechanism(s) and automatic locking hold open arms. The doors shall have a watertight stainless steel slam lock operated by a removable key from the outside and by a fixed handle inside. The doors shall have a recessed staple for padlock consisting of a fabricated box and a hinged lid with bolt lock for access to the padlock. A aluminum skirt shall be welded to the frame to provide a combined height equal to the depth of the concrete slab. The Hatch Access unit shall also incorporate a fall through protection system consisting of hinged aluminum safety grating with lifting handle(s) and 316 SS hardware. The Installation shall be in accordance with the manufacturer's attached instructions. Manufacturer shall guarantee against defects in materials and workmanship for a period of five (5) years.

PART 3 - EXECUTION

3.01 FABRICATION

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.

B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connections to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.

C. Welded joints shall be rigid and continuously welded or spot welded as specified or shown. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.

D. Welding of parts shall be in accordance with the Standard Code for Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the Engineer. All welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.

E. Welding of aluminum shall conform to the applicable provisions of the AA-30 for aluminum structures. The general recommendations and regulations of AWS D1.1 as applicable shall apply to welded aluminum.

F. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the Engineer. All finished surfaces shown on the drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95 percent of the theoretical weight computed from the dimensions shown. The Contractor shall provide facilities for weighing castings in the presence of the Engineer showing true weights, certified by the supplier.

G. All steel finish work shall be thoroughly cleaned, by effective means, of all loose mill scale, rust, and foreign matter before shipment and shall be given one shop coat of primer compatible with finish coats specified in Painting

Section after fabrication but before shipping. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces. Abrasions in the field shall be touched up with primer immediately after erection.

H. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Following all manufacturing operations, all items to be galvanized shall be thoroughly cleaned, pickled, fluxed, and completely immersed in a bath of molten zinc. The resulting coating shall be adherent and shall be the normal coating to be obtained by immersing the items in a bath of molten zinc and allowing them to remain in the batch until their temperature becomes the same as the bath. Coating shall be not less than 2 oz. per sq. ft. of surface.

3.02 INSTALLATION

A. All steel surfaces to come in contact with exposed concrete shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.

B. Where aluminum contacts a dis-similar metal, apply a heavy brush coat of zinc-chromate primer followed by two coats of aluminum metal and masonry paint to the dis-similar metal.

C. Where aluminum contacts concrete, apply a heavy coat of approved alkali resistant paint to the concrete.

END OF SECTION

SECTION 05 45 00

METAL SUPPORT ASSEMBLY

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals and install pipe hangers, supports, concrete inserts, and anchor bolts including all metallic hanging and supporting devices for supporting exposed piping.

1.02 RELATED WORK

A. Concrete is included in Sections 3 31 00, 3 20 00 and 3 30 00.

B. Painting is included in Section 9 90 00.

C. Pipe and fittings are included in Section 5 50 00.

1.03 QUALIFICATIONS

A. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for pipe supports shall be five (5) times the ultimate tensile strength of the material, assuming ten feet (10') of water-filled pipe being supported.

B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification stating that such requirements have been complied with.

1.04 SUBMITTALS

A. Submit to the Engineer for approval, as provided in the General Conditions and Section 01 33 00, shop drawings of all items to be furnished under this section.

B. Submit to the Engineer, for approval, samples of all materials specified herein.

PART 2 - PRODUCTS

2.01 GENERAL

A. All pipe and tubing shall be supported as required to prevent significant stresses in the pipe or tubing material, valves, and fittings and to support and secure the pipe in the intended position and alignment. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. All pipe supports shall be approved prior to installation.

B. All materials used in manufacturing hangers and supports shall be capable of meeting the respective ASTM Standard Specifications with regard to tests and physical and chemical properties, and be in accordance with MSS SP-58.

C. Hangers and supports shall be spaced in accordance with ANSI B31.1.0 except that the maximum unsupported span shall not exceed ten feet (10') unless otherwise specified herein.

D. Unless otherwise specified herein or shown on the drawings, pipe hangers and supports shall be as manufactured by Grinnell Co., Inc., Carpenter and Patterson, Inc., or equal. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance will be considered for approval. Shop fabrication of supports will be allowed provided adequate details of such are submitted to the Engineer for approval.

2.02 PIPE HANGERS AND SUPPORTS FOR METAL PIPE

A. Suspended single pipes shall be supported by hangers suspended by steel rods from galvanized concrete inserts, beam clamps, or ceiling mounting bolts as follows:

1. Hangers:

Pipe size, inches	Grinnell Fig. No.
Less than 1/2	138R
1/2 through 1	97C
1 through 4	104
6 through 12	590
14 through 30	171

2. Hanger rods shall be rolled steel machine threaded with load ratings conforming to ASTM Specifications and the strength of the rod shall be

based on root diameter. Hanger rods shall have the following minimum diameters.

Pipe Size, inches	Min. Rod Diameter, inch
Less than 2-1/2	3/8
2-1/2 through 4	1/2
4	5/8
6	3/4
8-12	7/8
14-18	1
20-30	1-1/4

3. Where applicable, structural attachments shall be beam clamps. Beam clamps, for rod sizes 1/2" through 3/4", shall be equal to Grinnell Fig. No. 229, and for rod sizes 7/8" through 1-1/4" shall be equal to Grinnell Fig. No. 228, or equal.

4. Concrete inserts for pipe hangers shall be, continuous metal inserts designed to be used in ceilings, walls or floors, spot inserts for individual pipe hangers, or ceiling mounting bolts for individual pipe hangers and shall be as manufactured by Unistruct Corp., Wayne, Michigan; Carpenter and Patterson, Inc., Laconia, New Hampshire, or equal, and shall be as follows:

   a. Continuous concrete inserts shall be used where applicable and/or as shown on the drawings and shall be used for hanger rod sizes up to and including 3/4" diameter. Inserts to be used where supports are parallel to the main slab reinforcement shall be Series P3200 by Unistruct Corp., Fig. 1480 Type 2 by Carpenter and Patterson, Inc., or equal. Inserts to be used where supports are perpendicular to the main slab reinforcement shall be Series P3300 by Unistruct Corp., Fig. 1480 Type 1 by Carpenter and Patterson, Inc., or equal.

   b. Spot concrete inserts shall be used where applicable and shall be used for hanger sizes up to and including 7/8" diameter. Inserts shall be Fig. 650 by Carpenter and Patterson, Inc. for hanger rod sizes 1/2" through and including 3/4", and Fig. 266 by Carpenter and Patterson, Inc. for 7/8" hanger rods.

   c. Ceiling mounting bolts shall be used where applicable and be for hanger rod sizes 1" through and including 1-1/4" and shall be Fig. 104M as manufactured by Carpenter and Patterson, Inc., or equal.

5. All pipe hangers shall be capable of vertical adjustment under load and

after erection. Turnbuckles, as required and where applied, shall be equal to Grinnell Fig. No. 230.

B. Wall or column supported pipes shall be supported by welded steel brackets equal to Grinnell Fig. 194, 195 and 199 as required for pipe sizes up to and including 20" diameter. Additional wall bearing plates shall be provided where required.

1. Where the pipe is located above the bracket, the pipe shall be supported by an anchor chair and U-bolt assembly supported by the bracket for pipes 4" and larger and by a U-bolt for pipes smaller than 4". Anchor chairs shall be equal to Carpenter and Patterson Fig. No. 127. U-bolts shall be equal to Grinnell Fig. 120 and 137.

2. Where the pipe is located below the bracket, the pipes shall be supported by pipe hangers suspended by steel rods from the bracket. Hangers and steel rods shall be as specified above.

3. Wall or column supported pipes 2" and smaller may be supported by hangers equal to Carpenter and Patterson Fig. 74, 179 or 237 as required.

C. Floor supported pipes 3" and larger in diameter shall be supported by either cast-in-place concrete supports or adjustable pipe saddle supports as directed by the Engineer. In general, concrete supports shall be used when lateral displacement of the pipes is probable (unless lateral support is provided), and adjustable pipe saddle type supports shall be used where lateral displacement of the pipes is not probable.

1. Each concrete support shall conform to the details shown on the drawings. Concrete shall be poured after the pipe is in place with temporary supports. Top edges and vertical corners of each concrete support shall have 1" bevels. Each pipe shall be secured on each concrete support by a wrought iron or steel anchor strap anchored to the concrete with cast-in-place bolts or with expansion bolts. Where directed by the Engineer, vertical reinforcement bars shall be grouted into drilled holes in the concrete floor to prevent overturning or lateral displacement of the concrete support. Unless otherwise approved by the Engineer, maximum support height shall be five feet (5').

2. Concrete piers used to support base elbows and tees shall be similar to that specified above. Piers may be square or rectangular.
3. Each adjustable pipe saddle support shall be screwed or welded to the corresponding size 150 lb. companion flanges or slip-on welding flanges respectively. Supporting pipe shall be of Schedule 40 steel pipe construction. Each flange shall be secured to the concrete floor by a

minimum of two (2) expansion bolts per flange. Adjustable saddle supports shall be equal to Grinnell Fig. No. 264. Where used under base fittings, a suitable flange shall be substituted for the saddle.

4. Floor supported pipes less than 3" shall be supported by fabricated steel supports.

D. Vertical piping shall be supported as follows:

1. Where pipes change from horizontal to vertical, the pipes shall be supported on the horizontal runs within two feet of the change in direction by pipe supports as previously specified herein.

2. For vertical runs exceeding 15', pipes shall be supported by approved pipe collars, clamps, brackets, or wall rests at all points required to insure a rigid installation.

3. Where vertical piping passes through a steel floor sleeve, the pipe shall be supported by a friction type pipe clamp which is supported by the pipe sleeve. Pipe clamps shall be equal to Grinnell Fig. 262.

E. Anchor bolts shall be equal to Kwik-Bolt as manufactured by the McCullock Industries, Minneapolis, Minnesota or Wej-it manufactured by Wej-it Expansion Products, Inc., Bloomfield, Colorado.

F. All rods, hangers, inserts, brackets, and components shall be furnished with galvanized finish.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All pipes, horizontal and vertical, shall be rigidly supported from the building structure by approved supports. Supports shall be provided at changes in direction and elsewhere as shown in the drawings or specified herein. No pipe shall be supported from other piping or from metal stairs, ladders, and walkways, unless it is so indicated on the drawings, or specifically directed or authorized by the Engineer.

B. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement, and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces. Prior to installation, all pipe supports shall be approved by the Engineer.

C. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings, and sleeve type couplings and to minimize all pipe forces on pump housings. Pump housing shall not be utilized to support connecting pipes.

D. Pipe supports shall be provided as follows:

1. Ductile iron shall be supported at a maximum support spacing of 10'-0" with a minimum of one support per pipe section at the joints.

2. Individually supported PVC pipes shall be supported as recommended by the manufacturer except that support spacing shall not exceed five feet (5').

3. All vertical pipes shall be supported at each floor or at intervals of at least 15' by approved pipe collars, clamps, brackets, or wall rests, and at all points necessary to insure rigid construction.

E. Pipe supports shall not result in point loadings but shall distribute pipe loads evenly along the pipe circumference.

F. Effects of thermal expansion and contraction of the pipe shall be accounted for in pipe support selection and installation.

G. Inserts for pipe hangers and supports shall be installed on forms before concrete is poured. Before setting these items, all drawings and figures shall be checked which have a direct bearing on the pipe location. Responsibility for the proper location of pipe supports is included under this section.

H. Continuous metal inserts shall be embedded flush with the concrete surface.

3.02 PRIME COATING

A. Prior to prime coating, all pipe hangers and supports shall be thoroughly clean, dry, and free from all mill-scale, rust, grease, dirt, paint, and other foreign substances to the satisfaction of the Engineer.

B. All pipe supports shall be primed and coated as specified in Section 09800 and 09900.

C. Finish coating shall be compatible with the prime coating used and shall be applied as specified in Section 09800 and 09900.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1) Framing with dimension lumber.
2) Wood furring.
3) Plywood backing panels.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1) Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
2) Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.03 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1) Wood-preservative-treated wood.
2) Fire-retardant-treated wood.
3) Engineered wood products.
4) Power-driven fasteners.
5) Powder-actuated fasteners.
6) Expansion anchors.
7) Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1) Factory mark each piece of lumber with grade stamp of grading agency.
2) For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3) Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less, no limit for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1) Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1) Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2) Wood sills, blocking, furring, stripping, and similar concealed members in

contact with masonry or concrete.
3) Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4) Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5) Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire- test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1) Exterior Type: Treated materials shall comply with requirements specified above for fire- retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2) Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat items indicated on Drawings, and the following:
1) Concealed blocking.
2) Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: No. 2 grade.

1. Application: Interior partitions not indicated as load-bearing.
2. Species:

a. Mixed southern pine; SPIB.
b. Northern species; NLGA.
c. Eastern softwoods; NeLMA.
d. Western woods; WCLIB or WWPA.

B. Framing Other Than Non-Load-Bearing Interior Partitions: No. 2 grade.

1. Application: Framing other than interior partitions.
2. Species:

a. Hem-fir (north); NLGA.
b. Southern pine; SPIB.
c. Douglas fir-larch; WCLIB or WWPA.
d. Mixed southern pine; SPIB.
e. Spruce-pine-fir; NLGA.
f. Douglas fir-south; WWPA.
g. Hem-fir; WCLIB or WWPA.
h. Douglas fir-larch (north); NLGA.
i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine; No. 2 grade; SPIB.
2. Eastern softwoods; No. 2 Common grade; NeLMA.
3. Northern species; No. 2 Common grade; NLGA.
4. Western woods; No. 2 Common grade; WCLIB or WWPA.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Power-Driven Fasteners: NES NER-272.

C. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.8 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.
6. Prior reviewed equal.

B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated on structural drawings. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high- strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall and roof sheathing.

2. Sheathing joint and penetration treatment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.

2. Fire-retardant-treated plywood.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or GA-600, "Fire Resistance Design Manual."

2.2 WOOD PANEL PRODUCTS

A. Plywood: DOC PS 1.

2.3 WALL AND ROOF SHEATHING

A. Plywood Wall & Roof Sheathing: Exterior, Structural I sheathing.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Maximum spacing of fasteners: 6”

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Subflooring:

    a. Glue and nail to wood framing.
    b. Screw to cold-formed metal framing.
    c. Space panels 1/8 inch apart at edges and ends.

2. Wall Sheathing:

    a. Nail to wood framing.
    b. Screw to cold-formed metal framing.
    c. Space panels 1/8 inch apart at edges and ends.

3. Roof Sheathing:

    a. Screw to cold-formed metal framing; screw along all overlapping joists. Maximum spacing between screws = 6”
    b. Space panels in accordance with manufacturer’s recommendations. If none are provided, space panels at 1/8 apart at edges and ends.

END OF SECTION 061600

SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Plastic-laminate cabinets.
2. Plastic-laminate countertops.
3. Shop finishing of woodwork.

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 ACTION SUBMITTALS

A. Product Data: For cabinet hardware and accessories and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
2. Plastic-laminates, for each type, color, pattern, and surface finish.
3. Thermoset decorative panels, for each type, color, pattern, and surface finish.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of woodwork.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

A. Wood Species and Cut for Transparent Finish: Birch, plain sawn or sliced

B. Wood Products:

1. Softwood Plywood: DOC PS 1.
2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Available Manufacturers: Subject to compliance with requirements, provide one of the following:

a. Formica Corporation;
b. Nevamar Company, LLC
c. Wilsonart International

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter or back mounted, HEWI nylon pulls, 4 inches long, 5/16 inch in diameter, as selected by Architect from manufacturer's full range of colors.

E. Catches: Magnetic catches, BHMA A156.9, B03141.

F. Drawer Slides: BHMA A156.9, B05091.

1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted; full-extension type; epoxy-coated steel with polymer rollers.
2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
3. Box Drawer Slides: Grade 1; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
4. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
5. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.

G. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.

H. Door Locks: BHMA A156.11, E07121.

I. Drawer Locks: BHMA A156.11, E07041.

J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Adhesives, General: Adhesives shall not contain urea formaldehyde.

2.5 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Custom.
2. Shop cut openings to maximum extent possible. Sand edges of

cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

B. Wood Cabinets for Transparent Finish:

1. AWI Type of Cabinet Construction: Flush overlay.
2. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
3. Matching of Veneer Leaves: Slip match.
4. Semiexposed Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
5. Drawer Sides and Backs: Solid-hardwood lumber, same species indicated for exposed surfaces.
6. Drawer Bottoms: Hardboard.

C. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: Flush overlay.
2. Laminate Cladding: High-pressure decorative laminate as follows:
   a. Horizontal Surfaces Other Than Tops: Grade HGS.
   b. Vertical Surfaces: Grade HGS.
   c. Edges: Grade HGS.
3. Drawer Sides and Backs: Solid-hardwood lumber.
4. Drawer Bottoms: Hardwood plywood.
5. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of colors, patterns and finish. Architect shall select up to 4 different colors, patterns, or finishes for different surfaces.

D. Plastic-Laminate Countertops:

1. High-Pressure Decorative Laminate Grade: HGS.
2. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of colors patterns, and finish. Architect shall select up to 4 different colors, patterns, or finishes for different surfaces.
3. Edge Treatment: Same as laminate cladding on horizontal surfaces.

2.6 SHOP FINISHING

A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Transparent Finish:

1. Grade: Custom.
2. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Shim as required with concealed shims.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass-fiber blanket insulation.
   2. Black poly scrim kraft (PSK) faced fiber-glass blanket insulation to be used behind perforated metal liner panels.
   3. Mineral-wool sound attenuation blanket insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Research/evaluation reports.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. CertainTeed Corporation.
   2. Johns Manville.
   3. Knauf Insulation.
   4. Owens Corning.
   5. Prior reviewed equal.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

C. Black Poly Scrim Kraft (PSK) Faced Fiber Glass Blanket Insulation: ASTM C 665, Type II, Class A, Category 1; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively per ASTM E84; passing ASTM E 136 for combustion characteristics; water vapor permeance of 0.02 perms per ASTM E 96.

2.2 MINERAL-WOOL BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. IIG-Industrial Insulation Group, LLC
2. Thermafiber
3. Prior reviewed equal.

B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. Nominal density of 2.5 pcf.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
   5. For wood-framed construction, install blankets according to ASTM C 1320.

C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation.

END OF SECTION

SECTION 07 41 13

STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. Section includes standing-seam metal roof panels.

B. Related Sections:

1. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Sustainable Design Submittals:

1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
2. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 3 inches per 12 inches (1:5).

D. Calculations:

1. Include calculations with registered engineer seal, verifying roof panel and attachment method resist wind pressures imposed on it pursuant to applicable building codes.

E. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

F. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Manufacturer and Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in architectural sheet metal products.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels until installation. Remove as panels are being installed. Verify film is not left on installed panels.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Galvalume Substrate Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including rupturing, or perforating.
    b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: 20 years and 6 months from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    c. Cracking, chipping, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Watertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.
2. Shop drawings must be provided to, reviewed, and approved by panel manufacturer prior to panel system installation.
3. Inspections by panel system manufacturer technical representative are required. Perform first inspection when underlayment and flashing are in place and second inspection when the roof is complete.

D. Special Installer Warranty: Furnish a written warranty signed by the Panel Applicator guaranteeing materials and workmanship for watertightness of the roofing system, flashings, penetrations, and against all leaks.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 29 percent.

B. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 32 or initial SRI not less than 39 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

C. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for steep-slope roof products.

D. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:

1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E 1980.

E. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

F. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 1680 and ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

G. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 and ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 15 lbf/sq. ft.

H. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL PANELS

A. General: Provide factory-formed metal panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.
3. **Standing-seam metal panels shall have concealed fasteners.**

B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Panels formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Berridge Manufacturing Company; Cee-lock or approved equal.

2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

   a. Nominal Thickness: 22 gauge.
   b. Exterior Finish: Two-coat fluoropolymer.
   c. Painted materials shall have a removable plastic film to protect the paint during roll forming, shipping and handling.
   d. Color: As selected by Owner.

3. Clips: Continuous Cee-Rib with Vinyl Weatherseal Insert to accommodate thermal movement.

   a. Material: 22 gauge nominal thickness, aluminum-zinc alloy-coated steel sheet.

4. Panel Coverage: 16.5 inches.
5. Panel Height: 1.5 inches.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils (1.02 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.

2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Mid-States Asphalt Quick Stick HT Pro
    b. Polyglass Polystick MTS
    c. Soprema Lastobond Shield HT
    d. Tamko TW Underlayment or TW Metal & Tile Underlayment

B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch (2400-mm) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot (3-m) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

F. Roof Curbs: Fabricated from same material as roof panels, 22 gauge nominal thickness; galvalume or stainless steel; supply an integral full-length cricket for curbs wider than 24 inches (610 mm) supported by a structural metal deck. Fabricate curb flashing from 22 gauge thickness steel. On open framing, provide roof underlayment and decking at and about roof curb per roofing manufacturer's requirements. Maintain a minimum of 1/2 of roofing panel width on each side of roof curb, and start panels a minimum of 9 inches (229 mm) up slope of roof curb, flashing roofing panels to roof curb per roofing manufacturer's requirements. Fabricate curb and subframing to withstand indicated loads of size and height of roof top equipment. Where required insulate roof curbs with rigid insulation.

G. Panel Fasteners: Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size as approved for the applicable loading requirements.

H. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Joint Sealant: Silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using factory set, non-adjustable, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Metallic Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide

a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.35 mil (0.009 mm).

D. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Metallic Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.

2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 36 inches. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days or as directed by the underlayment product manufacturer.

1. Apply over the entire roof surface.
2. At minimum apply over the roof area indicated below:

    a. Roof perimeter for a distance up from eaves of 36 inches beyond interior wall line.
    b. Valleys, from lowest point to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches.
    c. Rake edges for a distance of 18 inches.
    d. Hips and ridges for a distance on each side of 12 inches.
    e. Roof-to-wall intersections for a distance from wall of 18 inches.

B. Felt Underlayment: Apply at locations indicated on Drawings, in shingle fashion to shed water, and with lapped joints of not less than 2 inches.

1. Apply over the entire roof surface.

2. Apply on roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than 6 inches, in shingle fashion to shed water.

C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels to be level to 1/4 inch in 20 ft.
2. Flash and seal metal panels at perimeter of all openings. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Install flashing and trim as metal panel work proceeds.
5. Panels should be continuous without end laps.
6. Align bottoms of metal panels and fasten.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use stainless-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.

2. Install pressure plates, if required, at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied vinyl weatherseal.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

J. Roof Curbs: Install flashing around bases where they meet metal roof panels.

K. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 42 00

FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels.

B. Related Sections:

1. Reserved.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

C. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 3" = 1'-0" (1:5).

D. Calculations:

1. Include calculations with registered engineer seal, verifying wall panel and attachment method resist wind pressures imposed on it pursuant to applicable building codes.

E. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.

1. Include Samples of trim and accessories involving color selection.

F. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Manufacturer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Manufacturer Qualifications: Company specializing in Architectural Sheet Metal Products.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Remove strippable protective covering on metal panels as panels are being installed. Do not leave the film on installed panels.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Galvalume Substrate Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including rupturing or perforating.
    b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: 20 years and 6 months from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, chipping, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 29 percent.

B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Deflection Limits: For wind loads, no greater than 1/240 of the span.

2.2 EXPOSED-FASTENER, LAP-SEAM EXTERIOR METAL WALL PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and a flat pan between major ribs.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Berridge Manufacturing Company; M-Panel or approved equal.

2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Nominal Thickness: 22 gauge
b. Exterior Finish: Two-coat fluoropolymer.
c. Color: As selected by Owner.

3. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), 3105 alloy as standard with manufacturer, with H14 temper as required to suit forming operations and structural performance required.

    a. Thickness: 0.032 inch (0.81 mm)
    b. Surface: Smooth, flat finish.
    c. Exterior Finish: Two-coat fluoropolymer.
    d. Color: As selected by Owner.

4. Major-Rib Spacing: 6 inches o.c.
5. Panel Coverage: 36 inches.
6. Panel Height: 0.75 inch.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils (1.02 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Grace Ultra
    b. Mid-States Asphalt Quick Stick HT Pro
    c. Polyglass Polystick MTS
    d. Soprema Lastobond Shield HT
    e. Tamko TW Underlayment or TW Metal & Tile Underlayment

2. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
3. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.

B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.

2.4 INTERIOR METAL WALL PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and a flat pan between major ribs.

1. Basis-of-Design Product: Subject to compliance with requirements, provide MBCI; PBU Panel or approved equal.

2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

   a. Nominal Thickness: 26 gauge
   b. Exterior Finish: Galvalume Plus
   c. Color: As selected by Owner.

3. Major-Rib Spacing: 6 inches o.c.
4. Panel Coverage: 36 inches.
5. Panel Height: 0.75 inch.

2.5 INTERIOR METAL CEILING PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Tapered-Rib-Profile, Exposed-Fastener Metal Ceiling Panels: Formed with raised, trapezoidal major ribs and a flat pan between major ribs.

1. Basis-of-Design Product: Subject to compliance with requirements, provide MBCI; PBU Panel or approved equal.

2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

   a. Nominal Thickness: 26 gauge
   b. Exterior Finish: Galvalume Plus
   c. Color: As selected by Owner.

3. Major-Rib Spacing: 6 inches o.c.
4. Panel Coverage: 36 inches.
5. Panel Height: 0.75 inch.

2.6 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275) hot-dip galvanized coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.7 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.8 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm) over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm) over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Metallic Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm) over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.35 mil (0.009 mm).

D. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm) over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm) over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare,

pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Metallic Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm) over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use stainless-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Metal Liner Panels: Install panels on exterior side of girts, with girts exposed to the interior.

G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets and counterflashing.
2. Formed roof drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field- assembled work.

1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.

C. Samples: For each exposed product and for each finish specified.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.6 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. Exposed Coil-Coated Finishes:

a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.

2. Color: As selected by Architect from manufacturer's full range.

C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed; 2D (dull, cold rolled) finish.

D. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot- dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
3. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.

4. Color: As selected by Architect from manufacturer's full range.

2.2 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip- resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).

C. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike

with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
4. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

C. Solder:

1. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 REGLETS

A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.

1. Material: Stainless steel, 0.019 inch thick.
2. Finish: 2D.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections.

Furnish flat- stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.

1. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen. Wire ball downspout strainer. Valley baffles.

B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Hanger Style: 1-35H
2. Fabricate from the following materials:
   a. Galvanized Steel: 24 gage thick.

C. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper. Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

E. Splash Pans: Fabricate from the following materials:
1. Aluminum: 0.040 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof-Edge Flashing and Cap Flashing: Fabricate in minimum 96-inch-long, but not exceeding 10-foot- long, sections. Furnish with 6-inch- wide, joint cover plates. Fabricate from the following materials:

1. Galvanized Steel: 24 gage thick.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill

elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight. Fabricate from the following materials:

1. Galvanized Steel: 24 gage thick.

C. Base Flashing: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

D. Counterflashing and Flashing Receivers: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

F. Roof-Drain Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.016 inch thick.

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

B. Valley Flashing: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

C. Drip Edges: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

2.9 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.

B. Wall Expansion-Joint Cover: Fabricate from the following materials:
1. Galvanized Steel: 24 gage thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
5. Install sealant tape where indicated.
6. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and

trim will contact wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1- 1/4 inches for nails and not less than 3/4 inch for wood screws. For metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre- tinned surface would show in completed Work.

1. Do not solder [metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more

than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable hinged to swing open for cleaning gutters.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in adhesive material compatible with the roofing.

E. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

F. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper discharge.

G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inchcenters.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.

1. Interlock exterior bottom edge of coping with continuous cleat

anchored to substrate at 16-inch centers.

2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighter.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 04 20 00 "Unit Masonry."

C. Reglets: Installation of reglets is specified in Section 04 20 00 "Unit Masonry."

D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION

SECTION 07 84 13

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire- protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

B. Product test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program

Requirements."

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by UL, or FM Global.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Grace Construction Products.
2. Hilti, Inc.
3. Johns Manville.
4. Nelson Firestop Products.
5. RectorSeal Corporation.
6. 3M Fire Protection Products.
7. Tremco, Inc.; Tremco Fire Protection Systems Group.
8. USG Corporation.
9. Prior reviewed equal.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire- resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as

permanent components of firestopping.

D. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.
B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.4 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product

Category XHEZ.

B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."

C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

D. Firestopping with No Penetrating Items FS-1:

1. UL-Classified Systems: C-AJ-0073.

E. Firestopping for Metallic Pipes, Conduit, or Tubing FS-2:

1. UL-Classified Systems: C-AJ-1285.

F. Firestopping for Nonmetallic Pipe, Conduit, or Tubing FS-3:

1. UL-Classified Systems: C-AJ-2223.

G. Firestopping for Electrical Cables FS-4:

1. UL-Classified Systems: F-A-3003 and W-L-3120.

H. Firestopping for Cable Trays with Electric Cables FS-5:

1. UL-Classified Systems: W-L-4027.

I. Firestopping for Insulated Pipes FS-6:

1. UL-Classified Systems: F-A-5024 and W-L-5138.

J. Firestopping for Miscellaneous Electrical Penetrants FS-7:

1. UL-Classified Systems: C-BJ-3025.

K. Firestopping for Miscellaneous Mechanical Penetrants FS-8:

1. UL-Classified Systems: C-AJ-7059.

L. Firestopping for Groupings of Penetrants FS-9:

1. UL-Classified Systems: C-AJ-8074.

END OF SECTION

SECTION 07 84 46

FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire- protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

B. Product test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

1. Fire-resistive joint system tests are performed by UL or a qualified testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases,and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Ratings determined per ASTM E 1966 or UL 2079:

1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Grace Construction Products.
   b. Hilti, Inc.
   c. Johns Manville.
   d. Nelson Firestop Products.
   e. RectorSeal Corporation .
   f. 3M Fire Protection Products.
   g. Tremco, Inc.; Tremco Fire Protection Systems Group.
   h. USG Corporation.
   i. Prior reviewed equal.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Rating determined by ASTM E 119 based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa) or ASTM E 2307.

1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Grace Construction Products.
   b. Hilti, Inc.

c. Johns Manville.
d. Nelson Firestop Products.
e. RectorSeal Corporation.
f. 3M Fire Protection Products.
g. Thermafiber, Inc.
h. Tremco, Inc.; Tremco Fire Protection Systems Group.
i. USG Corporation.
j. Prior reviewed equal.

D. Joints in Smoke Barriers: Ratings determined per UL 2079.

1. L-Rating: Not exceeding 5.0 cfm/ft (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Grace Construction Products.
   b. Hilti, Inc.
   c. Johns Manville.
   d. Nelson Firestop Products.
   e. RectorSeal Corporation.
   f. 3M Fire Protection Products.
   g. Tremco, Inc.; Tremco Fire Protection Systems Group.
   h. USG Corporation.
   i. Prior reviewed equal.

E. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke- developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

D. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire- resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self- adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.

6. Installer's name.

3.3 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.4 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.

B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under product category Expansion/Seismic Joints or Firestop Systems.

C. Head-of-Wall, Fire-Resistive Joint Systems FRJS-1*:*

1. UL-Classified Systems: HW-D-0048 and HW-D-0186.

D. Wall-to-Wall, Fire-Resistive Joint Systems FRJS-2:

1. UL-Classified Systems: WW-S-0044.

E. Floor-to-Wall, Fire-Resistive Joint Systems FRJS-3:

1. UL-Classified Systems: FW-D-1015.

F. Bottom-of-Wall, Fire-Resistive Joint Systems FRJS-4:

1. UL-Classified Systems: BW-S-0012.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Preformed joint sealants.
5. Acoustical joint sealants.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.

4. Joint-sealant color

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preconstruction compatibility and adhesion test reports.

C. Preconstruction field-adhesion test reports.

D. Field-adhesion test reports.

E. Warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

A. Neutral-Curing Silicone Joint Sealant SS-1: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Dow Corning Corporation.
c. GE Advanced Materials - Silicones.
d. Pecora Corporation.
e. Sika Corporation; Construction Products Division.

f. Tremco Incorporated.
g. Prior reviewed equal.

2. Type: Single component (S).
3. Grade: nonsag (NS).
4. Class: 50.
5. Uses Related to Exposure: Nontraffic (NT).

B. Neutral-Curing Silicone Joint Sealant SS-2: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation; 890-SL.
b. Pecora Corporation: 300-SL.

2. Type: Single component (S).
3. Grade: Pourable (P).
4. Class: 100/50.
5. Uses Related to Exposure: Traffic (T).

C. Mildew-Resistant, Neutral-Curing Silicone Joint Sealant SS-3: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Pecora Corporation; 898.
b. Approved equal.

2. Type: Single component (S).
3. Grade: Nonsag (NS).
4. Class: 50.
5. Uses Related to Exposure: Nontraffic (NT).

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant LS-1: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.
b. Bostik, Inc.

c. Pecora Corporation.
d. Tremco Incorporated.
e. Prior reviewed equal.

2.4 PREFORMED JOINT SEALANTS

A. Preformed Foam Joint Sealant PS-1: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure- sensitive adhesive and covered with protective wrapping.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dayton Superior Specialty Chemicals.
b. EMSEAL Joint Systems, Ltd.
c. Sandell Manufacturing Co.
d. Schul International, Inc.
e. Willseal USA, LLC.
f. Prior reviewed equal.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant AS-1: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. USG Corporation; Sheetrock Acoustical Sealant.
c. Prior reviewed equal.

2.6 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint- sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

    a. Perform 5 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
    b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-1.

1. Joint Locations:
    a. Isolation and contraction joints in cast-in-place concrete slabs.
    b. Joints between different materials listed above.
    c. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: SS-2.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Control and expansion joints in unit masonry.
c. Joints in exterior insulation and finish systems.
d. Joints between metal panels.
e. Joints between different materials listed above.
f. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
g. Control and expansion joints in ceilings and other overhead surfaces.
h. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: SS-1.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces JS-3.

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.
b. Control and expansion joints in tile flooring.
c. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: SS-2.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-4.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings where indicated.

c. Tile control and expansion joints.
d. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
e. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
f. Other joints as indicated.

2. Joint Sealant: Latex.

3. Joint Sealant: LS-1.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-5.

1. Joint Sealant Location:

   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Tile control and expansion joints where indicated.
   c. Other joints as indicated.

2. Joint Sealant: Silicone.
3. Joint Sealant: SS-3.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces JS-6.

1. Joint Location:

   a. Acoustical joints where indicated.
   b. Other joints as indicated.

2. Joint Sealant: Acoustical.
3. Joint Sealant: AS-1.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM- HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amweld International, LLC.
2. Benchmark
3. Ceco Door Products; an Assa Abloy Group company.

4. Curries
5. Custom Metal Products.
6. MPI Group, LLC (The).
7. Premier Products, Inc.
8. Republic Doors and Frames.
9. Steelcraft; an Ingersoll-Rand company.
10. Prior reviewed equal.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature- rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Wind Loads: Provide hollow metal assemblies capable of withstanding windload design pressures in accordance with Chapter 16 of IBC 2009, and indicated on the Structural Drawings. Provide assemblies that meet ASTM E 330.

2.3 INTERIOR DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B (Heavy Duty) according to SDI A250.4.
2. Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches.
   c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 18 gage (0.042 inche).
   d. Edge Construction: Model 2, Seamless.
   e. Core: Manufacturer’s standard honeycomb core.

3. Frames:

a. Materials: Metallic-coated, steel sheet, minimum thickness of 16 gage.
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 18 gage, with minimum A60 galvanneal coating.
d. Edge Construction: Model 2, Seamless.
e. Core: Polyurethane.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than R-10 when tested according to ASTM C 1363.

4. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 14 gage, with minimum A60 galvanneal coating.
b. Construction: Full profile welded.

5. Exposed Finish: Prime.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry:

Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

I. Glazing: Section 08 80 00 "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.7 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

1) Two anchors per jamb up to 60 inches high.
2) Three anchors per jamb from 60 to 90 inches high.
3) Four anchors per jamb from 90 to 120 inches high.
4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c.

and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

c. Compression Type: Not less than two anchors in each frame.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow- metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.9 ACCESSORIES

A. Louvers: Provide sightproof louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.

B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that will be

filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:
    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
    c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
    d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

C. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing"

and with hollow- metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to otherwork.

C. Samples: For each door face material.

D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 tested according to the following test method:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
2. Karp Associates, Inc.
3. Larsen's Manufacturing Company.

4. Milcor Inc.
5. Nystrom, Inc.
6. Prior reviewed equal.

B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

C. Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Karp Associates, Inc., Model DSC-214M.
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall and ceiling.
4. Door Size: 24 x 24.
5. Metallic-Coated Steel Sheet for Door: 14 gage.
   a. Finish: Factory prime.
6. Frame Material: 16 gage.
7. Hinges: Continuous piano.
8. Hardware: Screwdriver operated latch.

D. Fire-Rated, Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: Karp Associates, Inc., Model KRP-150-FR.
2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral- fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall.
4. Fire-Resistance Rating: Not less than 1 hour.
5. Temperature-Rise Rating: 450 deg F (250 deg C) at the end of 30 minutes.
6. Metallic-Coated Steel Sheet for Door: 14 gage.
   a. Finish: Factory prime
7. Frame Material: 16 gage.
8. Hinges: Continuous piano.
9. Hardware: Keyed operated latch.

E. Hardware:

1. Latch: Slam latch operated by screwdriver.
2. Lock: Cylinder.
   a. Lock Preparation: Prepare door panel to accept cylinder specified in Section 08 71 00 "Door Hardware."

2.3 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) metallic coating.

E. Frame Anchors: Same type as door face.

F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder locks, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate- free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.
B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 51 13

ALUMINUM WINDOWS – FIXED

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:
   1. Extruded aluminum fixed windows.
   2. Factory glazing.

1.02 SYSTEM DESCRIPTION

A. Design Requirements: Drawings and Specifications establish requirements for aesthetic, including dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

B. Performance Requirements: As specified in PART 2, with the following additional requirements:

C. Manufacturer's “Certificate of Compliance” must be submitted certifying product meets requirements of AAMA/WDMA/CSA 101/I.S.2/A440-08 CW-PG80-FW. **AAMA Certificate of Compliance will be required on all windows.**

D. Design and Size: Windows to withstand both positive and negative loads when tested in accordance with ASTM E 330, using test loads equal to 1.5 times the design test pressure (120 psf).

E. Deflection: Not to exceed l/175 of unsupported spans, when tested in accordance with ASTM E 330, using test loads equal to the design pressure (80 psf), both positive and negative, and must be without permanent deformation of any component, glass breakage, or anchorage failure.

F. Air Infiltration: None, measured at a reference differential pressure across assembly of 1.6 psf when measured in accordance with ASTM E 283.

G. Water Leakage: None, when measured in accordance with ASTM E 547 and ASTM E 331 at a water test pressure of 12.11 psf.

1.03 SUBMITTALS

A. Administrative requirements for submittal procedures. Submit the following for review and approval:
   1. Product Data: Provide component dimensions, information on glass and

glazing, and descriptions of hardware and accessories.

2. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, and installation requirements.
   a. Include full-scale head, jamb, meeting stile, and sill sections.
3. Color Samples: Submit two samples of frame coating for approval, showing full range of color variations.
4. Window Samples: Submit two samples, 12 x 12 inch (300 x 300 mm) in size, illustrating typical corner construction, accessories, and finishes.
5. Submit current unexpired copies of AAMA/WDMA/CSA 101/I.S.2/A440-08 **certified** structural test reports.
6. Submit current specifications of technical compliance of factory-applied paint finish.

B. Quality Assurance/Control Submittals: Submit the following for Project record. No action will be taken.

1. Test Reports: Manufacturer's published reports and independent testing agency reports must be **AAMA Certified** and demonstrate compliance with specified requirements. Include the following:
   a. Reports of independent testing agency, approved by Owner and Architect, demonstrating compliance of proposed units with specified performance requirements. Test reports shall describe window and door systems completely.
   b. Written test procedure and drawings, including details of units and mounting in test chamber.
2. Manufacturer and Installer Qualifications: Submit lists of projects documenting not less than five years of documented, successful experience in fabrication and installation of commercial windows in similar project types.
   a. For each project: List building name and address, Owner's representative, general contractor, Architect, and appropriate subcontractors, with phone numbers and contact personnel.
3. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

C. Contract Closeout Submittals:
1. Submit warranty. Ensure that forms have been completed in Owner's name and registered with manufacturer. Produce **original** warranties by manufacturer.
2. Maintenance Manuals: Produced by manufacturer, listing procedures and recommended frequency for inspecting, adjusting, and maintaining windows specific to this project. Address all hardware, gaskets, and sealants. Describe cleaning procedures for glass and metal surfaces.

1.04 QUALITY ASSURANCE

A. Comply with requirements of AAMA/WDMA/CSA 101/I.S.2/A440-08.
1. Maintain one copy of document on-site.

B. Manufacturer and Installer: Company specializing in fabrication of commercial aluminum windows of types required, with no fewer than five years of experience.
   1. Check availability of all specified materials upon contract signing, and order promptly so work is not delayed.
   2. Installer Qualifications: All mechanics on this project shall be completely familiar with these contract documents and procedures shown on installation sequence shop drawings before installing units.

C. Testing Agency Qualifications: Manufacturer's testing and/or independent testing agency, acceptable to authorities having jurisdiction, with experience and capability to conduct testing indicated, as documented according to ASTM E 548.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Delivery: Scheduled delivery to coincide with glazing schedules so that minimum handling is required.
   1. Deliver products to project site and store in manufacturer's delivered state until openings are ready for window and door installation. Do not open any concealment except as required by inspection for shipping damage.
   2. Inspect frames for damage, including finish damage, fracture of thermal breaks, or frame corner seals.

B. Storage: Store all product according to AAMA CW-10, in areas least subject to traffic or falling objects. Provide space around frames and keep storage area clean, dry, and well-ventilated to avoid condensation and other moisture-induced damage to frame finish.

C. Handling: Stack individual units on edge, leaned slightly against upright supports, with separators between each.

1.06 WARRANTY

A. Provide manufacturer's warranty against defective materials or workmanship with both submittals and Field and File records, for a period of 2 years from substantial completion. Warranty must convey ownership to the project owner.

PART 2 PRODUCTS

A. Windows shall be single fixed, aluminum frame with Thermal Break, including 1" double-pane glazing.
   1. Aluminum shall be of proper alloy for commercial window construction. All extruded sections shall be of 6063-T5 aluminum alloy.
   2. Main frame members shall be a nominal thickness as required by ANSI/AAMA 101. Main frame shall be 3.250" in depth. Main frames are

to be extruded aluminum with a structural thermal barrier of high-density, low thermal conductivity polyurethane, poured and debridged.

B. All aluminum windows must be provided by sole source manufacturer capable of providing the aluminum windows.

2.01 MANUFACTURERS

A. Basis of Design: Series 750 Fixed Window Type, as manufactured by Thermal Windows, Inc., or approved equivalent.
1. Performance Requirements: AAMA/WDMA/CSA 101/I.S.2/A440-08 CW-PG80-FW.
2. Construction: Thermally broken.
3. Glazing: Double; clear; Low-E.

B. Windows: Tubular aluminum sections, factory-fabricated, factory-finished, thermally broken, vision glass, infill panels, related flashings, anchorage and attachment devices.

C. Substitutions

1. Other manufacturers' products that meet or exceed specified design requirements may be considered. The following information must be submitted within ten (10) working days preceding bid date.

a) Substitution Request form CSI Form 1.5C
b) Test reports specified in 1.02 SYSTEM PERFORMANCE REQUIREMENTS
c) Full proposal details and samples specified in 1.03 SUBMITTALS
d) Copy of manufacturer's warranty specified in 1.06 WARRANTY
e) Other information as requested for evaluation

2. Substituted products not pre-approved by the Architect via addenda will not be considered.

2.02 COMPONENTS

A. Frames: Profile as indicated, thermally improved with interior portion of frame insulated from exterior portion; applied glass stops of snap-on type.
1. Attachment Accessories: Aluminum, as detailed and required for attachment to wall structure at head, jamb, and sill.

B. Fasteners: Stainless Steel.

C. Sealant and Backing Materials: As specified in Section 079005.

D. Muntins (Optional):
1. Provide muntin grids, as detailed on architectural drawings.

2. Finish shall match window frames.

E. Panning (Optional):
1. Provide extruded aluminum panning to receive replacement windows, as detailed on architectural drawings.
2. Finish shall match window frames.

F. Receptors/Sill Starter (Optional):
1. Provide extruded aluminum receptors to receive windows, as detailed on architectural drawings.
2. Finish shall match window frames.

G. Provide steel internal reinforcement in mullions, as required to meet loading requirements.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B 221/ASTM B 221M, 6063 alloy, T5 temper.

B. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A 123/A 123M to 2.0 oz/sq ft (600 g/sq m), as required.

C. Fastener materials: All screws at joints of main frame shall be secured into integral screw ports.

D. Plastic Components: Resist QUV exposure with UV-B 313 bulbs, 4 hour CON at 50° C/4 hour UV at 40° C, in accordance with ASTM G 154 for 2,000 hours without embrittlement, cracking, or fading, and shall have a verifiable 5-year successful field track record.
1. Recommended for exterior use by plastics manufacturer.
2. Polyurethane for Poured and Debridged Thermal Breaks: Obtain from source providing material used successfully in poured and debridged thermal breaks for at least five years.

E. Sealants: Compatible with perimeter joint caulking. Seals with double-faced tape not allowed.
1. Frame Corner Sealant: Butyl rubber sealant, compatible with contiguous sealants.

2.04 HARDWARE

A. Fixed window—no hardware.

2.05 GLASS & GLAZING INSTALLATION

A. Conform to latest edition of glazing standards of GANA Glazing Manual and GANA Sealant Manual.
1. Install glass in fixed units, in accordance with manufacturer's recommendations.
2. Allow all rubber gaskets to relax and recover several hours prior to

installation. All gaskets shall be oversized, 1% to 2% in length. Install gaskets at ends and center, and then fit in remaining portions. Butt corner joints tightly and seal. Avoid contaminating surfaces to be sealed with any lubricating solutions.

3. Do not permit edges of insulated glass to contact any solvents.
4. Do not allow glass to touch framing system; replace chipped or scratched glass.
5. Keep glazing rabbet clean and dry during installation of glass.
6. Place setting blocks at quarter points of sill member without blocking any weep holes.
7. Set glass centered in opening to allow at least 1/8 inch clearance between sides of glass and anti- walk pads, and to provide at least 1/2 inch bite on glass by glazing stops.

B. Sealed Insulated Glass: Sealed insulated glass shall be factory-glazed set in butyl tape on glazing leg and secured with a snap in aluminum glazing stop at the interior. A silicone cap bead shall be applied to the exterior glazing leg. The insulated glass units shall be 1” overall thickness with two panes of .125” (1/8”) double-strength glass, separated by a .75” (3/4”) airspace. Exterior pane shall be .125” (1/8”) Clear and the interior pane shall be .125” (1/8”) Clear; 2nd surface Low-E. Glass shall be tempered where required by code.

C. All sealed insulated glass units shall meet the requirements of ASTM E 2190-10 specification, Class “A”. Sealed insulated glass units shall be warranted against seal failure for a period of **10 years** from date of manufacturing.

2.06 FABRICATION

A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly, to enable window installation and dynamic movement of perimeter seal.

1. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
2. Arrange fasteners and attachments to ensure concealment from view.

B. Perimeter Seals: Provide outer head and jamb perimeter seals, as well as a through-sill flashing (if detailed).

1. Edge return may be an extruded part inserted into window frame, or may be a sub-frame/receptor system.
2. Cap ends of extrusions with system-compatible sealants.
3. Do not penetrate or interrupt continuity of perimeter seals.

C. Polyurethane Poured and Debridged Thermal Breaks:

1. Design and fabricate frame and sub-frame with continuous integral thermal barrier, permanently bonded to extrusions, providing solid, continuous, integral non-conducting area at all frame members.
2. Cavity Profile: Symmetric and incorporated mechanical interlock.
3. Provide "Braded" thermal cavity preparation to ensure adhesion of thermal break poured in all water barrier extrusions.
4. Do not expose polyurethane to sunlight in permanent installation.

5. Shield plastic components, such as parting blocks, in unit construction from direct exterior exposure at sills, jambs, and meeting stiles using aluminum covers. Other exterior visible components shall match frame color.
6. Filled and debridged sections shall not distort or fracture due to handling, storage, fabrications, and in-service use.
7. Frame Corner Sealant: Compatible with polyurethane.
8. Replace damaged thermal breaks.

D. Match components to ensure continuity of line.

2.07 FINISHES

A. High Performance Organic Finish: AAMA 2605, thermally cured powder coating organic paint system.
1. Color as selected from manufacturer's (14) standard colors.

B. Anodized Finish: AAMA 611 Class I, electrolytically deposited anodic oxide coating system.

C. Apply 1 coat of bituminous coating or install PVC shim separations to concealed aluminum and steel surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Existing Conditions: Examine openings for aluminum windows to ensure that they are proper size, plumb, square, and level before installation of frames is started.
1. Verify that adjoining air and vapor seal materials are ready to receive aluminum windows.

B. Immediately before placing into opening, inspect frames for any damage, including finish damage and fracture of thermal breaks or frame corner seals.

3.02 PREPARATION

A. Clean down masonry prior to installation of window unit assemblies.

B. Coat aluminum in direct contact with concrete, masonry, steel, or other non-compatible material with bituminous paint, zinc rich primer, or other suitable insulating material.

3.03 INSTALLATION

A. Securely install windows and doors in accordance with AAMA 101, manufacturer's instructions, and approved shop drawings.
1. Shim frames to perimeter opening, to accommodate

construction tolerances and other irregularities.

2. Install sill shims at three points to support to sill track. Use wedge shim directly over sill flashing to offset slope of flashing. Set wedge and uniform thickness shims into bed of sealant and place over any shims below flashing. Do not damage or dent flashing during shim installation.
3. Align windows plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
4. Maintain relation to established lines and grades indicated on approved shop drawings.

B. Use anchorage devices to securely fasten unit assemblies to wall construction without distortion or imposed stresses.
   1. Use approved means of frame anchorage to allow for thermal expansion and contraction of frames. Fit support angles tightly against sub-frame and sill flashing without gaps and support directly on substrate without shims.
   2. Do not penetrate horizontal portion of flashing or active weep areas of unit frame with fasteners. Install frames without use of exterior exposed fasteners.

C. Install subsill and sill end dams.

D. Provide thermal isolation where components penetrate or disrupt building insulation.

E. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.

F. Install operating hardware not pre-installed by manufacturer.

G. Install perimeter sealant in accordance with requirements specified in Section 079005.

H. Install perimeter trim and interior closures.

I. Do not drill or punch holes, including weep holes, through thermal break.

3.04 FIELD QUALITY CONTROL

A. Either with a window unit selected from the initial delivery or a mock-up unit of each type to be used within the project, conduct a field test in strict compliance with AAMA 502-8 method A and Method B. Each opening will be tested to achieve performance of ASCE 7-05 calculated requirements (psf) for water resistance, which shall not exceed .667 % of the product's capable water based on AAMA 101/I.S.2. Allowable rates of air leakage for field testing shall be 1.5 times applicable AAMA 101/I.S.2

rate for the Product Type and Performance Class (Example: Performance test at 1.57 psf allows .30 cfm/ft²; 502B test allows .45 cfm/ft²). Both separate openings to be tested under “Contract” testing by a designated independent testing agency.

1. Schedule installation sufficiently in advance of need to allow adequate time for cure of sealants, testing and reconstruction, if needed, without delaying the project.

B. Notify Owner and Architect at least one week before testing so that they may be represented during all testing.

C. Perform tests specified in Field Quality Control Article.
   1. If window unit fails test, Contractor shall propose corrections for approval of Owner and Architect.
   2. Modify construction and perform additional tests as required to achieve specified minimum acceptable results. If corrections are not adequate, construct new mock-up at written direction of Owner and Architect. Coordinate construction of mock-up with other involved trades.
   3. Approved mock-ups may become part of completed Work if undisturbed at time of Substantial Completion.

3.05 ERECTION TOLERANCES

A. Comply with the following tolerances:
   1. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.
   2. Maximum Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 foot straight edge.

3.06 ADJUSTING AND CLEANING

A. Weather-tight closure.

B. Cleaning:
   1. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
   2. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following:
1. Hinges
2. Continuous hinges
3. Key control system
4. Lock cylinders and keys
5. Lock and latch sets
6. Bolts
7. Exit devices
8. Closers
9. Overhead holders
10. Miscellaneous door control devices
11. Door trim units
12. Protection plates
13. Weatherstripping for exterior doors
14. Sound stripping for interior doors
15. Automatic drop seals (door bottoms)
16. Astragals or meeting seals on pairs of doors
17. Thresholds

C. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 08110: Steel Doors and Frames
2. Section 08113: Steel Frames
3. Section 08210: Wood Doors
4. Section 08255: Packaged Steel Door Assemblies
5. Section 08260: Packaged Wood Door Assemblies
6. Section 08330: Coiling Doors
7. Section 08400: Entrances and Storefronts

8. Section 08410: Aluminum Entrances and Storefronts
9. Section 08430: Hardware for Aluminum Entrances
10. Division 26: Electrical

D. Products furnished but not installed under this Section to include:
1. Cylinders for locks on entrance doors.
2. Final replacement cores and keys to be installed by Owner.

1.3 REFERENCES

A. Standards of the following as referenced:
1. American National Standards Institute (ANSI)
2. Door and Hardware Institute (DHI)
3. Factory Mutual (FM)
4. National Fire Protection Association (NFPA)
5. Underwriters' Laboratories, Inc. (UL)
a. UL 10C - Fire Tests Door Assemblies
6. Warnock Hersey

B. Regulatory standards of the following as referenced:
1. Department of Justice, Office of the Attorney General, *Americans with Disabilities Act*, Public Law 101-336 (ADA).
2. CABO/ANSI A117.1: *Providing Accessibility and Usability for Physically Handicap People*, 1992 edition.

1.4 SYSTEM DESCRIPTION

A. Refer to applicable “Headings” for system description for electric and electro-pneumatic hardware products.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements. For items other than those scheduled in the “Headings” of Section 3, provide catalog information for the specified items and for those submitted.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format “hardware sets" indicating complete designations of every item required for each door or

opening. Use specification Heading numbers with any variations suffixed .01, .02, etc. Include the following information:

a. Type, style, function, size, and finish of each hardware item.
b. Name and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
e. Explanation of all abbreviations, symbols, and codes contained in schedule.
f. Narrative of operation for all electrified hardware sets.
g. Color Coded Wiring Diagrams for hardware set that have electrified hardware.
h. Mounting locations for hardware.
i. Door and frame sizes and materials.
j. Keying information.

2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.

3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

D. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

E. Contract closeout submittals:
1. Operation and maintenance data: Complete information for installed door hardware.
2. Warranty: Completed and executed warranty forms.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware (latch and locksets, access control hardware, hinges, closers, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities within100 miles of the Project allowing timely service of hardware and software issues throughout the construction and warranty phases of the project, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that

employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Supplier to meet with Owner to consult on final keying requirements and to obtain final instructions in writing. This consultation conference to occur not more than 30 days from final finish hardware schedule approval date.
2. Required supplier to meet with installer prior to beginning of installation of door hardware. (Pre-installation conference)

C. Report any and all discrepancies to the architect no later than 7 days prior to bid. It is the responsibility of the successful supplier to supply hardware to 100% competition, should a door or item of hardware be omitted from this specification or should hardware other than what is specified be required to meet code it is the distributor's sole responsibility to supply that without cost. Only "per plans and specifications" quotes will be entertained, value engineering will not be acceptable.

D. If requested, the hardware manufacturer's representative(s) shall conduct a pre- installation conference with the Contractor's installer, a representative of the owner's planning and/or maintenance department, and a representative of the hardware supplier, to demonstrate product installation and adjustment in accordance with manufacturer's recommendations and Owner's requirements.

E. If requested, the hardware manufacturers' representative shall inspect hardware installation to confirm that all products are installed and adjusted according to manufacturer's recommendations. A certificate of compliance shall besubmitted with the project closeout documents.

F. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved- bearing hinges and seals whether listed in the Hardware Schedule or not. All hardware shall comply with standards UBC 702 (1997) and UL 10C.

1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

1.7 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier

and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.8 WARRANTY

A. Special warranties:
   1. Door Closers: Ten year period
   2. Exit Devices: Ten year period
   3. Automatic Door Operators: Two year period
   4. Locks and Cylinders: Ten year period

1.9 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS
(*Denotes manufacturer referenced in the Hardware Headings)

*Note: All Hardware shall be Stainless Steel Finish.

A. Hinges:
   1. Acceptable manufacturers:
      a. Hager Hinge Company BB1279, BB1199
      b. Stanley Works FBB179, FBB199
      c. Ives 5BB1, 5BB1HW*
   2. Characteristics:
      a. Templates: Provide only template-produced units.
      b. Screws: Provide Phillips flat-head screws complying with the following requirements:
         1) For metal doors and frames install machine screws into drilled and tapped holes.
         2) For wood doors and frames install threaded-to-the-head wood screws.
         3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to- the-head steel wood screws.
         4) Finish screw heads to match surface of hinges or pivots.
      c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:

1) Out-Swing Exterior Doors: Non-removable pins.
2) Out-Swing Corridor Doors with Locks: Non-removable pins.
3) Interior Doors: Non-rising pins.
4) Tips: Flat button and matching plug. Finished to match leafs.

d. Size: Size hinges in accordance with specified manufacturer's published recommendations or as jobsite requirements dictate. Hinges shall be sized to accommodate door opening degree per specification.

e. Quantity: Furnish three (3) hinges for all doors. Furnish one additional hinge for each additional 2-1/2 feet or fraction thereof.

B. Continuous Hinges:

1. Acceptable manufacturers:
   a. Hager 780-112HD, 780-224HD
   b. Ives 112HD, 224HD*
   c. Stanley Hinge 661HD, 662HD
2. Characteristics:
   a. Continuous gear hinges to be manufactured of extruded 6063-T6 aluminum alloy with anodized finish, or factory painted finish as scheduled.
   b. All hinges are to be manufactured to template. Uncut hinges shall be non-handed and shall be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising.
   c. Vertical door loads shall be carried on chemically lubricated polyacetal thrust bearings. The door and frame leaves shall be continually geared together for the entire hinge length and secured with a full cover channel. Hinge to operate to a full 180^{o}.
   d. Hinges to be milled, anodized and assembled in matching pairs. Fasteners supplied shall be 410 stainless steel, plated and hardened.
   e. Provide UL listed continuous hinges at fire doors. Continuous hinges at fire doors (suffix -FR) shall meet the required ratings without the use of auxiliary fused pins or studs.

C. Cylinders:

1. Acceptable manufacturers:
   a. Falcon SFIC*
   b. Schlage SFIC
2. Characteristics:
   a. Provide a new GGMK System for this project. Manufacturer to structure system so that a parish

wide GGMK system will be possible.

b. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
   1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, “DO NOT DUPLICATE."

c. Key Material: Provide keys of nickel silver only.

d. Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, 5 grandmaster keys for each grandmaster system, and 5 control keys for interchangeable core series.
   1) Furnish one hundred extra blanks for each keyway used.
   2) Deliver keys to Owner.

e. Key Control software: Windows based software to work on currently offered windows operating systems, single license with network upgrade available. Software must come preloaded with factory bitting, door numbers, and keysets per instructions. Software must also have the capability of importing all future system additions, must not require manual additions to factory systems. Software will also have pinning chart capability.

f. Permanent cores to be provided directly to owner for final installation.

g. Once permanent keying has been installed the contractor may sign out keys as needed, failure to return signed out keys will result in replacement of entire GGMK system at contractors expense.

D. Locksets, Latchsets, Deadbolts:
   1. Acceptable manufacturers:
      a. Falcon*
      b. Schlage
   2. Extra Heavy Duty Cylindrical Locks and Latches: as scheduled, fastened with through-bolts.
      a. Chassis: cylindrical design, corrosion-resistant plated cold-rolledsteel.
      b. Locking Spindle: stainless steel, interlocking design.
      c. Latch Retractors: forged steel. Balance of inner parts: corrosion- resistant plated steel, or stainless steel.
      d. Lever Trim: accessible design, independent operation, spring- cage supported, minimum 2" clearance from lever mid-point to door face.
      e. All lock functions: 7 year warranty, Vandalguard function outside lever is disengaged when in the locked mode.

f. Rosettes: minimum 3-7/16"diameter for coverage of ANSI/DHI A115.18, 1994 door preparation, through-bolt lugs on both spring cages to fully engage this pattern.
g. Springs: full compression type.
h. Electric operation: Manufacturer-installed continuous dutysolenoid.
i. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
j. Lock Series and Design: Schlage ND series, TRL design.
k. Certifications:
1) ANSI A156.2, 1996 , Series 4000, Grade 1. Tested to exceed 3,000,000 cycles.
2) UL listed for A label single doors up to 4 ft x 8 ft.

E. Exit Devices:
1. Acceptable manufacturers:
a. Falcon*
b. Von Duprin.
2. Characteristics:
a. Exit devices shall be "UL" listed for life safety. All exit devices for fire rated openings shall have “UL" labels for “Fire Exit Hardware."
b. All exit devices mounted on labeled wood doors shall be mounted on the door per the door manufacturer’s requirements.
c. All trim shall be thru-bolted to the lock stile case. Lever design to match locksets.
d. All exit devices shall be made of brass, bronze, stainless steel, or aluminum material, powder coated, anodized, or plated to the standard architectural finishes to match the balance of the door hardware.
e. Provide glass bead conversion kits to shim exit devices on doors with raised glass heads.
f. All exit devices shall be one manufacturer. No deviation will be considered.
g. Lever trim shall be solid, investment stainless steel material with a break- away feature to limit damage to the unit from vandalism.
h. Surface vertical rod devices shall be UL labeled for fire door applications without the use of bottom rod assemblies. Where bottom rods are required for security applications, the devices shall be UL labeled for fire doors applications with rod and latch guards by the device manufacturer.

F. Closers and Door Control Devices:
1. Acceptable manufacturers:

a. Falcon*
b. LCN

2. Characteristics:
   a. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cylinder.
   b. All closers shall utilize a stable fluid withstanding temperature range of 120^{O}F to -30^{O}F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with standards UBC 7- 2 (1997) and UL 10C.
   c. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non- critical valves. Closers shall have separate adjustment for latch speed, general speed and back check.
   d. All closers shall have solid steel main arms (and forearms for parallel arm closers) and where specified shall have a cast-in solid stop on the closer shoe. Where door travel on out-swing doors must be limited, use “SS” or “SS/HO” type closers.
   e. All surface closers shall be certified to ANSI/BHMA Grade 1 and supplied with “Full Covers.”
   f. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.
   g. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. To the greatest extent possible, mount closers inside rooms.
   h. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.
   i. Combination Door Closers and Holders: Provide units designed to hold door in open position under normal usage and to release and automatically close door under fire conditions. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.
   j. Supply all accessory plates and/or brackets as necessary.

G. Overhead Door Holders:

1. Acceptable manufacturers:
    a. Glynn Johnson 450 Series, 900 Series*
    b. Rixson Firemark 10 Series, 9 Series
2. Characteristics:
    a. Provide heavy duty or medium duty door holders, concealed or surface mounting, as scheduled, of stainless steel.
    b. Concealed holders to be installed with the jamb bracket mortised flush with the bottom of the jamb. The arm and channel to be mortised into the door.
    c. Surface holders to be installed with the jamb bracket mounted on the stop.

H. Floor Stops and Wall Bumpers:
1. Acceptable manufacturers:
    a. Burns
    b. Ives*
    c. Trimco
2. Characteristics: Refer to Hardware Sets.

I. Door Bolts/Coordinators:
1. Acceptable manufacturers:
    a. Burns
    b. Ives*
    c. Trimco
2. Characteristics:
    a. Flush bolts to be forged brass 6-3/4" x 1", with 1/2" diameter bolts. Plunger to be supplied with milled surface one side that fits into a matching guide.
    b. Automatic flush bolts and self-latching flush bolts shall be UL listed for fire door application without bottom bolts (LBB).
    c. Coordinator to be soffit mounted non-handed fully automatic UL listed coordinating device for sequential closing of paired doors with or without astragals.

J. Protective Plates:
1. Acceptable manufacturers:
    a. Burns
    b. Ives*
    c. Trimco
2. Characteristics:
    a. Provide manufacturers standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
    b. Materials:
        1) Metal Plates: Stainless Steel, .050 inch (U.S. 18 gage).
    c. Fabricate all protective plates with beveled edges on all 4 sides.

d. Fabricate all protective plates with countersunk screws.
e. Fabricate protection plates not more than 2 inches less than door width on hinge side and not more than 1 inch less than door width on pull side.
f. Heights:

K. Thresholds:
1) Kick plates to be 10 inches in height or 1” less bottom rail height.
2) Mop plates to be 4 inches in height or 1” less bottom rail height.
3) Armor plates to be 34“ in height. Armor plates on fire doors to comply with NFPA 80. All armor plates to be cut for hardware as required by application.
4) All protection plates to be cut or dimensions adjusted to accommodate all door hardware.

1. Acceptable manufacturers:
   a. National Guard Products, Inc.* 896S
   b. Reese Industries S483A
   c. Zero Weatherstripping Co., Inc. 265A
2. Types: Indicated in Hardware Sets.

L. Door Seals/Gasketing: As specified or required by code.
1. Acceptable manufacturers:
   a. National Guard Products, Inc.* 5050
   b. Reese Industries 797
   c. Zero Weatherstripping Co., Inc. 188FS PSA
2. Types: Indicated in Hardware Sets.

M. Sweeps/Door Bottoms: As specified or required by code.
1. Acceptable manufacturers:
   a. National Guard Products, Inc.*
   b. Reese Industries
   c. Zero Weatherstripping Co., Inc.
2. Types: Indicated in Hardware Sets.

N. Silencers:
1. Acceptable manufacturers:
   a. Burns
   b. GJ
   c. Ives*
2. Three for each single door; four for pairs of doors.

O. Key Cabinet and System:
1. Acceptable manufacturers:
   a. Telkee, Inc.
2. Provide a key control system including envelopes, labels, tags with self- locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer,

with capacity for 150 percent of the number of locks required for the Project.

a. Provide complete cross index system set up by key control distributor, and place keys on markers and hooks in the cabinet as determined by the final key schedule.
b. Provide hinged panel type cabinet for wall mounting.
c. Provide multiple drawer type cabinet.

P. Security Equipment:

1. Acceptable manufacturers:
   a. Schlage Electronics (No Acceptable Equal) To protect the integrity of the Access Control System only factory direct, hardware and software authorized distributors will be acceptable.

2. Characteristics:
   a. Lockset and Exit device listed to UL294.
   b. Lockset and Exit device trim to meet or exceed A156.25 Grade 1 operational and Security.
   c. Lockset and Exit device trim listed to UL10C, FCC Part15, Florida Building Code Standards TAS 201 large missile impact, TAS 202 and TAS 203. Lockset and Exit device trim shall be compliant with ICC / ANSI A117.1 NFPA 101, NFPA 80, and Industry Canada RSS-210.
   d. Lockset and Exit Device Trim to be manufactured with open architecture characteristics capable of handling new and existing access control software and credential reading technology.
   e. Lockset to be modular in design, to have the ability to change credential reader without being removed from door.
   f. Exit Device Trim to be modular in design, to have the ability to change credential reader in the field.
   g. Locking escutcheon, security lever trim to be non-handed, operate independently of non-locking levers for extended life cycles. Handing to be field reversible.
   h. Lockset and Exit Device Trim to have the following standard status switches: Lock/Unlock Status (Clutch Position), Request-to-Exit Switch, Request to Enter Switch, Door Position Switch, Interior Cover Tamper Guard.
   i. Exterior lever to be designed with ability to rotate freely while door remains securely locked, preventing damage to internal lock components from vandalism by excessive force.
   j. Lockset and Exit Device Trim to communicate Battery Status and Communication Status.
   k. Furnish locks with following functions which will be field configurable without taking the lock off the door:
      1) Classroom / Storeroom 70.
   l. Lockset powered by Eight AA batteries or a 12V or 24V DC power supply.

m. Lockset and Exit Device Trim utilized with brightblue software, SMS Premier/Enterprise software or 3rd Party software to have capability to be remotely locked down real-time, within 10 seconds or less, without user interface at the device.

n. Lockset and Exit Device Trim utilized with brightblue software, SMS Premier/Enterprise software or 3rd Party software to have capability to be remotely unlocked real-time without user interface at the device.

o. Lockset and Exit Device Trim to have visual tri-colored LED to indicate operational systems status, system error conditions and low power conditions.

p. Lockset and Exit Device Trim to have audible feedback that can be enabled or disabled.

q. Credential reader capabilities for SMS Software or 3rd Party Partner integrated software may include and may not belimited to:

1) 13.56 MHz Smart card credentials:

a) Secure section (Multi-Technology and Smartcard): Schlage, XceedID ISO-X, MIFARE, ISO-X Lite, my-d, DESFire 8-EV1.

b) 13.56 MHz Serial number only (Multi-Technology and Smartcard): MIFARE, DESfire, iClass,Inside Pictotag, ST Micro, TI Tagit.

2) 125 kHz Proximity card credentials: Schlage, XceedID, HID, GE/CASI ProxLite and AWID.

3) Multi-Technology readers that read both 13.56 MHz Smart Cards
+ 125 kHz Prox cards.

r. The lock and exit device trim will have the ability to utilize SFIC removable core key systems in the lever:

s. Provide option for tamper torx screws on inside escutcheon for Higher Security.

t. Acceptable Manufacturers: Schlage Electronics Model: AD-200Series.

2.2 MATERIALS AND FABRICATION

A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire rated labels and as otherwise acceptable to Architect.

1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy,

composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
   1. Do not provide hardware that has been prepared for self tapping sheet metal screws, except as specifically indicated.
   2. Furnish screws for installation with each hardware item. Provide Phillips flat- head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including “prepared for paint" surfaces to receive painted finish.
   3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
   4. Do not use thru bolts or sex bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of adequately fastening the hardware, or otherwise found in Headings. Coordinate with wood doors and metal doors and frames where thru bolts are used as a means of reinforcing the work, provide sleeves for each thru bolt or use sex screw fasteners.

2.3 HARDWARE FINISHES

A. Match items to the manufacturer’s standard color and texture finish for the latch and lock sets (or push-pull units if no latch of lock sets).

B. Provide finishes that match those established by ANSI or, if none established, match the Architect’s sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer’s standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

E. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.
1. Hinges (Exterior): 630 (US32D) Satin Stainless Steel
2. Hinges (Interior wood doors): 652 (US26D) Satin Chrome Plated Steel
3. Continuous Hinges: 628 (US28) Clear Anodized Aluminum
4. Flush Bolts: 626 (US26D) Satin Chrome Plated Brass/Bronze
5. Locks: 630 (US32D) Satin Stainless Steel
6. Exit Devices: 630 (US32D) touchpads
7. Door Closers: 689 Powder Coat Aluminum
8. Protective Plates: 630 (US32D) Satin Stainless Steel
9. Door Stops: 626 (US26D) Satin Chrome Plated Brass/Bronze
10. Overhead Holders: 630 (US32D) Satin Stainless Steel.
11. Thresholds/Weatherstripping: 627/628 (US27/US28) Aluminum

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
2. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.
3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section “Joint Sealers”.

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the applicationmade.
   1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and makes final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Door Hardware Supplier's Field Service
   1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
   2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
   3. File written report of this inspection to Architect.

D. Prior to project completion, representatives of the lock, exit device and overhead closer manufacturers shall inspect and adjust all units and certify that all units are installed in accordance with the manufacturer’s instructions, and are regulated properly and functioning correctly. A written report shall be provided to the Architect as to the inspection and shall include appropriate certificates.

HARDWARE SCHEDULE – DIVERSIFIED FILTER BUILDING

HW Set #1.00 – 101A, 101B, 102A, 102B, 103A, 103B.

Each Door to Receive:

3 Ea	Hinges
1 Ea	Classroom Mortise Lock w/ Lever
1 Ea	Core
1 Ea	Kick Plate
1 Ea	Floor Stop
1 Ea	Threshold
1 Ea	Seal Set
1 Ea	Door Sweep
1 Ea	Overhead Drip

HW Set #2.00 – 103C (Office 2).

Each Door to Receive:

3 Ea	Hinges
1 Ea	Passage Latch
1 Ea	Core
1 Ea	Closer
1 Ea	Kick Plate
1 Ea	Seal Set

HW Set #3.00 – 105A (Restroom).

Each Door to Receive:

3 Ea	Hinges
1 Ea	Bath Privacy Lock
1 Ea	Core
1 Ea	Closer
1 Ea	Kick Plate
1 Ea	Seal Set

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2009 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: 110 mph wind speed, Exposure B.
2. Design Snow Loads: As indicated on Drawings.
3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.4 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

1.6 QUALITY ASSURANCE

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR- A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat- treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

2.3 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Pilkington North America
2. PPG Industries, Inc.
3. Prior reviewed equal.

B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal.
2. Spacer: Manufacturer’s standard spacer material and construction.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
2. EPDM complying with ASTM C 864.
3. Silicone complying with ASTM C 1115.
4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Corning Corporation; 799.

b. GE Advanced Materials-Silicones; UltraGlaze SSG4000

c. Tremco Incorporated; Proglaze SSG

d. Prior reviewed equal.

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire- protection rating indicated.

2.8 MONOLITHIC-GLASS TYPES

A. Glass Type GL-1: Clear fully tempered float glass.

1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

B. Glass Type GL-2: Not used.

2.9 INSULATING-GLASS TYPES

A. Glass Type GL-3: Clear insulating glass.

1. Overall Unit Thickness: 1 inch.
2. Thickness of Each Glass Lite: 6.0 mm.
3. Outdoor Lite: Fully tempered float glass.
4. Interspace Content: Air.
5. Indoor Lite: Fully tempered float glass.
6. Visible Light Transmittance: 79 percent minimum.
7. Winter Nighttime U-Factor: 0.47 maximum.
8. Summer Daytime U-Factor: 0.50 maximum.
9. Solar Heat Gain Coefficient: 0.70 maximum.
10. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure- glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from

construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work of this section consists of furnishing all materials, labor, equipment and incidentals required and performing all the painting necessary to complete this contract in its entirety.

B. It is the intent of these specifications to paint all exposed pipe, fittings, valves, and pumping equipment. Minor items omitted in the schedule of work shall be included in the work of this section when they come within the general intent of the specifications as stated herein. Painting of pump station proper is not required by this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Shop priming and surface preparation of equipment and piping are specified in the respective section with the item to be primed.

B. Piping is included in Sections 33 05 19.

C. Protective Coatings in Section 09 97 00

D. Concrete Unit Masonry Coating in Section 04 22 00.

1.03 QUALITY ASSURANCE

Include on label of containers:

1. Manufacturer's name.
2. Type of paint.
3. Manufacturer's stock number.
4. Color.
5. Instructions for reducing, where applicable.
6. Label analysis.
7. Federal specification number.

1.04 SUBMITTALS

Submit to the Engineer as provided in the General Conditions and Section 01 33 23,

shop drawings, manufacturer's specifications, and printed technical data on the proposed paint systems and detailed surface preparation, application procedures and dry film thickness.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery of Materials

1. Deliver sealed containers with labels legible and intact and with batch codes indicating when the coating was manufactured.
2. Deliver to project site or segregate at source of supply in advance of need so as to allow 15 days for testing.

B. Storage Materials

1. Store only acceptable project materials on project site.
2. Store in a suitable location.
3. Restrict storage to paint materials and related equipment.
4. Comply with health and fire regulations.
5. No paint shall be stored on site or applied which exceeds the product shelf life at time of application.

1.06 JOB CONDITIONS

A. Environmental Requirements

1. Comply with manufacturer's recommendations as to environmental conditions under which coating systems can be applied.
2. Do not apply finish in areas where dust is being generated.

B. Protection

Cover or otherwise protect finished work of other trades or surfaces not being painted concurrently or not to be painted.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All painting materials shall be fully the equal to those manufactured by the Tnemec Co. or Koppers Company, Inc. or approved equal. No brand other than those named will be considered for approval unless the brand and type of paint proposed for each item in the following schedule, together with sufficient data substantiated by certified tests conducted at no expense to the Owner, to demonstrate its equality to the paint(s) named, is submitted in writing to the

Engineer for approval within 30 days after the signing of the Notice to Proceed. The type and number of tests performed shall be subject to the Engineer's approval. Minimum standards for testing shall be in accordance with the applicable test methods of the American Society for Testing Material (ASTM) and Federal Standard No. 141 or other approved methods when not covered by the preceding.

B. All painting materials shall be delivered in unbroken packages bearing the manufacturer's brand and name. They shall be used without adulteration and mixed, thinned, and applied in strict accordance with manufacturer's directions for the applicable materials and surface and with the Engineer's approval before using.

C. Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with the finish paints to be used.

D. No paint containing lead will be allowed. Oil shall be pure boiled linseed oil. All thinners used from the coating manufacturer.

E. All recommendations of the paint manufacturer in regard to the health and safety of workers shall be followed.

F. All pipe support floor stands shall be painted.

2.02 FABRICATED EQUIPMENT

A. Unless otherwise indicated below, all fabricated equipment shall be shop primed and shop or field finished.

B. All items to be shop primed shall be thoroughly cleaned of all loose material prior to priming. If, in the opinion of the Engineer, any prime coating shall have been improperly applied or if material contrary to these specifications shall have been used, that coating shall be removed by sandblasting to white metal and reprimed in accordance with these specifications.

C. All shop prime coats shall be of the correct materials and applied in accordance with these specifications. The Contractor shall remove any prime coats not in accordance with these specifications by sand-blasting and apply the specified prime coat at no additional cost to the Owner.

D. Shop primed surfaces shall be cleaned thoroughly and retouched with the specified primer before the application of successive paint coats in the field.

E. Shop finish coats may be the standard finish as ordinarily applied by the manufacturer when approved by the Engineer.

F. The Contractor shall be responsible for and take whatever steps are necessary to properly protect the shop prime and finish coats against damage from weather or any other cause.

G. If, in the opinion of the Engineer, a shop finish coat does not give the protection quality of other work of similar nature, the Contractor shall apply the coat or coats of paint as directed by the Engineer to accomplish the desired protection quality. The Engineer may request proof of purchase of specified materials by the Contractor and/or fabricator if the need arises.

2.03 EXTRA PAINT

Furnish one clearly marked unopened gallon can or kit, if coating is a catalized type coating, of each type and each color of paint used.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES

A. All surfaces to be painted shall be prepared as specified herein and by the manufacturers recommendations and shall be dry and clean before painting.

B. All metal welds, blisters, and other defects shall be ground and sanded smooth in accordance with SSPC-SP-3 or, in difficult and other-wise inaccessible areas, by hand cleaning in accordance with SSPC-SP-2. All pits and dents shall be filled and all imperfections shall be corrected so as to provide a smooth surface for painting. All rust, loose scale, oil, grease, and dirt shall be removed by use of approved solvents, wire brushing, or sanding.

C. Exposed Pipe: Bituminous coated pipe shall not be used in exposed locations. Pipe which shall be exposed after project completion shall be primed in accordance with the requirements in Section 09 97 00. Any bituminous coated pipe which is inadvertently installed in exposed locations shall be sandblasted clean before priming and painting. After installation of all exterior, exposed flanged joints shall have the gap between adjoining flanges sealed with a single component Thiokol caulking to prevent rust stains.

D. Shop-Finished Surfaces: All shop-coated surfaces shall be protected from damage and corrosion before and after installation by treating damaged areas immediately upon detection. Abraded or corroded spots on shop-coated surfaces shall be "Hand Cleaned" and then touched up with the same materials as the shop coat or as specified by the coating manufacturer. All shop coated surfaces which are faded, discolored, or which require more than minor touchup, in the opinion of the Engineer, shall be repainted.

3.02 PAINTING SYSTEMS

All colors shall be selected and paint schedule shall be as specified in Section 33 05 19, 09 97 00, and 04 22 00.

3.03 WORKMANSHIP

A. General

1. Primer (spot) and paint used for a particular surface shall, in general, be as scheduled for that type of new surface. Confirm with the paint manufacturer that the paint proposed for a particular repaint condition will be compatible with the existing painted surface. Sample repainted areas on the actual site will be required to ensure this compatibility. Finished repainted areas shall be covered by the same guarantee specified for the remainder of work.
2. At the request of the Engineer, samples of the finished work prepared in strict accordance with these specifications shall be furnished and all painting shall be equal in quality to the approved samples. Finished areas shall be adequate for the purpose of determining the quality of workmanship. Experimentation with color tints shall be furnished to the satisfaction of the Engineer where standard chart colors are not satisfactory.
3. On metal surfaces, apply each coat of paint at the rate specified by the manufacturer to achieve the minimum dry mill thickness required. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. One gallon of paint, as originally furnished by the manufacturer, shall not cover a greater area when applied by spray gun than when applied unthinned by brush. Deficiencies in film thickness shall be corrected by the application of an additional coat(s).
4. Paints shall be mixed in proper containers of adequate capacity. All paints shall be thoroughly stirred before use and shall be kept stirred while using. No unauthorized thinners or other materials shall be added to any paint.

B. Field Priming

1. Steel members, metal castings, mechanical and electrical equipment, and other metals which are shop primed before delivery at the site, will not require a prime coat on the job, provided the Contractor and/or subcontractor apply only the brand and type of coating specified in 09800 and as the "Standard of Quality" for the total coating system applied. All piping and other bare metals to be painted shall receive one (1) coat of primer before exposure to the weather, and this prime coat shall be the first coat as specified in the painting schedule.
2. Surfaces that have been shop painted and have been damaged, or where the shop coats or coats of paint have deteriorated, shall be properly cleaned and

retouched before any successive painting is done on them in the field. All such field painting shall match as nearly as possible the original finish.

C. Field Painting

1. All painting at the site shall be designated as Field Painting and shall be under the direct and complete control of the Engineer, and only skilled painters and specialists, where required, shall be used on the work.
2. All paint shall be at 70F before applying, and painting shall be done when the air and surface temperatures are between 60-100F for epoxies, 50-100F for acrylic emulsions and 32-100F for all other coating systems applied. Unless coating manufacturer's technical information states otherwise, no paint shall be applied unless the surface and air temperature is 5 degrees above the dew point.
3. Successive coats of paint shall be tinted so as to make each coat easily distinguishable from each other with the final undercoat tinted to the approximate shade of the finished coat.
4. Finish surfaces shall not show brush marks or other irregularities. Undercoats shall be thoroughly and uniformly sanded with No. 00 sandpaper or equal to remove defects and provide a smooth even surface. Top and bottom edges of doors shall be painted and all exterior trim shall be back-primed before installation.
5. Painting shall be continuous and shall be accomplished in an orderly manner so as to facilitate inspection.
6. All materials shall be brush painted unless spray painting is specifically approved by the Engineer.
7. All surfaces to be painted, as well as the atmosphere in which painting is to be done, shall be kept warm and dry by heating and ventilation, if necessary, until each coat of paint has hardened. Any defective paint shall be scraped off and repainted in accordance with the Engineer's directions.
8. Before final acceptance of the work, all damaged surfaces of paint shall be cleaned and repainted as directed by the Engineer, Owner and/or Testing Laboratory.
9. Valves and fittings shall be painted the same color as the pipe.
10. It shall be the responsibility of the coating manufacturer's representative to provide on site technical assistance to the Engineer and Contractor and to report his findings from the on-site inspection as to surface preparation, application procedures, and dry film thickness to the Engineer on a timely basis unless deemed unnecessary by the Engineer.

3.04 CLEANUP

A. The premises shall at all times be kept free from accumulation of waste material and rubbish caused by employees or work. At the completion of the painting, remove all tools, surplus materials, and all rubbish from and about the site.

B. Upon completion, remove all paint where it has been spilled, splashed, or splattered on floors, fixtures, equipment, and all other surfaces, leaving the work ready for inspection.

END OF SECTION

SECTION 09 97 00

PROTECTIVE COATINGS

PART 1 - GENERAL

1.01 This specification covers preparation of surfaces, performance and completion of painting and coating of all surfaces unless specified otherwise elsewhere in the specifications and the drawings.

1.02 All materials delivered to job site shall be in original sealed and labeled containers of the paint manufactured.

1.03 Coatings shall be applied during good painting and coating weather. Air and surface temperatures a well as dew point shall be within limits prescribed by the manufacturer for the coating being applied and work areas shall be reasonably free of airborne dust at the time of application and while coating is drying.

1.04 Upon completing the installation of the protective coatings, the Contractor must obtain written certification from the manufacturer that all work has been performed within the limits prescribed by the manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

All materials specified herein are manufactured by Tnemec Co., Inc., Koppers Company, Inc. and Ameron Protective Coatings, or equal. These products are specified to establish standards of performance and quality and are approved for use on this project.

2.02 SUBSTITUTIONS

A. Equivalent materials of other manufacturers may be substituted on approval of the Engineer. Requests for substitution shall include Manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance. Submittals shall include the following performance data as certified by a qualified testing laboratory:

1. Abrasion - Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.
2. Adhesion - Elcometer Adhesion Tester.
3. Exterior Exposure - Exposed at 45 degrees facing ocean (South Florida Marine Exposure).
4. Hardness - ASTM D3363-74

5. Humidity - ASTM D2247-68
6. Salt Spray (Fog) - ASTM B117-73

B. Bidders desiring to use coatings other than those specified shall submit their proposal in writing to the Engineer. Substitutions that decrease the film thickness, the number of coats applied, change the generic type of coating, or fail to meet the performance criteria of the specified materials will not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.

2.03 COLORS

A. Colors, where not specified, shall be as selected by the Owner or Engineer. The Contractor shall furnish color chips for each protective coating system for review and selection.

B. Safety Color Code for Marking Physical Hazards. The safety color selected for the marking of physical hazards and safety, fire fighting and protection equipment shall be in accordance with OSHA 1910.144.

C. Color Selection

1. Colors shall meet the tests specified in ANSI Z53.1. The colors used shall conform to the color chips identified by numbers specified in Federal Standard 595.

Color	Standard	Color	Standard
Red	11105	Blue	15120
Yellow	13655	Purple	17142
Orange	12246	White	17875
Green	14260	Black	17038

2. The color selection for the items not covered by OSHA Color Standards shall either be in accordance with the Painting Schedule, or to be determined after submittal of color chips by Contractor.
3. Generally, different colors will be selected for pumps, equipment, piping, valves and electrical items, and for interior and exterior locations.

2.04 COATING SCHEDULE

A. Metal Surfaces - Exterior Environment (not subject to corrosive gases)

Surface Preparation for Carbon Steel: SSPC-SP10 Near-White Blast Cleaning.

Surface Preparation for Cast Iron & Ductile Iron: 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

		Dry Film-Mils
1st Coat	Epoxy-Polyamide Primer	5.0 - 6.0
2nd Coat	Epoxy-Polyamide Primer	5.0 - 6.0
3rd Coat	Aliphatic Acrylic Polyurethane	5.0 - 6.0

Description: All metal surfaces without factory finish not installed within an enclosed structure including buried piping and fittings, couplings, adaptors, valves, vaults, control panel enclosures, etc.

Aluminum, Stainless Steel and Galvanized Steel shall not to be coated unless approved by the Engineer or Owner.

B. Metal Surfaces - Corrosive Gas or Immersion Environment

Surface Preparation for Carbon SteelSSPC-SP10 Near-White Blast Cleaning

Surface Preparation for Cast Iron & Ductile Iron: 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

		Dry Film-Mils
1st Coat	Polyamidoamine Epoxy	5.0 - 6.0
2nd Coat	Cycloalphatic Amine Epoxy	5.0 - 6.0
3rd Coat	Cycloalphatic Amine Epoxy	5.0 - 6.0

Description: Metal surfaces exposed in lift station, wet well, manholes or similar locations including piping and fittings, valves, pumps, brackets, supports, etc.

Aluminum and Stainless Steel shall not to be coated unless approved by the Engineer or Owner.

If surface is subject to UV exposure, consult with coating manufacturer.

C. Interior of Existing concrete structures:

Description: Structures that hold liquids or are subject to corrosive gases and liquids, buried concrete or brick structures holding liquids such as wet wells and manholes.

1. Application procedures shall conform to recommendations of the manufacturer, including materials handling, mixing, environmental controls during application, safety and spray equipment
2. Approved Products

    a. 100% Solids Epoxy (Tnemec Permashield or approved equal)

        1) Surface Preparation: Allow new concrete to cure for 28 days, verify dryness by ASTM D4263. Abrasive blast to remove laitance, form release agents, curing compounds, sealers, or other contaminants and to achieve a surface profile equivalent to ICRI CSP 5.
        2) Materials:

		Dry Film-Mils
1st Coat	Surfacer: Cementitious Epxoy Resurfacer Tnemec Series 218 Motarclad or approved equal	1/16"
2nd Coat	Lining: 100% Solids Polyamine Epoxy Mortar Tnemec Series 434 H2S Permashield or approved equal	125 mils
3rd Coat	Glaze Coat: 100% Solids Polyamine Epoxy Tnemec Series 435 H2S Permaglaze or approved equal	12.0 – 15.0

    b. Multi-Component Polymeric Stress Skin System (Spectrashield or approved equal)

        1) Surface Preparation: The use of high pressure water cleaning, hydro blasting, abrasive blasting, grinding and detergent water cleaning shall conform to manufacturer's recommendations. All surface defects repair materials and procedures shall conform to manufacturer's recommendations.
        2) Materials:

            i. Modified polymer shall be spray able, solvent free, two components polymeric, moisture/chemical barrier specifically developed for the corrosive wastewater environment.
            ii. Final installation shall be a minimum of 500 mils.
            iii. A permanent identification and date of installation shall be a fixed to the structure in a readily visible location.

    c. H2S Resistant Cementitious Modified Silica Mortar and Amine Cured Epoxy Coating (Dinjer CMS 10-K and SG Mastic or approved equal)

1. Surface Preparation: The use of high pressure water cleaning, hydro blasting, abrasive blasting, grinding and detergent water cleaning shall conform to manufacturer's recommendations. All surface defects repair materials and procedures shall conform to manufacturer's recommendations.
2. Materials (All shall be from the same manufacturer)

    a. Cementitious Coating (Dinjer CMS-10K or approved equal)
        i. Quick setting, high strength, sulfide resistant, calcium aluminate-based or portland cement material.
        ii. Suitable for troweling or rotary spray application to inside of manhole.
        iii. Use additives to increase corrosion resistance or bond strength at manufacturer's direction and with Contract Manager's approval.
        iv. Density when applied: 135 lb./cf +/- 5 lb./cf.
        v. Compressive strength (ASTM C109) at 1 day Minimum acceptable: 2,000 psi.
        vi. Compressive strength (ASTM C109) at 28 days Minimum acceptable: 5,500 psi.
        vii. Bond Strength (ASTM C882) at 28 days minimum acceptable: 1,640 psi.
        viii. Flexural Strength (ASTM C78) at 28 days minimum acceptable: 1,500 psi.
        xi. Shrinkage (ASTM C596) at 28 days: 0 percent.

    b. Amine Epoxy (Dinjer SG Mastic or approved equal)
        i. Final installation shall be a minimum of 100 mils at 16 square feet per gallon minimum.
        ii. Compressive strength (ASTM D-695) at 1 day Minimum acceptable: 12,000 psi.
        iii. Compressive strength (ASTM D-695) at 7 days Minimum acceptable: 13,000 psi.
        iv. Bond Strength (ASTM C882) at 14 days minimum acceptable: 3,000 psi.
        v. Flexural Strength (ASTM D-790) at 28 days minimum acceptable: 13,000 psi.

D. Interior and Exterior of new concrete structures see Specification 04 22 00.

2.05 PERFORMANCE REQUIREMENTS

A. Epoxy Polyamide: Epoxy polyamide shall contain no lead or soluble chromates. Epoxy-polyamide shall be able to weather sixty (60) days prior to top coating with itself or aliphatic urethanes. Scarify surface before top coating if exposed to sunlight for 60 days or longer.

    1. Minimum Solids per Gallon: 56.0 +/- 2.0%

2. Abrasion: No more than 115 mg loss after 1000 cycles (ASTM D 4060, CS-17 Wheel, 1,000 grams load)
3. Adhesion: Not less than 1600 psi pull average of three trials (ASTM D 4541 Elcometer Adhesion Tester)
4. Exterior Exposure: No blistering, cracking or delamination of the film. No more rust creepage at scribe or after seventy-two months exposure.
5. Fresh Water Immersion: No blistering, cracking, softening or delamination of the film after 4 years immersion in 77 F. tap water (ASTM D 870).
6. Hardness: Must pass 3H (ASTM D 3363)
7. Salt Fog: No blistering, rusting, cracking, softening or delamination of the film. No more than 1/8 inch rust creepage at scribe after 8,000 hours exposure (ASTM B117).
8. Manufacturer: Tnemec 66 or equal.

B. High Solids Catalyzed Epoxy – Amine:

1. Minimum Solids per Gallon: 82.0 +/- 2.0%
2. Abrasion: No more than 120 mg loss after 1000 cycles (ASTM D 4060, CS-17 Wheel, 1,000 grams load)
3. Chemical Resistance: No blistering, cracking, softening or delamination of the film after seven days exposure at 75^{o}F to 10% sulfuric acid, 50% sodium hydroxide, 10% hydrochloric acid, 10% phosphoric acid and 5% sodium chloride.
4. Salt Spray Resistance: No blistering, rusting, cracking, softening or delamination of the film. No more than 1/32 inch rust creepage at scribe after 1,500 hours exposure (ASTM B 117-73).
5. Manufacturer: Tnemec 104 or equal.

C. High – Build Coal Tar Epoxy: Minimum of 68% epoxy resin and 32% coal tar pitch. Maximum of 2.73 lbs Volatile Organic Compounds (VOC) after thinning.

1. Minimum Solids per Gallon: 75.0 +/- 2.0%
2. Abrasion: No more than 145 mg loss after 1000 cycles (ASTM D 4060 CS-17 Wheel, 1,000 grams load)
3. Adhesion: Steel - Not less than 800 psi pull average of three trials (Elcometer Adhesion Tester). Concrete - Not less than 350 psi pull average of three trials (Elcometer Adhesion Tester)
4. Impact Resistance: Not less than 40 inch/lbs average (ASTM D 2794, direct impact).
5. Salt Spray Resistance: No blistering, rusting, cracking, softening or delamination of the film. No rust creepage at scribe after 9000 hours exposure (ASTM B 117).
6. Manufacturer: Tnemec 46H-413 or equal.

D. Modified Aliphatic Amine Epoxy Mortar: Aggregate – reinforced 100% solids, hybrid epoxy mortar. Maximum of 0.79 lbs/gallon volatile organic compounds (VOC) (unthinned).

1. Minimum Solids per Gallon: 100%
2. Chemical Resistance: No blistering, cracking, erosion, softening, swelling, or loss of adhesion or gloss after 98 day continuous immersion at 100F and 25% sulfuric acid (ASTM D 868 Atlas Cell).
3. Impact Resistance: No visible cracking or delamination after 160 in lbs (ASTM D 2794, direct impact).
4. ASTM G 210 Severe Wastewater Analysis Test: Minimal initial impedance of 10 Log Z (Z in ohms cm2 @ 0.1 hz). No blistering, cracking, checking or loss of adhesion. Final impedance greater than 9 Log Z after 28 days exposure.
5. Manufacturer: Tnemec 434 or equal.

E. Polyurethane Multi-Component Stress Skin System

Tensile Strength (PSI)	ASTM D412	2670
Elongation (%)	ASTM D412	430
100% Modulus	ASTM D412	2200
300 % Modulus	ASTM D412	2600
Tear Strength (PLI)	ASTM D2240	280
Hardness (shore D)	ASTM D1737	42D
Flexibility (1/ 8 “Mandrel)	ASTM D1737	Pass
Flashpoint (°F)	ASTM Pensky-Martin	>200
Taber Abrasion (mg loss)	ASTM D4060	25

The supplied lining system shall include a 10-year limited warranty covering both materials AND installation beginning on the date of final acceptance. Both the Manufacturer and the Applicator shall stand behind this warranty for 10 years.

PART 3 - EXECUTION

3.01 GENERAL

A. All surface preparation, coating and painting shall conform to applicable standards of the Steel Structures Painting Council (SSPC), and the manufacturer's printed instructions. Material applied prior to approval of the surface by the Engineer shall be removed and reapplied to the satisfaction of the Engineer at the expense of the Contractor.

B. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice.

Continuity of personnel shall be maintained and transfers of key personnel shall be coordinated with the Engineer.

C. The Contractor shall provide a supervisor at the work site during cleaning and application operation. The supervisor shall have the authority to sign change orders, coordinate work and make decisions pertaining to the fulfillment of the contract.

D. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in an approved cleaning solvent and wiped dry with clean rags as per SSPC SP1.

E. Coating and painting systems include surface preparations, prime coating and finish coatings. Any off-site work that does not conform to this specification is subject to rejection by the Engineer.

F. Shop applied prime coatings, which are damaged during transportation, construction or installation shall be thoroughly cleaned and touched up in the field as directed by the Engineer. The Contractor shall use repair procedures that insure the complete protection of all adjacent primer. The specified repair method and equipment may include wire brushing, hand, or power tool cleaning or dry air blast cleaning. In order to prevent injury to surrounding painted areas, blast cleaning may require use of lower air pressure, small nozzle and abrasive particle sizes, short blast nozzle, distance from surface, shielding and masking. If damage is too extensive or uneconomical to tough-up, then the item shall be re-cleaned and coated or painted as directed by the Engineer.

G. The Contractor's coating and painting equipment shall be designed for application of materials specified and shall be maintained in first class working condition. Compressors shall have suitable traps and filters to remove water and oils from the air. Contractor's equipment shall be subject to approval of the Engineer.

H. Application of the first coat shall follow immediately after surface preparation and cleaning and within an eight-hour working day. Any cleaned areas not receiving first coat within eight-hour period shall be re-cleaned prior to application of first coat.

I. Prior to assembly, all surfaces made inaccessible after assembly shall be prepared as specified herein and shall receive the coating or paint system specified.

3.02 SURFACE PREPARATION

A. The latest revision of the following surface preparation specifications of the Steel Structures Painting Council (SSPC) shall form a part of this specification.

1. Solvent Cleaning (SSPC SP): Removal of oil, grease soil and other contaminants by use of solvents, emulsions, cleaning compounds, steam cleaning or similar materials and methods which involve a solvent or cleaning action.
2. Hand Tool Cleaning (SSPC SP2): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by hand chipping, scraping, sanding and wire brushing.
3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale and other detrimental foreign matter to degree specified by power wire brushing, power impact tools or power sanders.
4. White Metal Blast Cleaning (SSPC-SP5): Blast cleaning to a gray-white uniform metallic color until each element of surface area is free of all visible residues.
5. Commercial Blast Cleaning (SSPC-SP6): Blast cleaning until at least two thirds of each element of surface area is free of all visible residues.
6. Brush-Off Blast Cleaning (SSPC-SP7): Blast cleaning to remove loose rust, loose mill scale and other detrimental foreign matter to degree specified.
7. Near White Blast Cleaning (SSPC-SP10): Blast cleaning to nearly white metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues.

B. Slag and weld metal accumulation and spatters not removed by the fabricator, erector or installer shall be removed by chipping and grinding. All sharp edges shall be peened, ground or otherwise blunted as required by the Engineer.

C. Field blast cleaning for all surfaces shall be by dry method unless otherwise directed.

D. Particle size of abrasives used in blast cleaning shall be that which will produce a 1 1/2 - 2 mil (37.5 microns - 50.0 microns) surface profile or in accordance with recommendations of the manufacturer of the specified coating or paint system to be applied.

E. Abrasive used in blast cleaning operations shall be new, washed, graded, and free of contaminants that would interfere with adhesion of coating or paint and shall not be reused unless specifically approved by the Engineer.

F. Surface preparation will be based upon comparison with: "Pictorial Surface preparation Standards for Painting Steel Surfaces", SSPC-Vis 1 ASTM Designation D220; "Standards Methods of Evaluation Degree of Rusting on Painted Steel Surfaces", SSPC-Vis-2 ASTM Designation D610; "Visual Standard for Surfaces of New Steel Air blast Cleaned with Sand Abrasive".

G. During blast cleaning operations, caution shall be exercised to insure that existing coatings or paint are not exposed to abrasion from blast cleaning.

H. The Contractor shall keep the area of his work in a clean condition and shall not permit blasting materials to accumulate as to constitute a nuisance or hazard to the prosecution of the work or the operation of the existing facilities.

I. Blast cleaned surfaces shall be cleaned prior to application of specified coatings or paint. No coatings or paint shall be applied over damp or moist surfaces.

3.03 APPLICATION

A. Coating and paint application shall conform to the requirements of the Steel Structures Painting Council Paint Application Specification SSPC-PA latest revision for "Shop Field and Maintenance Painting", and the manufacturer of the coating and paint materials.

B. Thinning shall be permitted only as recommended by the manufacturer and approved by the Engineer.

C. Each application of coating or paint shall be applied evenly, free of brush marks, sags, runs, with no evidence of poor workmanship. Care shall be exercised to avoid lapping on glass or hardware. Coatings and paints shall be sharply cut to lines. Finished surfaces shall be free from defects or blemishes.

D. Protective coverings or drop cloths shall be used to protect floors, fixtures, and equipment. Care shall be exercised to prevent coatings or paints from being splattered onto surfaces that are not to be coated or painted. Surfaces from which materials cannot be removed satisfactorily shall be recoated or repainted as required to produce a finish satisfactory to the Engineer.

E. When two coats of paint are specified, where possible, the first coat shall contain sufficient approved color additive to act as an indicator of coverage or the two coats must be of contracting color.

F. Film thicknesses per coat specified are the minimum required. Contractor shall apply additional coats as necessary to achieve the specified thickness.

G. No coating or paint shall be applied: When the surrounding air temperature or the temperature of the surface to be coated or painted is below 40 degrees F., too wet or damp surfaces or in rain, snow, fog or mist; when the temperature is less than 5 degrees F. above the dew point; when it is expected the air temperature will drop below 40 degrees F. six hours after application of coating and paint. Dew point shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce Weather Bureau Psychrometric Tables.

H. If above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall

be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.

I. All material shall be applied as per manufacturer's recommendations.

J. All welds and irregular surfaces shall receive a brush coat of the specified product prior to application of the first complete coat.

K. All parts that can be disassembled such as vents and manhole covers shall be removed and coated inside and out as per applicable coating systems. Upon completion of coating, those parts disassembled shall be reassembled prior to placing in service.

3.04 ACCEPTANCE OF WORK

A. All surface preparation and repairs shall be approved by the Engineer/Owner before primer is applied.

B. Request acceptance of each coat before applying next coat.

C. Correct work that is not acceptable and request reinspection.

D. Thickness of coatings and or the paint shall be checked with a non-destructive, magnetic type thickness gauge. (Use an instrument such as a Tooke Gauge if a destructive tester is deemed necessary.) Coating integrity of interior coated surfaces shall be tested with approved inspection devices. Holiday detection shall be performed prior to application of aluminum or metallic finish coats. Non-destructive holiday detector shall not exceed 67.5 volts nor shall destructive holiday detector exceed the voltage recommended by the manufacturer of the coating system. For thicknesses between 10 and 20 mils (250 microns and 500 microns) a non-sudsing type setting agent, such as Kodak Photo-Flo, shall be added to the water and detector sponge prior to detector use. All pinholes shall be marked and repaired in accordance with the manufacturer's printed recommendations and retested. No pinholes or other irregularities shall be permitted in the final coating.

E. The Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for detection of holidays and measurement of dry-film thickness of coating and paint. The Contractor shall also furnish U.S. Department of Commerce, National Bureau of Standards certified thickness calibration plates to test accuracy of dry-film thickness gauge and certified instrumentation to test accuracy of holiday detectors.

F. The coating contractor is to regularly check his work with these devices to make sure that dry-film thickness meet specifications. The Engineer shall at his discretion use the Contractors or his own equipment to perform similar inspections.

G. Dry-film thickness gauges and holiday detectors shall be made available for the Engineer's use at all times until final acceptance of application. Holiday detection device shall be operated in the presence of the Engineer.

H. Concrete surfaces in immersion service must have void - and pinhole-free coating application. Inspection of coating system with 5X magnification will provide these assurances.

I. Warranty inspection shall be conducted during the eleventh month following completion of all coating and painting work. All defective work shall be repaired in accordance with this specification and to the satisfaction of the Engineer/Owner.

J. In accordance with requirements set forth by regulatory agencies applicable to the construction industry and manufacturer's printed instructions and appropriate technical bulletins and manuals, the Contractor shall provide and require use of personnel protective lifesaving equipment for persons working in, or about the project site.

K. Equipment shall include protective helmets that shall be worn by all persons while in the vicinity of the work. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying, half-mask or mouthpiece respirator with appropriate filter. Barrier creams shall be used on any exposed areas of skin.

L. Where ventilation is used to control hazardous exposure, all equipment shall be explosion proof. Ventilation shall reduce the concentration of air contaminant to the degree a hazard does not exist. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.

M. Whenever the occupational noise exposure exceeds maximum allowable sound levels, the Contractor shall provide and require the use of approved ear protective devices.

N. Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the Engineer, the Contractor shall provide additional illumination and necessary supports to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the Engineer.

O. All temporary ladders and scaffolding shall conform to applicable safety requirements. They shall be erected where requested by the Engineer to facilitate inspection and be moved by the Contractor to locations requested by the Engineer.

P. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paint must be stored to conform to City, Parish, State, and Federal safety codes for

flammable coating or paint materials. At all times, coatings and paints shall be protected from freezing.

3.05 CLEAN UP

Upon completion of the work, all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Coating or paint spots and oil or stains upon adjacent surfaces shall be removed and the job site cleaned. All damage to surfaces resulting from the work of painting contractor or subcontractor shall be cleaned, repaired, or refinished to the satisfaction of the Engineer at no cost to the Owner.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

This Section includes the following:

1. Panel signs.
2. Interior unframed signs.
3. Signage accessories.

1.2 SUBMITTALS

Product Data: For each type of product indicated.

Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
3. Wiring Diagrams: Power, signal, and control wiring.

Samples: For each sign type and for each color and texture required.

1.3 QUALITY ASSURANCE

Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 MATERIALS

Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.

Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.

Brass Castings: ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).

Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi (103 MPa) when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi (207 MPa) when tested according to ASTM D 790.

Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:

1. Impact Resistance: 16 ft-lbf/in. (854 J/m) per ASTM D 256, Method A.
2. Tensile Strength: 9000 lbf/sq. in. (62 MPa) per ASTM D 638.
3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. (2345 MPa) per ASTM D 790.
4. Heat Deflection: 265 deg F (129 deg C) at 264 lbf/sq. in. (1.82 MPa) per ASTM D 648.
5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.

Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure- sensitive adhesive backing, suitable for exterior applications.

2.2 PANEL SIGNS

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ASI-Modulex, Inc.
2. Best Sign Systems Inc.
3. InPro Corporation
4. Mohawk Sign Systems.

5. Prior reviewed equal.

Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:

6. Laminated, Sandblasted Polymer: Raised graphics with Braille 1/32 inch (0.8 mm) above surface with contrasting colors as selected by Architect from manufacturer's full range and laminated to acrylic back.
7. Edge Condition: Square cut.
8. Corner Condition: Square.
9. Mounting: Framed.

    a. Wall mounted with two-face tape.
    b. Manufacturer's standard anchors for substrates encountered.

10. Color: As selected by Architect from manufacturer's full range.
11. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.

Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign.

Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of slide-in inserts.

12. Furnish insert material cut-to-size for changeable message insert.

Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

13. Panel Material: Opaque acrylic sheet.
14. Raised-Copy Thickness: Not less than 1/32 inch.

2.3 ACCESSORIES

Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.4 FABRICATION

General: Provide manufacturer's standard signs of configurations indicated.

1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.5 ALUMINUM FINISHES

Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.

1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.

2.6 COPPER-ALLOY FINISHES

Cast-Bronze Plaque Finishes: Exposed surfaces free of porosity, burrs, and rough spots; with returns finished with fine-grain air blast.

1. Raised Areas: Hand-tool and buff borders and raised copy to produce manufacturer's standard satin finish.
2. Background Finish: Dark oxidized.

Clear Protective Coating: Coat exposed surfaces of copper alloys with manufacturer's standard, clear organic coating specially designed for coating copper-alloy products.

PART 3 - EXECUTION

3.1 INSTALLATION

Sign Location: Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.

1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches

of sign without encountering protruding objects or standing within swing of door.

Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.

3. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
4. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
5. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.

Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.

Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

6. Flush Mounting: Mount characters with backs in contact with wall surface.

Cast-Metal Plaques: Mount plaques using standard fastening methods to comply with manufacturer's written instructions for type of wall surface indicated.

7. Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.

3.2 SIGN TYPE LEGEND

Type1: 8” high x 8” wide. International ADA symbol for toilet rooms and text, as indicated in schedule.

Type 2: 4” high x 8” wide. Shall have room number and/or room name as indicated in schedule.

Type 3: 4” high by 6” wide. Low-level exit sign mounted at latch side of door 60 inches above finish floor to the centerline of the sign.

All signs to comply with ADAAG.

All signage text to be verified by Owner.

3.3 SIGN SCHEDULE

ROOM NO.	TEXT	TYPE	REMARKS
DIVERSIFIED FILTER BUILDING			
101A, 101B	Filter Room	2	
102A, 102B	Chemical Storage	2	
103A, 103B	Office 1	2	
103C	Office 2	2	
105A	Restroom	1	International Symbol for Unisex Restroom
All Exterior Doors	Exit	3	4 Total

END OF SECTION

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Solid-polymer toilet compartments configured as toilet enclosures and urinal screens.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 75 or less.
   2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and
Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.

1. Electrolytically Zinc Coated: ASTM A 879/A 879M, 01Z (03G).
2. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvannealed.

B. Zamac: ASTM B 86, commercial zinc-alloy die castings.

2.2 SOLID-POLYMER UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Accurate Partitions Corporation.
2. Bradley Corporation; Mills Partitions.
3. Comtec Industries/Capitol Partitions.
4. Santana Products, Inc.
5. Prior reviewed equal.

B. Toilet-Enclosure Style: Overhead braced.

C. Urinal-Screen Style: Overhead braced.

D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
2. Polymer Panel Finish: One color and pattern in each room.

a. Color and Pattern: As selected by Architect from manufacturer's full range.

E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; polymer.

1. Polymer Color and Pattern: Matching pilaster.

F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe matching that on the pilaster.

G. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, stainless steel.
2. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum with bright dip anodized finish.

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.

1. Material: Chrome-plated zamac.
2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position.
3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft- resistant- type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective- coated steel.

2.4 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit

floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at bottoms of posts. Provide shoes at posts to conceal anchorage.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

B. Clearances: Maximum 1/2 inch between pilasters and panels; 1 inch between panels and walls.

C. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bathroom accessories for Diversified Filter Building Restroom.

B. Contractor-Furnished, Contractor Installed Equipment: Toilet tissue dispenser, grab bars, mirrors, paper towel dispenser, and liquid-soap dispenser.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. Prior reviewed equal.

B. Toilet Tissue (Roll) Dispenser:

1. Basis-of-Design Product: Bobrick Washroom Equipment B-4288.

2. Description: Double-roll dispenser.

3. Mounting: Surface mounted.

4. Operation: Theft-resistant heavy duty spindles.

5. Capacity: Designed for up to 5 1/4 inch diameter tissue rolls.

6. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Waste Receptacle:

1. Basis-of-Design Product: Bobrick Washroom Equipment B-3644.
2. Mounting: Open top, recessed.
3. Minimum Capacity: 12 gal.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Liner: Reusable vinyl liner.
6. Lockset: Tumbler type for waste-receptacle.

D. Liquid-Soap Dispenser:

1. Basis-of-Design Product: Bobrick Washroom Equipment B-40.

2. Description: Designed for dispensing soap in liquid form.

3. Mounting: Vertically oriented, surface mounted.

4. Capacity: 40 fluid ounces; 1.2 liters.

5. Materials: Two-tone black and grey. Valve dispenses all-purpose soaps. Vandal- resistant lid with keyless locking device. Translucent container. Pushbutton operation.

E. Grab Bar:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc.: B-5806..
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

F. Paper Towel Dispenser

1. Bobrick B-262 Surface Mounted Paper Towel Dispenser.

2. Material and Finish: Stainless steel, No. 4 finish (satin).

G. Mirror Unit:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc. B-1659 1836.
2. Frame: Stainless-steel channel.

    a. Corners: Mitered and mechanically interlocked.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

    a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

2.2 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Plumberex Specialty Products, Inc.
2. Truebro by IPS Corporation.
3. Prior reviewed equal.

C. Underlavatory Guard:
1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.3 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. Section includes fire extinguishers for blower building.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. LAC 55:V:303.E: Provide listed portable fire extinguishers in accordance with NFPA 10.

Classification:

Class A fires: fires in ordinary combustible materials, such as wood, cloth, paper, rubber and many plastics. Travel distance to a fire extinguisher shall not exceed 75 feet.

Class B fires: fires in flammable liquids, combustible liquids. petroleum greases, tars. oils, oil-based paints, solvents, lacquers, alcohols and flammable gases. Travel distance to a fire extinguisher shall not exceed 30 feet for Class B fires

(liquids). (May be increased to 50 feet for Light (low) Hazard fires with 10-B extinguisher, for Ordinary (moderate) Hazard fires with 20-B extinguisher, and for Extra (high) Hazard fires with 80-B extinguisher). See NFPA 10, Table 6.3.1.1.

Class C fires: fires that involve energized electrical equipment. Travel distance to a fire extinguisher shall not exceed 75 feet.

B. Provide UL rated fire extinguishers with enameled steel containers.

C. Fire Extinguisher Requirements:
   1. Class ABC
   2. Capacity: 10 LBS
   3. UL Rating: 4A:80B:C

D. Products: MP10 by Larsen, Cosmic 10E by J.L. Industries, Amerex B456, or approved equal.

E. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fire extinguishers at locations shown in drawings.

B. Mounting height: Top of fire extinguisher shall be installed 4’-0” Above Finished Floor (A.F.F.) but not more than 5’-0” A.F.F. per NFPA 10:6.1.3.8.

C. NFPA 10:6.1.3: Fire extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. Locate portable fire extinguishers along normal paths of travel, including exits from areas.

D. NFPA 10:6.1.3.3.1: Fire extinguishers shall not be obstructed or obscured from view.

END OF SECTION

SECTION 10 73 26

PROTECTIVE COVERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pre-engineered, pre-finished hot-dip galvanized steel eye-brow canopies.

1.2 RELATED SECTIONS

A. Section 03300 – Cast-In-Place Concrete.

B. Section 26500 – Electrical Lighting.

1.3 REFERENCES

A. ASTM A 500: Specification for Structural Tubing for construction of bridges and buildings.

B. ASTM A 653: Specification for Steel Sheet, zinc coated by the hotdip process; Structural quality.

C. ASTM A 924: General requirements for Steel Sheet, metallic coated by the hot dip process.

D. AISI: Specification for the design of Cold-formed steel structural members.

1.4 DESIGN REQUIREMENTS

A. Roof Deck and Trim: Pre-painted, hot-dip galvanized (G-90) steel meeting ASTM A 653.

B. Roof Beams and Structural Framing: ASTM A 653, Grade 50, hot-dip galvanized (G-90) steel.

C. Canopy: Self-draining from deck to gutter beam with discharge point as indicated.

D. Building Code: IBC 2009.

E. Design Loads:
   1. Comply with Building Code for site location. Basic wind speed 120 MPH, exposure category B.
   2. Collateral Loads: Additional loads imposed by other materials or systems identified in contract documents.

F. Structural Design: Prepare complete structural design calculations for canopy members by a Louisiana licensed structural engineer.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's catalog data, detail sheets, and specifications.

C. Shop Drawings: Layout and erection drawings showing roof framing, deck panels, cross sections, thru-bolt fasteners size, location and spacing and trim details, clearly indicating proper assembly.

D. Samples: Color selection samples consisting of actual coating material.

E. Quality Assurance/Control Submittals:
   1. Qualifications: Letter certifying manufacturer's required qualifications.
   2. Structural Design Calculations.
   3. Manufacturer's Installation Instructions.

1.6 QUALITY ASSURANCE

A. Overall Standard: Structural engineering design documents stamped by a structural engineer registered to practice in the State of Louisiana.

B. Manufacturer Qualifications: Minimum five years experience in producing covers/canopies with welded bents and of the type specified.

C. Installer Qualifications: Minimum two years experience in erecting covers/canopies of the type specified.

1.7 DELIVERY, STORAGE AND HANDLING

A. Conform to Section 01660 – Product Storage and Handling Requirements.

B. Follow manufacturer's instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Childers Carports & Structures, Inc.

B. Peachtree Protective Covers.

C. Dittmer Architectural Aluminum.

D. Prior reviewed equal.

E. Provide all protective covers from a single manufacturer.

2.2 MATERIALS

A. Roof Deck and Trim: Pre-painted, hot-dip galvanized (G-90) steel meeting ASTM A 653.

B. Roof Beams and Structural Framing: ASTM A 653, Grade 50, hot-dip galvanized (G-90) steel.

C. Grout: 1 part Portland cement, 3 parts masonry sand; 2,000 pounds per square inch (13.8 MPa) compressive strength.

2.3 COMPONENTS

A. Steel Beams Supporting Decking Below Beam: Tapered steel beam supports.
   1. Size: As shown on drawings.
   2. Size: As required by structural engineering design.

B. Deck: Flat pan, pre-painted hot-dip galvanized steel, self-flashing, and interlocking sections.
   1. Size and Profile: As required by structural engineering design.
   2. Provide welded endplate water dams where sections terminate at other than drainage channels.

C. Fascia: Manufacturer’s standard pre-painted hot-dip galvanized steel sections as shown on drawings and as required to complete the installation resulting in a neat finished appearance.

D. Flashing: Prefinished galvanized steel sheet, 24 gage thickness.

2.4 ACCESSORIES

A. Fasteners:
   1. Deck Screws: No. 14 by 1 inch (25 mm), self-tapping, Type 18-8 stainless steel with neoprene washers.
   2. Trim Screws: No. 10 by ½ inch (13 mm), self-tapping, Type 18-8 stainless steel.
   3. Trim Rivets: Stainless steel, size recommended by manufacturer for specific condition.
   4. Thru-bolts: Stainless steel, 1/2 inch diameter with 1/4 inch galvanized steel backing plates. Number and spacing as determined by manufacturer's design.
   5. Other Fasteners: Type 18-8 stainless steel, type recommended by manufacturer for specific condition.

2.5 FINISHES

A. Deck:
   1. Factory applied baked on polyester coating.

B. Fascia/Gutter:
   1. Factory applied baked on polyester coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine building surfaces to which canopy will connect.

B. Coordinate with responsible trade for thru-bolting of canopy supports, and location of steel backing plates.

C. Commencement of work by installer is acceptance of existing conditions.

3.2 ERECTION

A. Erect protective covers in accordance with manufacturer's installation instructions.

B. Install straight, and true to line.

3.3 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer.

B. Remove surplus materials and debris from the site.

3.4 PROTECTION

A. Protect finished surfaces from damage due to subsequent construction operations.

END OF SECTION

SECTION 13 34 19

METAL BUILDINGS

PART I - GENERAL

1.01 DESCRIPTION OF WORK

A. Provide all labor, material, equipment and services necessary for design, fabrication and erection of a pre-engineered metal building in accordance with Specifications.

Provide the following metal building structure to enclose the Filter assemblies in accordance with the dimensions shown on the Plans. The Contractor shall submit shop drawings indicating his proposed metal building components, curbs, foundations, flashings, aluminum canopy, including 3ft overhang on three sides.

The contractor's proposed drawings shall be reviewed by the Engineer prior to approval of fabrication and construction. The Contractor is required to visit the site and familiarize himself with all the existing conditions. Contractors shall be aware that existing downspouts from the adjacent building are shown to be rerouted to the south side of the building. All piping, electrical conduits, and other systems that are presently in this area and are required to pass through the walls or roof of new building shall be sealed with a watertight detail proposed by the Contractor.

Concept drawing shows new building on curbs with opening at the base. It shall be permissible for the Contractor to provide a new housekeeping concrete topping and adjust grades of adjacent grass areas so that positive drainage away from the new enclosure is achieved.

B. The pre-engineered metal buildings shall include but be not necessarily limited to, the following:

1. All anchor bolts, primary and secondary structural framing members and connection bolts;

2. Structural framing (headers and trimmers) around openings in roofs and walls; for items suspended from the roof construction such as ducts, pipes, etc.

3. Roof and wall bracing;

4. Roof, wall, canopy an soffit coverings; flashing, closures, clips and connectors, fasteners, accessories, trim and sealers;

5. Roof jacks for pipe penetrations.

6. Galvanized steel grating and framing for the Eden Isles facility.

C. Building Type:

1. Clear-span

2. Roof slopes shall be as shown on Drawings;

3. Bay Spacing of primary frames shall be as determined by the Contractor;

4. Eave heights shall be as required to span above the existing tanks.

D. Drawings for construction shall be sealed by a professional engineer licensed in Louisiana.

1.02 QUALITY ASSURSNCE

A. Metal buildings of the following manufacturers, providing they meet the requirements of these Specifications and Drawings, are acceptable;

1. Hercules Metal Buildings

2. Varco-Pruden Metal Building Systems

3. E.B. Ludwig

1.03 SUBMITTALS

A. Design Calculations shall:

1. Immediately after award of Contract, be submitted to the Engineer, in triplicate, in a format presentable to St. Tammany Parish for review and approval by both, the Engineer and St. Tammany Parish, prior to issuance of the building permits.

2. Include anchor bolts, base and splice plates (use AISC design procedure only), frames, purlins, girts, roof covering, wall covering and

all connections. Wind load: Determine according to IBC-15, 160 MPH wind.

3. Bear the seal of a Professional Civil Engineer registered in the State of Louisiana.

B. Shop Drawings shall include:

1. Anchor bolt and column setting plans.

2. Sidewall, endwall and roof framing.

3. Transverse and longitudinal sections.

4. Coverings, flashings and accessories details.

5. Installation details containing complete piece-marked erection drawings which shall include listings and description of all building components required to complete the pre-engineered metal buildings as specified.

C. Samples:

1. Manufacturer's standard color chips for color selection by the Engineer of walls, roof gutters and downspouts, trim and accessories.

1.04 WARRANTIES

A. Upon completion, submit the following written warranties:

1. Building manufacturer's warranty shall warrant the pre-engineered building systems, proper, under express conditions of use and exposure, against defective materials and workmanship for a period of five (5) years from date of delivery and shall warrant building accessories against defective materials and workmanship of accessory manufacturer for not less than one (1) year.

2. The building manufacturers shall furnish a minimum warranty of ten (10) years on the exterior color finishes.

3. Erection warranty shall warrant the building systems, proper against defects due to faulty workmanship in erection for a period of five (5) years from date of completion. Collateral materials and work shall be warranted against defects in material and workmanship for a period of one (1) year.

PART 2 – PRODUCTS

2.01 GENERAL DESIGN REQUIREMENTS

A. Structural mill shapes and welded plate sections shall be designed in accordance with the latest edition of AISC “Specification for the Design, Fabrication and Erection of Structural Steel for Buildings”.

B. Cold-formed steel members shall be designed in accordance with latest edition AISC “Specification for the Design of Cold-Formed Steel Structural Members”.

C. Design Loads:

1. Roof live load shall be applied to horizontal roof projection and shall be 20 psf.

2. A design wind pressure of in accordance with 2015 IBC, with 130 MPH wind speed shall be applied to Structural in accordance with the MBMA “Recommended Design Practices Manual”.

3. The roof shall sustain up-lift pressures as of specified in IBC-2015.

4. Roof purlins shall have sufficient strength to support roof, suspended ducts, pipes light fixtures, etc. Verify weights to be supported.

5. Design load combinations shall be as specified in IBC-2015.

D. Anchor Bolts shall be:

a. Sized by the building manufacturer to resist all shears and uplifts induced by the structure and shall be not less than the sizes shown on the manufacturer’s anchor bolt-approved layout drawings.

b. Unpainted so as to bond with the concrete.

2.02 STRUCTURAL FRAMING

A. All framing members shall be shop fabricated for bolted field assembly. Field cutting or drilling, when required, shall be clearly noted on the erection drawings.

B. Primary structural framing shall include the transverse rigid frame, end bearing frames, endwall columns, and wind bracing.

C. Secondary structural framing shall include the purlins, girts, eave struts, flange bracing, sill support, clips and other miscellaneous structural parts.

D. All hot-rolled steel sheet, plate, and strip used in the fabrication of weld assemblies shall conform to the requirements of ASTM Specification A-529, A-572 Grade 42, or A-570 Grade “E” as applicable. All hot roll sheet and strip used in the fabrication of cold-formed members shall conform to the requirements of ASTM Specification A-570 Grade 45 except for the following: Thickness 0.050” to 0.097” shall have a minimum yield strength of 55,000 psi and a minimum tensile strength of 67,500 psi; Thickness 0.131” to 0.229” shall have a minimum yield strength of 50,000 psi and a minimum tensile strength of 62,500 psi. Smooth round bars for diagonal rod bracing shall conform to the requirements of ASTM Specification A-752, Grade 65.

E. All shop connections shall be welded in accordance with AWS “Standard Code for Welding in Building Construction”. Welders and welding process shall have been previously certified as provided in this code. All flange to web welds shall be continuous, submerged arc, partial penetration fillet welds on one side of the web. Other welds shall be by either the gas metal, submerged or shielded arc process. Butt welds in flange plates shall be full penetration.

F. All field connections shall be bolted. Bolts shall be machine bolts conforming to ASTM Specification A-307 or ASTM Specification A-325 as shown on the drawings. A-325 bolts shall be electro-zinc plated.

G. Wind bracing shall consist of diagonal rod or angle bracing in both roof and walls.

H. Shop Painting: All primary structural framing members which are not galvanized shall be cleaned by rotary abrasive blasting to a “Commercial Blast” grade as specified by the Steel Structures Painting Council, Specification SP 6-63. Following cleaning, one shop coat primer, 99-G as manufactured by Tnemec Co., Inc., Heavy Duty RIP 1-0900 as manufactured by Southern Coatings & Chemical Company, Inc., or RUST-OLEUM 1069 as manufactured by Rust-Oleum Corporation, shall be applied.

I. Framing for grating shall be hot dipped galvanized.

2.03 ROOF AND WALL COVERING

A. Roof Panels: Minimum 20 ga. galvalume rib panel.

B. Wall Panels: Minimum 26 ga. prefinished rib panel.
C. Factory Color Coating: “Spectrum 20”.

D. Material for galvanized steel shall conform to ASTM Specifications A 446 Grade “E” (80,000 psi yield) coating class.

E. Fasteners:

1. All self-tapping sheet metal screws shall conform to ANSI. Standard B 18.6 and shall have Type “A” threads. Where required for weathertightness, screws shall be equipped with metal and neoprene washers.

2. Screws and washers shall be Carbon steel, plated with 0.0003” thick cadmium.

3. After plating, all exposed fasteners and washers shall be coated with zinc phosphate and with one prime coat and two finish coats of baked silicone polyester; the color of the finish shall match the wall panels.

F. Closures:

- Standard closures shall be closed cell foam DPDM closures matching the panel profile and installed along the eave, rake and at accessories as required to provide a weathertight connection.

2.04 GRATING

A. All grating shall be hot dipped galvanized.

B. All grating shall be 1 1/4” x 3/16” serrated & galvanized. Provide hold clips as per manufacturer’s specification with a minimum of 4-clips per section.

C. All anchor bolts to be a minimum 3/4-inch galvanized, or as shown on the plans with HILTI HIT –HY 200 Safe Set System or approved equal.

D. All stair treads to be grating 1 1/4” x 3/16” serrated, galvanized with ck plate nosing.

E. All handrail shall be galvanized 1 1/2" standard pipe (1.90 OD) with 1/4" x 4” toe plate.

2.05 ACCESSORIES

A. Galvanized steel for eave gutters, downspouts, trim, flashing and other miscellaneous uses shall be 24 ga. or heavier.

B. Eave gutters shall be formed to match sculptured profile of eave trim and equipped with heavy gauge, galvanized, adjustable supports. Square downspouts shall be equipped with wall attachments.

C. Trim or flashing shall be furnished at corners, rakes, eaves, openings, intersections of roofs with walls, where shown on Drawings, and where necessary to provide weathertightness and a finished appearance.

D. Roof jacks shall be manufacturer's standard, sized to properly accommodate the roof penetrations, and shall positively protect the roof openings as well as their connections to the roof panels.

PART 3 – EXECUTION

3.01 INSPECTION

A. Check surfaces and other existing conditions affecting the proper erection of pre-engineered metal buildings.

B. Verify that locations and spacings of anchor bolts are correct.

C. Do not proceed with erection of pre-engineered metal buildings until deficiencies are corrected.

D. Starting erection shall be construed as acceptance of existing conditions.

3.02 ERECTION

A. Erection of pre-engineered metal buildings, accessories, wall and roof insulation, shall be performed by one of the following:

1. Authorized dealers or builders of the manufacturer.

2. Building manufacturer's crews.

3. Other erectors authorized by the manufacturer as trained and qualified to erect that manufacturer's product, in which case, the manufacturer

shall inspect the work and certify its correctness to the Engineer in writing.

B. Structural Framing:

1. Erect framing in compliance with manufacturer's recommendations and governing building codes.

2. Comply with AISC "Specification and Code of Standard Practice" and with specified requirements. Maintain work in a safe and stable condition during erection.

3. Install structural steel level, plumb true to lines and slopes, and as indicated. Shim bearing plates with metal and grout solid.

4. Weld all field connections except where bolted connections are specifically indicated on approved Shop Drawings.

5. Install high-strength threaded fasteners in accordance with AISC "Specification for Structural Joints".

3.03 TOUCH-UP PAINTING

A. Structural Framing:
- Immediately upon erection, field welds, and abraded or corroded spots shall be wire brushed and including bolted connections, shall be touched-up with same rust-inhibitive primer as that used for shop coat.

B. Panels and Accessories:

- Abraded surfaces of panels and accessories shall be cleaned and touched-up with manufacturer's matching paint. Touch-up shall be unnoticeable.

C. Remove and replace all items which cannot be satisfactorily touched-up.

END OF SECTION

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.
3. Grout.
4. Silicone sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. GPT; an EnPro Industries company.

B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, anticorrosion coated or galvanized, with plain ends and integral welded waterstop collar.

C. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. GPT; an EnPro Industries company.
4. Metraflex Company (The).
5. Proco Products, Inc.

B. Description:

1. Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
2. Designed to form a hydrostatic seal of 20 psig minimum.
3. Sealing Elements: High-temperature-silicone interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
4. Pressure Plates: Carbon steel or Stainless steel.
5. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, ASTM B 633 or Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.4 SILICONE SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Polymeric Systems, Inc.
d. Schnee-Morehead, Inc., an ITW company.
e. Sherwin-Williams Company (The).

B. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. May National Associates, Inc.; a subsidiary of Sika Corporation.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout or silicone sealant, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.

B. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Steel pipe sleeves.

2. Exterior Concrete Walls below Grade:

a. Piping Smaller Than NPS 6: Steel pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:

a. Piping Smaller Than NPS 6: Steel pipe sleeves with sleeve-seal system.

1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Steel pipe sleeves.

5. Interior Partitions:

a. Piping Smaller Than NPS 6: Steel pipe sleeves or PVC pipe sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed and salvaged, or removed and reinstalled.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. BrassCraft Manufacturing Co.; a Masco company.
2. Dearborn Brass.
3. Jones Stephens Corp.
4. Keeney Manufacturing Company (The).
5. Mid-America Fittings, Inc.
6. ProFlo; a Ferguson Enterprises, Inc. brand.

2.2 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated or polished brass finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished, chrome-plated finish and spring-clip fasteners.

C. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.3 FLOOR PLATES

A. Split Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

1. Escutcheons for New Piping and Relocated Existing Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
b. Insulated Piping: One-piece cast brass with polished, chrome-plated finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
e. Bare Piping in Unfinished Service Spaces: One-piece cast brass with polished, chrome-plated finish.
f. Bare Piping in Equipment Rooms: One-piece cast brass with rough-brass finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 220518

SECTION 220523.12 - BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Brass ball valves.
2. Bronze ball valves.
3. Steel ball valves.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1. Certification that products comply with NSF 61 and NSF 372.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and soldered ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded end valves.
2. ASME B16.1 for flanges on iron valves.
3. ASME B16.5 for flanges on steel valves.
4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
5. ASME B16.18 for solder-joint connections.
6. ASME B31.9 for building services piping valves.

C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Actuator Types:

1. Handlever: For quarter-turn valves smaller than NPS 4.

H. Valves in Insulated Piping:

1. Include 2-inch stem extensions.
2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRASS BALL VALVES

A. Brass Ball Valves, Two-Piece with Full Port and Brass Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. American Valve, Inc.
b. Apollo Flow Controls; Conbraco Industries, Inc.
c. Crane; Crane Energy Flow Solutions.
d. DynaQuip Controls.
e. Elkhart Products Corporation.

f. FNW; Ferguson Enterprises, Inc.
g. Hammond Valve.
h. Jomar Valve.
i. KITZ Corporation.
j. Legend Valve & Fitting, Inc.
k. Marwin Valve; Richards Industries.
l. Milwaukee Valve Company.
m. NIBCO INC.
n. Red White Valve Corp.
o. Stockham; Crane Energy Flow Solutions.
p. WATTS.

2. Description:

a. Standard: MSS SP-110 or MSS SP-145.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Forged brass.
e. Ends: Threaded and soldered.
f. Seats: PTFE.
g. Stem: Brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, Two-Piece with Full Port, and Bronze or Brass Trim, Threaded or Soldered Ends:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Apollo Flow Controls; Conbraco Industries, Inc.
b. Crane; Crane Energy Flow Solutions.
c. FNW; Ferguson Enterprises, Inc.
d. Hammond Valve.
e. Lance Valves.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. WATTS.
i. Zurn Industries, LLC.

2. Description:

a. Standard: MSS SP-110 or MSS-145.
b. CWP Rating: 600 psig.
c. Body Design: Two piece.
d. Body Material: Bronze.
e. Ends: Threaded and soldered.

f. Seats: PTFE.
g. Stem: Bronze or brass.
h. Ball: Chrome-plated brass.
i. Port: Full.

2.4 STEEL BALL VALVES

A. Steel Ball Valves with Full Port, Class 150:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Apollo Flow Controls; Conbraco Industries, Inc.
b. FNW; Ferguson Enterprises, Inc.
c. Jamesbury; Metso.
d. NIBCO INC.

2. Description:

a. Standard: MSS SP-72.
b. CWP Rating: 285 psig.
c. Body Design: Split body.
d. Body Material: Carbon steel, ASTM A 216, Type WCB.
e. Ends: Flanged or threaded.
f. Seats: PTFE.
g. Stem: Stainless steel.
h. Ball: Stainless steel, vented.
i. Port: Full.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.4 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Brass ball valves, two-piece with full port and brass trim. Provide with threaded or solder joint ends.
2. Bronze ball valves, two-piece with full port and bronze or brass trim. Provide with threaded or solder joint ends.

B. Pipe NPS 2-1/2 and Larger:

1. Steel and Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
2. Steel ball valves, Class 150 with full port.

END OF SECTION 220523.12

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal hanger-shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Pipe-positioning systems.
8. Equipment supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.

B. Pipe Welding Qualifications: Qualify procedures and operators according to 2015 ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated or epoxy powder coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly, made from structural-carbon-steel shapes, with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. B-line, an Eaton business.
    b. Flex-Strut Inc.
    c. G-Strut.
    d. Haydon Corporation.
    e. Thomas & Betts Corporation; A Member of the ABB Group.
    f. Unistrut; Part of Atkore International.
    g. Wesanco, Inc.

2. Description: Shop- or field-fabricated pipe-support assembly, made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4, factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel channel with inturned lips.
5. Channel Width: Selected for applicable load criteria.
6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
8. Metallic Coating: Pregalvanized G90.

2.5 THERMAL HANGER-SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Buckaroos, Inc.
2. Carpenter & Paterson, Inc.
3. Clement Support Services.
4. ERICO International Corporation.
5. National Pipe Hanger Corporation.
6. Pipe Shields Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Hilti, Inc.
b. ITW Ramset/Red Head; Illinois Tool Works, Inc.
c. MKT Fastening, LLC.
d. Simpson Strong-Tie Co., Inc.

B. Mechanical-Expansion Anchors: Insert-wedge-type anchors, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. B-line, an Eaton business.
b. Empire Tool and Manufacturing Co., Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head; Illinois Tool Works, Inc.
e. MKT Fastening, LLC.

2. Indoor Applications: Zinc-coated steel.
3. Outdoor Applications: Stainless steel.

2.7 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand:

1. Description: Single base unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
3. Hardware: Galvanized steel or polycarbonate.
4. Accessories: Protection pads.

C. Low-Profile, Single-Base, Single-Pipe Stand:

1. Description: Single base with vertical and horizontal members, and pipe support, for roof installation without membrane protection.
2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
3. Vertical Members: Two galvanized-steel, continuous-thread, 1/2-inch rods.
4. Horizontal Member: Adjustable horizontal, galvanized-steel pipe support channels.
5. Pipe Supports: Roller or Strut clamps.
6. Hardware: Galvanized steel.
7. Accessories: Protection pads.
8. Height: 12 inches above roof.

D. High-Profile, Single-Base, Single-Pipe Stand:

1. Description: Single base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Single vulcanized rubber or molded polypropylene.
3. Vertical Members: Two galvanized-steel, continuous-thread, 1/2-inch rods.
4. Horizontal Member: One adjustable-height, galvanized--steel, pipe-support slotted channel or plate.
5. Pipe Supports: Roller or Swivel hanger.
6. Hardware: Galvanized steel.
7. Accessories: Protection pads, 1/2-inch, continuous-thread, galvanized-steel rod.
8. Height: 36 inches above roof.

E. High-Profile, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
2. Bases: Two or more; vulcanized rubber or molded polypropylene.
3. Vertical Members: Two or more, galvanized-steel channels.
4. Horizontal Members: One or more, adjustable-height, galvanized-steel pipe support.
5. Pipe Supports: Roller or Swivel hanger.
6. Hardware: Galvanized steel.
7. Accessories: Protection pads, 1/2-inch, continuous-thread rod.
8. Height: 36 inches above roof.

F. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.8 PIPE-POSITIONING SYSTEMS

A. Description: IAPMO PS 42 positioning system composed of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.9 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-carbon-steel shapes.

2.10 MATERIALS

A. Aluminum: ASTM B 221.

B. Carbon Steel: ASTM A 1011/A 1011M.

C. Structural Steel: ASTM A 36/A 36M carbon-steel plates, shapes, and bars; black and galvanized.

D. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size, or install intermediate supports for smaller-diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal Hanger-Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete, after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete, after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe-Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms, and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports, so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating Below Ambient Air Temperature: Use thermal hanger-shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39 protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

a. Option: Thermal hanger-shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
b. NPS 4: 12 inches long and 0.06 inch thick.

5. Thermal Hanger Shields: Install with insulation of same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections, so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finishes.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal hanger-shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.

9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction occurs.
15. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction occurs.
16. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction occurs but vertical adjustment is unnecessary.
17. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction occurs and vertical adjustment is unnecessary.
18. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation, in addition to expansion and contraction, is required.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment of up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11 split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable-Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal Hanger-Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.

7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

R. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Valve tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Brady Corporation.
b. Brimar Industries, Inc.
c. Carlton Industries, LP.
d. Champion America.

e. Craftmark Pipe Markers.
f. emedco.
g. Kolbi Pipe Marker Co.
h. LEM Products Inc.
i. Marking Services, Inc.
j. Seton Identification Products.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
3. Letter Color: Black.
4. Background Color: White.
5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated plans, details, and schedules, and the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated plans, details, and schedules and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Carlton Industries, LP.
5. Champion America.
6. Craftmark Pipe Markers.
7. emedco.
8. Kolbi Pipe Marker Co.
9. LEM Products Inc.
10. Marking Sevices Inc.
11. Seton Identification Products.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

2.3 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Carlton Industries, LP.
5. Champion America.
6. Craftmark Pipe Markers.
7. emedco.
8. Kolbi Pipe Marker Co.
9. LEM Products Inc.
10. Marking Sevices Inc.
11. Seton Identification Products.

B. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass beaded chain.

C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation as shown on valve tag, location of valve room or space, normal-operating position open, closed, or modulating, and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

C. Pipe Label Color Schedule:

1. Domestic Water Piping

a. Background: Safety green.

b. Letter Colors: White.

2. Sanitary Waste Piping:

a. Background Color: Safety white.
b. Letter Color: Black.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches, round.
b. Hot Water: 1-1/2 inches, round.

2. Valve-Tag Colors:

a. Cold Water: Natural.
b. Hot Water: Natural.

3. Letter Colors:

a. Cold Water: White.
b. Hot Water: White.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Knauf Insulation.
c. Manson Insulation Inc.
d. Owens Corning.

2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ramco Insulation, Inc.

B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ramco Insulation, Inc.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.

c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.

C. ASJ Adhesive Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Dow Corning Corporation.
b. Johns Manville; a Berkshire Hathaway company.
c. P.I.C. Plastics, Inc.
d. Speedline Corporation.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Knauf Insulation.
d. Vimasco Corporation.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Eagle Bridges - Marathon Industries.
    c. Foster Brand; H. B. Fuller Construction Products.
    d. Mon-Eco Industries, Inc.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Eagle Bridges - Marathon Industries.
    c. Foster Brand; H. B. Fuller Construction Products.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Eagle Bridges - Marathon Industries.
    c. Foster Brand; H. B. Fuller Construction Products.
    d. Knauf Insulation.
    e. Mon-Eco Industries, Inc.
    f. Vimasco Corporation.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 SEALANTS

A. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.7 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Foster Brand; H. B. Fuller Construction Products.
    b. Vimasco Corporation.

2.8 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Alpha Associates, Inc.

2.9 FIELD-APPLIED JACKETS

A. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. P.I.C. Plastics, Inc.
    c. Proto Corporation.
    d. Speedline Corporation.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

    a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.10 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Avery Dennison Corporation, Specialty Tapes Division.
    b. Compac Corporation.
    c. Ideal Tape Co., Inc., an American Biltrite Company.
    d. Knauf Insulation.
    e. Venture Tape.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Compac Corporation.
    b. Ideal Tape Co., Inc., an American Biltrite Company.
    c. Venture Tape.

2. Width: 2 inches.

3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Avery Dennison Corporation, Specialty Tapes Division.
   b. Compac Corporation.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
   e. Venture Tape.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.11 SECUREMENTS

A. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

2.12 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Buckaroos, Inc.
   b. Engineered Brass Company.
   c. Insul-Tect Products Co.
   d. McGuire Manufacturing.
   e. Plumberex Specialty Products, Inc.
   f. Truebro.
   g. Zurn Industries, LLC.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

    a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

D. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe

diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 and Smaller: Insulation shall be the following:

    a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

2. NPS 1-1/4 and Larger: Insulation shall be the following:

    a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Domestic Hot Water:

1. NPS 1-1/4 and Smaller: Insulation shall be the following:

    a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.

2. NPS 1-1/2 and Larger: Insulation shall be the following:

    a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be the following:

    a. Protective shielding pipe covers.

D. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation shall be the following:

    a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Galvanized steel pipe and fittings.
3. Piping joining materials.
4. Transition fittings.
5. Dielectric fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

A. System purging and disinfecting activities report.

B. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
2. Do not interrupt water service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Potable-water piping and components shall comply with NSF 14, NSF 61, and NSF 372. Include marking "NSF-pw" on piping.

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

2.3 GALVANIZED-STEEL PIPE AND FITTINGS

A. Galvanized-Steel Pipe:

1. ASTM A 53/A 53M, Type E, Grade B, Standard Weight.
2. Include ends matching joining method.

B. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless steel pipe with threaded ends.

C. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

D. Malleable-Iron Unions:

1. ASME B16.39, Class 150.
2. Hexagonal-stock body.
3. Ball-and-socket, metal-to-metal, bronze seating surface.
4. Threaded ends.

E. Flanges: ASME B16.1, Class 125, cast iron.

F. Appurtenances for Grooved-End, Galvanized-Steel Pipe:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Anvil International.
b. Grinnell Mechanical Products.
c. Shurjoint Piping Products USA Inc.
d. Victaulic Company.

2. Fittings for Grooved-End, Galvanized-Steel Pipe: Galvanized, ASTM A 47/A 47M, malleable-iron casting; ASTM A 106/A 106M, steel pipe; or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
3. Fittings for Grooved-End, Galvanized-Steel Pipe:

a. AWWA C606 for steel-pipe dimensions.
b. Ferrous housing sections.
c. EPDM-rubber gaskets suitable for hot and cold water.
d. Bolts and nuts.
e. Minimum Pressure Rating:

1) NPS 8 and Smaller: 600 psig.
2) NPS 10 and NPS 12: 400 psig.

2.4 PP PIPE AND FITTINGS

A. PP Pipe: ASTM F 2389, SDR 11.

B. PVC Socket Fittings: ASTM F 2389.

2.5 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.6 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Cascade Waterworks Mfg. Co.
b. Dresser, Inc.
c. Ford Meter Box Company, Inc. (The).
d. Jay R. Smith Mfg. Co.
e. JCM Industries, Inc.
f. Romac Industries, Inc.
g. Smith-Blair, Inc.
h. Viking Johnson.

D. Plastic-to-Metal Transition Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Charlotte Pipe and Foundry Company.
b. Harvel Plastics, Inc.
c. Spears Manufacturing Company.
d. Uponor.

2. Description:

a. PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

E. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Colonial Engineering, Inc.
b. NIBCO INC.
c. Spears Manufacturing Company.

2. Description:

a. PVC four-part union.
b. Brass or stainless-steel threaded end.
c. Solvent-cement-joint or threaded plastic end.
d. Rubber O-ring.
e. Union nut.

2.7 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. A.Y. McDonald Mfg. Co.
b. Capitol Manufacturing Company.
c. Central Plastics Company.
d. HART Industrial Unions, LLC.
e. Jomar Valve.
f. Matco-Norca.
g. WATTS.
h. Wilkins.
i. Zurn Industries, LLC.

2. Standard: ASSE 1079.
3. Pressure Rating: 125 psig minimum at 180 deg F.
4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Matco-Norca.
d. WATTS.
e. Wilkins.
f. Zurn Industries, LLC.

2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. Pressure Rating: 125 psig minimum at 180 deg F.

5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Nonconducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig.
4. Gasket: Neoprene or phenolic.
5. Bolt Sleeves: Phenolic or polyethylene.
6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Elster Perfection Corporation.
b. Grinnell Mechanical Products.
c. Matco-Norca.
d. Precision Plumbing Products.
e. Victaulic Company.

2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure Rating and Temperature: 300 psig at 225 deg F.
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction

loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."

D. Install shutoff valve immediately upstream of each dielectric fitting.

E. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

F. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

G. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

H. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

I. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

K. Install piping to permit valve servicing.

L. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

P. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Joint Construction for Grooved-End Steel Piping: Make joints according to AWWA C606. Roll groove ends of pipe as specified. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

H. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.5 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges or flange kits.

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

H. Install supports for vertical steel piping every 15 feet.

I. Install vinyl-coated hangers for PP piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

J. Install supports for vertical PP piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

K. Support piping and tubing not listed in this article according to MSS SP-58 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
5. Remove and clean strainer screens. Close drain valves and replace drain plugs.

6. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
7. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Clean non-potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.12 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller, shall be one of the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
2. PP, SDR 11 socket fittings; and fusion-welded joints.

E. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and brazed or soldered joints.

F. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and brazed or soldered joints.
2. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
3. Galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.
4. PP, SDR 11 socket fittings; and fusion-welded joints.

3.13 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
3. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Temperature-actuated, water mixing valves.
3. Hose bibbs.
4. Drain valves.
5. Water-hammer arresters.
6. Air vents.
7. Trap-seal primer valves.
8. Flexible connectors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For domestic water piping specialties.

1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 and NSF 14. Mark "NSF-pw" on plastic piping components.

B. Comply with NSF 372 for low lead.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ames Fire & Waterworks; A WATTS Brand.
b. Apollo Flow Controls; Conbraco Industries, Inc.
c. Cash Acme, A Division of Reliance Worldwide Corporation.
d. FEBCO; A WATTS Brand.
e. Rain Bird Corporation.
f. Toro Company (The).
g. WATTS.
h. Zurn Industries, LLC.

2. Standard: ASSE 1001.
3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
4. Body: Bronze.
5. Inlet and Outlet Connections: Threaded.
6. Finish: Chrome plated.

2.4 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Individual-Fixture, Water Tempering Valves <TMV-1>:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Acorn Engineering Company.
b. Apollo Flow Controls; Conbraco Industries, Inc.
c. Cash Acme, A Division of Reliance Worldwide Corporation.

d. Honeywell.
e. Lawler Manufacturing Company, Inc.
f. Leonard Valve Company.
g. POWERS; A WATTS Brand.
h. WATTS.
i. Zurn Industries, LLC.

2. Standard: ASSE 1070, thermostatically controlled, water tempering valve.
3. Pressure Rating: 125 psig minimum unless otherwise indicated.
4. Body: Bronze body with corrosion-resistant interior components.
5. Temperature Control: Adjustable.
6. Inlets and Outlet: Threaded.
7. Finish: Rough or chrome-plated bronze.
8. Tempered-Water Setting: 105 deg F.

B. Individual-Fixture, Water Tempering Valves <TMV-2>:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Acorn Engineering Company.
b. Apollo Flow Controls; Conbraco Industries, Inc.
c. Cash Acme, A Division of Reliance Worldwide Corporation.
d. Honeywell.
e. Lawler Manufacturing Company, Inc.
f. Leonard Valve Company.
g. POWERS; A WATTS Brand.
h. WATTS.
i. Zurn Industries, LLC.

2. Standard: ASSE 1070, thermostatically controlled, water tempering valve.
3. Pressure Rating: 125 psig minimum unless otherwise indicated.
4. Body: Bronze body with corrosion-resistant interior components.
5. Temperature Control: Adjustable.
6. Inlets and Outlet: Threaded.
7. Finish: Rough or chrome-plated bronze.
8. Tempered-Water Setting: 85 deg F.

2.5 HOSE BIBBS

A. Hose Bibbs <HB-1>:

1. Basis of Design: Zurn Z1341XL.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Jay R. Smith Mfg. Co.
b. Josam Company.

c. MIFAB, Inc.
d. Prier Products, Inc.
e. Tyler Pipe; a subsidiary of McWane Inc.
f. WATTS.
g. Woodford Manufacturing Company.
h. Zurn Industries, LLC.

3. Standard: ASME A112.18.1 for sediment faucets.
4. Body Material: Bronze.
5. Seat: Bronze, replaceable.
6. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
7. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
8. Pressure Rating: 125 psig.
9. Vacuum Breaker: Integral or field-installation, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
10. Finish: Rough bronze.
11. Operation for Service Areas: Wheel handle.

2.6 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.7 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. AMTROL, Inc.
b. Jay R. Smith Mfg. Co.
c. Josam Company.
d. MIFAB, Inc.
e. Precision Plumbing Products.
f. Sioux Chief Manufacturing Company, Inc.
g. Tyler Pipe; a subsidiary of McWane Inc.
h. WATTS.

i. Zurn Industries, LLC.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.8 AIR VENTS

A. Bolted-Construction Automatic Air Vents:

1. Body: Bronze.
2. Pressure Rating and Temperature: 125-psig minimum pressure rating at 140 deg F.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 1/2 minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

2.9 TRAP-SEAL PRIMER DEVICE

A. Supply-Type, Trap-Seal Primer Device:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Jay R. Smith Mfg. Co.
   b. MIFAB, Inc.
   c. Precision Plumbing Products.
   d. Sioux Chief Manufacturing Company, Inc.
   e. WATTS.
   f. Zurn Industries, LLC.

2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.10 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Flex Pression Ltd.
2. Flex-Hose Co., Inc.
3. Flexicraft Industries.

4. Flex-Weld, Inc.
5. Hyspan Precision Products, Inc.
6. Mercer Gasket & Shim, Inc.
7. Metraflex Company (The).
8. Proco Products, Inc.
9. Tozen Corporation.
10. Unaflex.
11. Universal Metal Hose.

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 250 psig.
2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified.

B. Water-Hammer Arresters: Install in water piping according to PDI-WH 201.

C. Air Vents: Install vents at high points of water piping.

D. Trap primers required for all traps on floor drains and any traps where a trap seal is subject to loss by evaporation.

E. Supply-Type, Trap-Seal Primer Device: Install with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

F. Drainage-Type, Trap-Seal Primer Device: Install as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

3.2 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

C. Comply with requirements for grounding equipment in Section 260526 "Grounding and Bonding for Electrical Systems."

3.3 IDENTIFICATION

A. Plastic Labels for Equipment: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.
2. Primary water tempering valves.
3. Supply-type, trap-seal primer valves.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 ADJUSTING

A. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless, cast-iron soil pipe and fittings.
3. PVC pipe and fittings.
4. Specialty pipe fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 FIELD CONDITIONS

A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.

2.2 PIPING MATERIALS

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

C. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed with NSF International.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ANACO-Husky.
    b. Charlotte Pipe and Foundry Company.
    c. Dallas Specialty & Mfg. Co.
    d. Fernco Inc.
    e. Ideal Tridon.
    f. Josam Company.
    g. Matco-Norca.
    h. MIFAB, Inc.
    i. Mission Rubber Company, LLC; a division of MCP Industries.
    j. NewAge Casting.
    k. Tyler Pipe; a subsidiary of McWane Inc.

2. Standard: CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
4. Hubless couplings shall confirm to CISPI Standard 310 and be certified by NSF International.

2.5 PVC PIPE AND FITTINGS

A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

B. Solid-Wall PVC Pipe: ASTM D 2665 and ASTM D1785, drain, waste, and vent.

C. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

D. Adhesive Primer: ASTM F 656.

E. Solvent Cement: ASTM D 2564.

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
2. Unshielded, Nonpressure Transition Couplings:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) Dallas Specialty & Mfg. Co.
        2) Fernco Inc.
        3) Froet Industries LLC.
        4) Mission Rubber Company, LLC; a division of MCP Industries.
        5) Plastic Oddities.

    b. Standard: ASTM C 1173.
    c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
    d. End Connections: Same size as and compatible with pipes to be joined.
    e. Sleeve Materials:

        1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
        2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
        3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

3. Shielded, Nonpressure Transition Couplings:

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) Cascade Waterworks Mfg. Co.
2) Mission Rubber Company, LLC; a division of MCP Industries.

b. Standard: ASTM C 1460.
c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
d. End Connections: Same size as and compatible with pipes to be joined.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.

    a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.
4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

    a. Reducing size of waste piping in direction of flow is prohibited.

K. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
3. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

N. Install aboveground PVC piping according to ASTM D 2665.

O. Install underground PVC piping according to ASTM D 2321.

P. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping.

    a. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.

    a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.

b. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

3. Install drains in sanitary waste gravity-flow piping.

a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

Q. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

R. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

T. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

C. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Underground Waste Drainage Piping: Unshielded, nonpressure transition couplings.
3. In Aboveground Waste Drainage Piping: Shielded, nonpressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges or flange kits.

3.5 VALVE INSTALLATION

A. Comply with requirements in Section 220523.12 "Ball Valves for Plumbing Piping," Section 220523.13 "Butterfly Valves for Plumbing Piping," Section 220523.14 "Check Valves for Plumbing Piping," and Section 220523.15 "Gate Valves for Plumbing Piping" for general-duty valve installation requirements.

B. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified in Section 221319 "Sanitary Waste Piping Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Install individual, straight, horizontal piping runs:

    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
6. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.

4. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install supports for vertical cast-iron soil piping every 15 feet.

G. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.

H. Install supports for vertical PVC piping every 48 inches.

I. Support piping and tubing not listed above according to MSS SP-58 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Install horizontal backwater valves with cleanout cover flush with floor.
6. Comply with requirements for backwater valves, cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
7. Equipment: Connect waste piping as indicated.

D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

E. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

    a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.

    a. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.

    a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
    b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
    c. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.

    a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
    b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.

c. Air pressure must remain constant without introducing additional air throughout period of inspection.
d. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.
7. Do not use compressed air to test PVC.

3.10 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

E. Repair damage to adjacent materials caused by waste and vent piping installation.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Utilize cast iron piping where piping is installed in an air plenum.

C. Aboveground, sanitary and soil, waste and vent piping shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Underground, sanitary and soil, waste and vent piping shall be the following:

1. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
2. Dissimilar Pipe-Material Couplings: Unshielded, nonpressure transition couplings.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backwater valves.
2. Cleanouts.
3. Roof flashing assemblies.
4. Through-penetration firestop assemblies.
5. Miscellaneous sanitary drainage piping specialties.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene.

B. FOG: Fats, oils, and greases.

C. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing, and marked for intended location and application.

2.2 BACKWATER VALVES

A. Horizontal, Cast-Iron Backwater Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Jay R. Smith Mfg. Co.
    b. Josam Company.
    c. MIFAB, Inc.
    d. Tyler Pipe; a subsidiary of McWane Inc.
    e. WATTS.
    f. Zurn Industries, LLC.

2. Standard: ASME A112.14.1.
3. Size: Same as connected piping.
4. Body: Cast iron.
5. Cover: Cast iron with bolted or threaded access check valve.
6. End Connections: Hub and spigot or hubless.
7. Type Check Valve: Removable, bronze, swing check, factory assembled or field modified to hang open for airflow unless subject to backflow condition.
8. Extension: ASTM A 74, Service class; full-size, cast-iron, soil-pipe extension to field-installed cleanout at floor; replaces backwater valve cover.

2.3 CLEANOUTS

A. Cast-Iron Exposed Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Jay R. Smith Mfg. Co.
    b. Josam Company.
    c. MIFAB, Inc.
    d. Tyler Pipe; a subsidiary of McWane Inc.

e. WATTS.
f. Zurn Industries, LLC.

2. Standard: ASME A112.36.2M.
3. Size: Same as connected drainage piping
4. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: Countersunk or raised-head, brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.

B. Cast-Iron Exposed Floor Cleanouts (FCO):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Jay R. Smith Mfg. Co.
b. Josam Company.
c. Oatey.
d. Sioux Chief Manufacturing Company, Inc.
e. Tyler Pipe; a subsidiary of McWane Inc.
f. WATTS.
g. Zurn Industries, LLC.

2. Standard: ASME A112.36.2M for threaded, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Threaded, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: Required.
7. Outlet Connection: Inside calk or Spigot.
8. Closure: Brass plug with straight threads and gasket.
9. Adjustable Housing Material: Cast iron with threads.
10. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
11. Frame and Cover Shape: Round.
12. Top Loading Classification: Heavy Duty.
13. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

2.4 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Acorn Engineering Company.
b. Thaler Metal Industries Ltd.
c. Zurn Industries, LLC.

2. Description: Manufactured assembly made of 4.0-lb/sq. ft., 0.0625-inch- thick, lead flashing collar and skirt extending at least 8 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

    a. Open-Top Vent Cap: Without cap.
    b. Low-Silhouette Vent Cap: With vandal-proof vent cap.
    c. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.5 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ProSet Systems Inc.

2. Standard: UL 1479 assembly of sleeve-and-stack fitting with firestopping plug.
3. Size: Same as connected soil, waste, or vent stack.
4. Sleeve: Molded-PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
5. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
6. Special Coating: Corrosion resistant on interior of fittings.

2.6 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Deep-Seal Traps:

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.

    a. NPS 2: 4-inch-minimum water seal.
    b. NPS 2-1/2 and Larger: 5-inch-minimum water seal.

B. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 side inlet.

C. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.

4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

D. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 1 inch above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

E. Stack Flashing Fittings:

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

F. Expansion Joints:

1. Standard: ASME A112.6.4.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backwater valves in building drain piping.

1. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

F. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

G. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

H. Assemble open drain fittings and install with top of hub 1 inch above floor.

I. Install deep-seal traps on floor drains and other waste outlets, if indicated.

J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

L. Install sleeve and sleeve seals with each riser and stack passing through floors with waterproof membrane.

M. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

N. Install wood-blocking reinforcement for wall-mounting-type specialties.

O. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

B. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required.

C. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

D. Set flashing on floors and roofs in solid coating of bituminous cement.

E. Secure flashing into sleeve and specialty clamping ring or device.

F. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 076200 "Sheet Metal Flashing and Trim."

G. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 221319.13 - SANITARY DRAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Floor drains.
2. Area drains.
3. Trench drains.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene styrene.

B. FRP: Fiberglass-reinforced plastic.

C. HDPE: High-density polyethylene.

D. PE: Polyethylene.

E. PP: Polypropylene.

F. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 DRAIN ASSEMBLIES

A. Sanitary drains shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary piping specialty components.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains (FD-1):

1. Basis of Design: Josam 30000-A.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Commercial Enameling Company.
    b. Jay R. Smith Mfg. Co.
    c. Josam Company.
    d. MIFAB, Inc.
    e. Prier Products, Inc.
    f. Sioux Chief Manufacturing Company, Inc.
    g. Wade; a subsidiary of McWane Inc.
    h. WATTS.
    i. Zurn Industries, LLC.

3. Standard: ASME A112.6.3.
4. Pattern: Floor drain.
5. Body Material: Gray iron.
6. Seepage Flange: Required.
7. Anchor Flange: Required.
8. Clamping Device: Required.
9. Outlet: Bottom.
10. Top or Strainer Material: Nickel bronze.
11. Top Shape: Round.
12. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
13. Trap Pattern: Standard P-trap.

2.3 AREA DRAINS

A. Cast-Iron Floor Drains (AD-1):

1. Basis of Design: Watts FD-460-F.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Commercial Enameling Company.
    b. Jay R. Smith Mfg. Co.
    c. Josam Company.
    d. MIFAB, Inc.
    e. Prier Products, Inc.
    f. Sioux Chief Manufacturing Company, Inc.
    g. Wade; a subsidiary of McWane Inc.
    h. WATTS.
    i. Zurn Industries, LLC.

3. Standard: ASME A112.6.3.
4. Pattern: Area drain.
5. Body Material: Gray iron.
6. Seepage Flange: Required.
7. Anchor Flange: Required.
8. Outlet: Bottom.
9. Sediment Bucket: Not required.
10. Top or Strainer Material: Acid resisting epoxy coated ductile iron.
11. Top Shape: Square.
12. Dimensions of Top or Strainer: 12” by 12”.
13. Trap Pattern: Standard P-trap.
14. Trap Features: Trap-seal primer valve drain connection.

2.4 TRENCH DRAINS

A. Trench Drains (TD-1):

1. Basis of Design: ACO FG200.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Jay R. Smith Mfg. Co.
    b. Josam Company.
    c. MIFAB, Inc.
    d. Sioux Chief Manufacturing Company, Inc.
    e. Wade; a subsidiary of McWane Inc.
    f. WATTS.
    g. Zurn Industries, LLC.

3. Standard: ASME A112.6.3 for trench drains.
4. Material: Fiberglass.
5. Clamping Device: Required.
6. Outlet: End.
7. Grate Material: Stainless steel.
8. Grate Finish: Not required.
9. Dimensions of Frame and Grate: ACO 8” channels, with 1% slope at a 7” minimum depth. Manufacturer must include female closing cap and outlet cap.
10. Top Loading Classification: Heavy Duty.
11. Trap Material: Cast iron.
12. Trap Pattern: Standard P-trap.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage.
3. Set with grates depressed according to the following drainage area radii:

    a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
    b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
    c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

4. Install floor-drain flashing collar or flange, so no leakage occurs between drain and adjoining flooring.

    a. Maintain integrity of waterproof membranes where penetrated.

5. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

B. Install trench drains at low points of surface areas to be drained.

1. Set grates of drains flush with finished surface, unless otherwise indicated.

C. Comply with ASME A112.3.1 for installation of stainless-steel channel drainage systems.

1. Install on support devices, so that top will be flush with adjacent surface.

D. Install open drain fittings with top of hub 1 inch above floor.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements in Section 221319 "Sanitary Waste Piping Specialties" for backwater valves, air admittance devices and miscellaneous sanitary drainage piping specialties.

C. Install piping adjacent to equipment to allow service and maintenance.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to

identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319.13

SECTION 223300 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Commercial, electric, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of commercial, electric, domestic-water heater, from manufacturer.

B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

C. Source quality-control reports.

D. Field quality-control reports.

E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Structural failures including storage tank and supports.
    b. Faulty operation of controls.
    c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

    a. Commercial, Electric, Storage, Domestic-Water Heaters:

        1) Storage Tank: Three years.
        2) Controls and Other Components: Three years.

    b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. American Water Heaters.
    b. Bradford White Corporation.
    c. Cemline Corporation.
    d. Electric Heater Company (The).
    e. GSW Water Heating.
    f. HESco Industries, Inc.
    g. Lochinvar, LLC.
    h. Precision Boilers, LLC.
    i. PVI; A WATTS Brand.
    j. RECO USA.
    k. Rheem Manufacturing Company.
    l. Smith, A. O. Corporation.
    m. State Industries.
    n. Vaughn Manufacturing Corporation.

2. Standard: UL 1453.
3. Storage-Tank Construction: ASME-code, steel vertical arrangement.

    a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.

        1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
        2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

    b. Pressure Rating: 150 psig.
    c. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending lining material into tappings.

4. Factory-Installed Storage-Tank Appurtenances:

    a. Anode Rod: Replaceable magnesium.
    b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
    c. Insulation: Comply with ASHRAE/IESNA 90.1.
    d. Jacket: Steel with enameled finish.
    e. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
    f. Temperature Control: Adjustable thermostat.
    g. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
    h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

5. Special Requirements: NSF 5 construction.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. AMTROL, Inc.
    b. Flexcon Industries.
    c. Honeywell.
    d. Pentair Pump Group.
    e. Smith, A. O. Corporation.
    f. State Industries.
    g. TACO Comfort Solutions, Inc.

2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

    a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
    b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
    c. Air-Charging Valve: Factory installed.

4. Capacity and Characteristics:

    a. Working-Pressure Rating: 100 psig.
    b. Capacity Acceptable: 4 gal. minimum.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

D. Heat-Trap Fittings: ASHRAE 90.2.

E. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

F. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

G. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

H. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base. Comply with requirements for concrete bases specified in Section 033000 "Cast-in-Place Concrete."

1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.
8. Anchor domestic-water heaters to substrate.

B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523.12 "Ball Valves for Plumbing Piping."

C. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater

relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

E. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

F. Fill electric, domestic-water heaters with water.

G. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain electric, domestic-water heaters.

END OF SECTION 223300

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Water closets.
2. Flushometer valves and tanks.
3. Toilet seats.
4. Supports.

1.3 DEFINITIONS

A. Effective Flush Volume: Average of two reduced flushes and one full flush per fixture.

B. Remote Water Closet: Located more than 30 feet from other drain line connections or fixture and where less than 1.5 drainage fixture units are upstream of the drain line connection.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
2. Include rated capacities, operating characteristics and furnished specialties and accessories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BOTTOM-OUTLET WATER CLOSETS

A. Water Closets (WC-1): Floor mounted, bottom outlet, top spud, accessible, ADA complinant.

1. Basis of Design: American Standard 3043.001.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. American Standard.
    b. Briggs Plumbing Products, Inc.
    c. Capizzi.
    d. Crane Plumbing, L.L.C.
    e. FNW; Ferguson Enterprises, Inc.
    f. Gerber Plumbing Fixtures LLC.
    g. Kohler Co.
    h. Mansfield Plumbing Products LLC.
    i. Peerless Pottery Sales, Inc.
    j. Sloan Valve Company.
    k. TOTO USA, INC.
    l. Zurn Industries, LLC.

3. Bowl:

    a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
    b. Material: Vitreous china.
    c. Type: Siphon jet.
    d. Style: Flushometer valve.
    e. Height: Handicapped/elderly, complying with ICC/ANSI A117.1.
    f. Rim Contour: Elongated.
    g. Water Consumption: 1.6 gal. per flush.
    h. Spud Size and Location: NPS 1-1/2; top.
    i. Color: White.

4. Bowl-to-Drain Connecting Fitting: ASTM A 1045 or ASME A112.4.3.
5. Flushometer Valve: Lever-Handle, Diaphragm Flushometer Valves.
6. Toilet Seat: Commercial, elongated, open front.

2.2 FLUSHOMETER VALVES

A. Lever-Handle, Diaphragm Flushometer Valves:

1. Basis of Design: Sloan Regal 111-XL.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Delany Products.
    b. Gerber Plumbing Fixtures LLC.
    c. Sloan Valve Company.
    d. Zurn Industries, LLC.

3. Standard: ASSE 1037.
4. Minimum Pressure Rating: 125 psig.
5. Features: Include integral check stop and backflow-prevention device.
6. Material: Brass body with corrosion-resistant components.
7. Exposed Flushometer-Valve Finish: Chrome plated.
8. Panel Finish: Chrome plated or stainless steel.
9. Style: Exposed.
10. Consumption: 1.6 gal. per flush.
11. Minimum Inlet: NPS 1.
12. Minimum Outlet: NPS 1-1/4.

2.3 TOILET SEATS

A. Toilet Seats:

1. Basis of Design: American Standard 5901.100.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. American Standard.
    b. Bemis Manufacturing Company.
    c. Centoco Manufacturing Corporation.
    d. Church Seats; Bemis Manufacturing Company.
    e. Jones Stephens Corp.
    f. Kohler Co.
    g. Olsonite Seat Co.
    h. Sanderson Plumbing Products, Inc.
    i. Sperzel of Lexington.
    j. TOTO USA, INC.
    k. Zurn Industries, LLC.

3. Standard: IAPMO/ANSI Z124.5.
4. Material: Plastic.
5. Type: Commercial (Heavy duty).
6. Shape: Elongated rim, open front.
7. Hinge: Check.
8. Hinge Material: Noncorroding metal.
9. Seat Cover: Not required.
10. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:

1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.

B. Flushometer-Valve Installation:

1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.

C. Install toilet seats on water closets.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.
3. Supply fittings.
4. Waste fittings.
5. Supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Servicing and adjustments of automatic faucets.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 VITREOUS-CHINA, WALL-MOUNTED LAVATORIES

A. Lavatory (L-1) Vitreous china, wall mounted, with back.

1. Basis of Design: American Standard Lucerne 0356.015.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. American Standard.
    b. Briggs Plumbing Products, Inc.
    c. Crane Plumbing, L.L.C.
    d. FNW; Ferguson Enterprises, Inc.
    e. Gerber Plumbing Fixtures LLC.
    f. Kohler Co.
    g. Mansfield Plumbing Products LLC.
    h. Peerless Pottery Sales, Inc.
    i. Sloan Valve Company.
    j. Zurn Industries, LLC.

3. Fixture:

    a. Standard: ASME A112.19.2/CSA B45.1.
    b. Type: For wall hanging.
    c. Nominal Size: Oval, 20 by 18.
    d. Faucet-Hole Punching: Three holes, 8-inch centers.
    e. Faucet-Hole Location: Top.
    f. Color: White.
    g. Mounting Material: Chair carrier.

4. Faucet: Manual-type, two-handle mixing, commercial, solid-brass valve.
5. Support: Type II, concealed-arm lavatory carrier. Include rectangular, steel uprights.
6. Lavatory Mounting Height: Handicapped/elderly according to ICC A117.1.

2.2 SOLID-BRASS, MANUALLY OPERATED FAUCETS

A. NSF Standard: Comply with NSF 372 for faucet materials that will be in contact with potable water.

B. Lavatory Faucets: Manual-type, two-handle mixing, commercial, solid-brass valve.

1. Basis of Design: American Standard 6540.170.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. American Standard.
    b. Bradley Corporation.
    c. CHG; Component Hardware Group, Inc.
    d. Chicago Faucets; Geberit Company.
    e. Delta Faucet Company.
    f. Elkay Manufacturing Co.
    g. Gerber Plumbing Fixtures LLC.
    h. GROHE America, Inc.
    i. Just Manufacturing.
    j. Kohler Co.
    k. Moen Incorporated.
    l. Speakman Company.
    m. T&S Brass and Bronze Works, Inc.
    n. Zurn Industries, LLC.

3. Standard: ASME A112.18.1/CSA B125.1.
4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
5. Body Type: Widespread.
6. Body Material: Commercial, solid brass.
7. Finish: Polished chrome plate.
8. Maximum Flow Rate: 1.5 gpm.
9. Mounting Type: Deck, exposed.
10. Valve Handle(s): Wrist blade, 4 inches.
11. Spout: Rigid, gooseneck type.
12. Spout Outlet: Aerator.
13. Operation: Noncompression, manual.
14. Drain: Not part of faucet.

2.3 LAMINAR-FLOW, FAUCET-SPOUT OUTLETS

A. NSF Standard: Comply with NSF 372 for faucet-spout-outlet materials that will be in contact with potable water.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. AM Conservation Group, Inc.
2. Chronomite Laboratories, Inc.
3. NEOPERL, Inc.
4. T&S Brass and Bronze Works, Inc.

C. Description: Chrome-plated-brass, faucet-spout outlet that produces non-aerating, laminar stream. Include external or internal thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

2.4 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF 372 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Risers:

1. NPS 1/2.
2. ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

2.5 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4.
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated, brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

2.6 SUPPORTS

A. Type II Lavatory Carrier:

1. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 224216.16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sinks.
2. Sink faucets.
3. Supply fittings.
4. Waste fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
2. Include rated capacities, operating characteristics and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted sinks.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sinks to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 SINKS

A. ADA Sinks (S-1): Stainless steel, counter mounted.

1. Basis of Design: Elkay LRAD191855.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Advance Tabco.
    b. Eagle Group.
    c. Elkay Manufacturing Co.
    d. Griffin Products, Inc.
    e. Just Manufacturing.

3. Fixture:

    a. Standard: ASME A112.19.3/CSA B45.4.
    b. Type: Ledge back.
    c. Number of Compartments: One.
    d. Overall Dimensions: 18 inches long by 19 inches wide by 5-1/2 inches deep.
    e. Provide hole punching for specified faucet.
    f. Metal Thickness: 0.050 inch.
    g. Compartment:

        1) Dimensions: 11-1/2 inches by 16 inches.
        2) Drain: Grid with NPS 1-1/2 tailpiece and twist drain.
        3) Drain Location: Centered in compartment.

4. Faucet(s): Manual type, single control mixing valve .

    a. Number Required: One.
    b. Mounting: On ledge.

5. Supply Fittings: Comply with requirements in "Supply Fittings" Article.
6. Waste Fittings: Comply with requirements in "Waste Fittings" Article.
7. Mounting: On counter with sealant.

2.2 SINK FAUCETS

A. NSF Standard: Comply with NSF 372 for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets: Manual type, single control mixing valve.

1. Commercial, Solid-Brass Faucets:

a. Basis of Design: Just Manufacturing J-900.
b. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) American Standard.
2) Bradley Corporation.
3) Elkay Manufacturing Co.
4) GROHE America, Inc.
5) Just Manufacturing.
6) Kohler Co.
7) Moen Incorporated.
8) Sloan Valve Company.
9) Speakman Company.
10) T&S Brass and Bronze Works, Inc.
11) Zurn Industries, LLC.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
4. Body Type: Centerset.
5. Body Material: Commercial, solid brass.
6. Finish: Chrome plated.
7. Maximum Flow Rate: 2.2 gpm.
8. Handle(s): Lever.
9. Mounting Type: Deck, concealed.
10. Spout Type: Swing, shaped tube.
11. Spout Outlet: Aerator.

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF 372 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Risers:

1. NPS 1/2.
2. ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

2.4 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/2 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2.
2. Material: Chrome-plated, two-piece, cast-brass trap and swivel elbow with 0.032-inch-thick brass tube to wall; and chrome-plated brass or steel wall flange.
3. Material: Stainless-steel, two-piece trap and swivel elbow with 0.012-inch-thick stainless-steel tube to wall; and stainless-steel wall flange.

2.5 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

C. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball or gate valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping" and Section 220523.15 "Gate Valves for Plumbing Piping."
2. Install stops in locations where they can be easily reached for operation.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.16

SECTION 224223 - COMMERCIAL SHOWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Individual Shower
2. Shower faucets.
3. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for showers.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For shower faucets to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 INDIVIDUAL SHOWERS

A. Individual FRP Showers (SH-1):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Aqua Glass Corporation.
b. Clarion Bathware.
c. Florestone Products Co., Inc.
d. LASCO Bathware.
e. MAAX.
f. Praxis Industries, LLC.
g. Sterling.
h. Swan Corporation (The).

2. General: FRP, accessible, shower enclosure with faucet and receptor and appurtenances.
3. Standard: ANSI Z124.1.2.
4. Type: One-piece unit without top or Sectional unit without top.
5. Style: Handicapped/wheelchair.
6. Nominal Size and Shape: 36 by 36 inches square.
7. Color: White.
8. Bathing Surface: Slip resistant according to ASTM F 462.
9. Outlet: Drain with NPS 2 outlet.
10. Shower Rod and Curtain: Required.
11. Grab Bar: ASTM F 446, mounted on support area back wall.

2.2 SHOWER FAUCETS

A. NSF Standard: Comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects," for shower materials that will be in contact with potable water.

B. Shower Faucets, accessible (SH-1):

1. Basis of Design: T&S Brass and Bronze Works B-3206-VB.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Acorn Engineering Company.
b. American Standard.
c. Chicago Faucets; Geberit Company.
d. FNW; Ferguson Enterprises, Inc.
e. Kohler Co.
f. Lawler Manufacturing Company, Inc.
g. Leonard Valve Company.

h. Matco-Norca.
i. POWERS; A WATTS Brand.
j. Sloan Valve Company.
k. Speakman Company.
l. Zurn Industries, LLC.

3. Description: Single-handle, pressure-balance mixing valve with hot- and cold-water indicators; check stops; fixed shower head; hand held spray assemnly with diverter valve.
4. Faucet:

a. Standards: ASME A112.18.1/CSA B125.1 and ASSE 1016.
b. Body Material: Solid brass.
c. Finish: Polished chrome plate.
d. Shower-Arm, Flow-Control Fitting: 2.0 gpm.
e. EPA WaterSense: Required.
f. Mounting: Concealed.
g. Operation: Single-handle, twist or rotate control.
h. Antiscald Device: Integral with mixing valve.
i. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.

5. Supply Connections: NPS 1/2.
6. Shower Head:

a. Standard: ASME A112.18.1/CSA B125.1.
b. Type: Ball joint with arm and flange.
c. Shower Head Material: Metallic with chrome-plated finish.
d. Spray Pattern: Adjustable.

2.3 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before shower installation.

B. Examine walls and floors for suitable conditions where showers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Assemble shower components according to manufacturers' written instructions.

B. Install showers level and plumb according to roughing-in drawings.

C. Install water-supply piping with stop on each supply to each shower faucet.

1. Exception: Use ball or gate valves if supply stops are not specified with shower. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping".
2. Install stops in locations where they can be easily reached for operation.

D. Install shower flow-control fittings with specified maximum flow rates in shower arms.

E. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheons requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Seal joints between showers and floors and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with traps and soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust showers and controls. Replace damaged and malfunctioning showers, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of showers, inspect and repair damaged finishes.

B. Clean showers, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed fixtures and fittings.

D. Do not allow use of showers for temporary facilities unless approved in writing by Owner.

END OF SECTION 224223

SECTION 224500 - EMERGENCY PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Combination units.
2. Supplemental equipment.

1.3 DEFINITIONS

A. Accessible Fixture: Emergency plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Plumbed Emergency Plumbing Fixture: Fixture with fixed, potable-water supply.

C. Self-Contained Emergency Plumbing Fixture: Fixture with flushing-fluid-solution supply.

D. Tepid: Moderately warm.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include flow rates and capacities, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: Submit certificates of performance testing specified in "Source Quality Control" Article.

B. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For emergency plumbing fixtures to include in operation and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushing-Fluid Solution: Separate lot and equal to at least 200 percent of amount of solution installed for each self-contained unit.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."

C. NSF Standard: Comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.

D. Regulatory Requirements: Comply with requirements in ICC/ANSI A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.

PART 2 - PRODUCTS

2.1 COMBINATION UNITS

A. Accessible, Plumbed Emergency Shower with Eye/Face Wash Combination Units, (EWES-1):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Acorn Safety.
b. Bradley Corporation.
c. Encon Safety Products.
d. Guardian Equipment Co.
e. Haws Corporation.
f. Sellstrom Manufacturing Company.
g. Speakman Company.
h. WaterSaver Faucet Co.

2. Piping:

a. Material: Galvanized steel or Chrome-plated brass or stainless steel.
b. Unit Supply: NPS 1-1/4 minimum.
c. Unit Drain: Outlet at back or side near bottom.

3. Shower:

a. Capacity: Not less than 20 gpm for at least 15 minutes.
b. Supply Piping: NPS 1 with flow regulator and stay-open control valve.
c. Control-Valve Actuator: Barrier Free Pull rod.
d. Shower Head: 8-inch-minimum diameter, chrome-plated brass or stainless steel.
e. Mounting: Pedestal.
f. Configuration: Barrier Free

4. Eye/Face Wash Unit:

a. Capacity: Not less than 3 gpm for at least 15 minutes.
b. Supply Piping: NPS 1/2 with flow regulator and stay-open control valve.
c. Control-Valve Actuator: Paddle.
d. Spray-Head Assembly: Two or four receptor-mounted spray heads.
e. Receptor: Chrome-plated brass or stainless-steel bowl.
f. Mounting: Attached to shower pedestal.
g. Configuration: Barrier Free

1) Capacity: Not less than 3 gpm for at least 15 minutes.
2) Mounting: Bracket on shower pedestal.

2.2 SOURCE QUALITY CONTROL

A. Certify performance of emergency plumbing fixtures by independent testing organization acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before plumbed emergency plumbing fixture installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EMERGENCY PLUMBING FIXTURE INSTALLATION

A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.

B. Install fixtures level and plumb.

C. Fasten fixtures to substrate.

D. Install shutoff valves in water-supply piping to fixtures. Use ball or gate valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation. Comply with requirements for valves specified in Section 220523.12 "Ball Valves for Plumbing Piping".

1. Exception: Omit shutoff valve on supply to group of plumbing fixtures that includes emergency equipment.
2. Exception: Omit shutoff valve on supply to emergency equipment if prohibited by authorities having jurisdiction.

E. Install dielectric fitting in supply piping to emergency equipment if piping and equipment connections are made of different metals. Comply with requirements for dielectric fittings specified in Section 221116 "Domestic Water Piping."

F. Install escutcheons on piping wall and ceiling penetrations in exposed, finished locations. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Fill self-contained fixtures with flushing fluid.

3.3 CONNECTIONS

A. Connect hot- and cold-water-supply piping to hot- and cold-water, water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures. Comply with requirements for hot- and cold-water piping specified in Section 221116 "Domestic Water Piping."

B. Indirectly connect emergency plumbing fixture receptors without trapped drain outlet to sanitary waste or storm drainage piping.

C. Where installing piping adjacent to emergency plumbing fixtures, allow space for service and maintenance of fixtures.

3.4 IDENTIFICATION

A. Install equipment nameplates or equipment markers on emergency plumbing fixtures and equipment and equipment signs on water-tempering equipment. Comply with requirements for identification materials specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

A. Mechanical-Component Testing: After plumbing connections have been made, test for compliance with requirements. Verify ability to achieve indicated capacities.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection.

2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Emergency plumbing fixtures will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust or replace fixture flow regulators for proper flow.

B. Adjust equipment temperature settings.

END OF SECTION 224500

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with NEMA MG 1 unless otherwise indicated.

B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Premium efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Multispeed Motors: Separate winding for each speed.

F. Rotor: Random-wound, squirrel cage.

G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

H. Temperature Rise: Match insulation rating.

I. Insulation: Class F.

J. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.

K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 ADDITIONAL REQUIREMENTS FOR POLYPHASE MOTORS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

B. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width-modulated inverters.
2. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 230513

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.
3. Silicone sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. GPT; an EnPro Industries company.

B. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, anti-corrosion coated or zinc coated, with plain ends and integral welded waterstop collar.

C. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

D. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.

2.2 GROUT

A. Description: Nonshrink, recommended for interior and exterior sealing openings in nonfire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.3 SILICONE SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant, ASTM C 920, Type S, Grade NS, Class 25, use NT.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Pecora Corporation.
d. Polymeric Systems, Inc.
e. Schnee-Morehead, Inc., an ITW company.
f. Sherwin-Williams Company (The).

B. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT. Grade P Pourable (self-leveling) formulation is for opening in floors and other horizontal surfaces that are not fire rated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. May National Associates, Inc.; a subsidiary of Sika Corporation.

C. Silicone Foam: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Smooth-On.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout or silicone sealant, seal space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use sealants appropriate for size, depth, and location of joint.

E. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke-Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.

B. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls Above Grade:

    a. Piping Smaller Than NPS 6: Steel pipe sleeves.
    b. Piping NPS 6 and Larger: Steel pipe sleeves.

2. Concrete Slabs Above Grade:

    a. Piping Smaller Than NPS 6: Steel pipe sleeves.
    b. Piping NPS 6 and Larger: Steel pipe sleeves.

3. Interior Partitions:

    a. Piping Smaller Than NPS 6: PVC-pipe sleeves.
    b. Piping NPS 6 and Larger: Galvanized-steel sheet sleeves.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. BrassCraft Manufacturing Co.; a Masco company.
2. Dearborn Brass.
3. Jones Stephens Corp.
4. Keeney Manufacturing Company (The).
5. Mid-America Fittings, Inc.
6. ProFlo; a Ferguson Enterprises, Inc. brand.

2.2 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished, chrome-plated finish and spring-clip fasteners.

C. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

2.3 FLOOR PLATES

A. Split Floor Plates: Steel with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping and Relocated Existing Piping:

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
    b. Insulated Piping: One-piece cast brass with polished, chrome-plated finish.
    c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
    d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
    e. Bare Piping in Unfinished Service Spaces: One-piece cast brass with polished, chrome-plated finish.
    f. Bare Piping in Equipment Rooms: One-piece cast brass with rough-brass finish.

2. Escutcheons for Existing Piping to Remain:

    a. Insulated Piping: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
    b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
    c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
    d. Bare Piping in Unfinished Service Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
    e. Bare Piping in Equipment Rooms: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: Split floor plate.
2. Existing Piping to Remain: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 230518

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Equipment supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated, or epoxy powder-coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-plated steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-plated steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. B-line, an Eaton business.
b. Flex-Strut Inc.
c. G-Strut.
d. Haydon Corporation.
e. MIRO Industries.
f. Thomas & Betts Corporation; A Member of the ABB Group.
g. Unistrut; Part of Atkore International.
h. Wesanco, Inc.

2. Description: Shop- or field-fabricated, pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel channel with inturned lips.
5. Channel Width: Selected for applicable load criteria.

6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Buckaroos, Inc.
2. Carpenter & Paterson, Inc.
3. Clement Support Services.
4. ERICO International Corporation.
5. National Pipe Hanger Corporation.
6. Pipe Shields Inc.
7. Piping Technology & Products, Inc.
8. Rilco Manufacturing Co., Inc.
9. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psi minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psi minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Hilti, Inc.
b. ITW Ramset/Red Head; Illinois Tool Works, Inc.
c. MKT Fastening, LLC.
d. Simpson Strong-Tie Co., Inc.

B. Mechanical-Expansion Anchors: Insert-wedge-type anchors for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. B-line, an Eaton business.
b. Empire Tool and Manufacturing Co., Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head; Illinois Tool Works, Inc.
e. MKT Fastening, LLC.

2. Indoor Applications: Zinc-coated or stainless-steel.
3. Outdoor Applications: Stainless steel.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand:

1. Description: Single base unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
3. Hardware: Galvanized steel or polycarbonate.
4. Accessories: Protection pads.

C. Low-Profile, Single Base, Single-Pipe Stand:

1. Description: Single base with vertical and horizontal members, and pipe support, for roof installation without membrane protection.
2. Base: Single, vulcanized rubber, molded polypropylene, or polycarbonate.
3. Vertical Members: Two, galvanized-steel, continuous-thread 1/2-inch rods.
4. Horizontal Member: Adjustable horizontal, galvanized-steel pipe support channels.
5. Pipe Supports: Strut clamps.
6. Hardware: Galvanized steel.
7. Accessories: Protection pads.
8. Height: 12 inches above roof.

D. High-Profile, Single Base, Single-Pipe Stand:

1. Description: Single base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
2. Base: Single vulcanized rubber or molded polypropylene.
3. Vertical Members: Two, galvanized-steel, continuous-thread 1/2-inch rods.
4. Horizontal Member: One, adjustable height, galvanized- or stainless-steel pipe support slotted channel or plate.

5. Pipe Supports: Roller.
6. Hardware: Galvanized steel.
7. Accessories: Protection pads, 1/2-inch continuous-thread galvanized-steel rod.
8. Height: 36 inches above roof.

E. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MATERIALS

A. Aluminum: ASTM B 221.

B. Carbon Steel: ASTM A 1011/A 1011M.

C. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; galvanized.

D. Stainless Steel: ASTM A 240/A 240M.

E. Threaded Rods: Continuously threaded. Zinc-plated or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar materials as rods.

F. Grout: ASTM C 1107/C 1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-58. Install hangers and attachments as required to properly support piping from building structure.

D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems.

E. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

F. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

G. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

H. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

O. Insulated Piping:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

    a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    b. NPS 4: 12 inches long and 0.06 inch thick.
    c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
    d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
    e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780/A 780M.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.

18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is unnecessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is unnecessary.
21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.

11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230548.13 - VIBRATION CONTROLS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Housed-spring isolators.
5. Restrained-spring isolators.
6. Housed-restrained-spring isolators.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 ELASTOMERIC ISOLATION PADS

A. Elastomeric Isolation Pads:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Novia; A Division of C&P.
    g. Vibration Eliminator Co., Inc.
    h. Vibration Isolation.
    i. Vibration Mountings & Controls, Inc.

2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
3. Size: Factory or field cut to match requirements of supported equipment.
4. Pad Material: Oil and water resistant with elastomeric properties.
5. Surface Pattern: Smooth, Ribbed or Waffle pattern.
6. Infused nonwoven cotton or synthetic fibers.
7. Load-bearing metal plates adhered to pads.
8. Sandwich-Core Material: Resilient and elastomeric.

    a. Surface Pattern: Smooth pattern.
    b. Infused nonwoven cotton or synthetic fibers.

2.2 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Novia; A Division of C&P.
    g. Vibration Eliminator Co., Inc.
    h. Vibration Isolation.
    i. Vibration Mountings & Controls, Inc.

2. Mounting Plates:

    a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
    b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.3 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Novia; A Division of C&P.
    g. Vibration Eliminator Co., Inc.
    h. Vibration Isolation.
    i. Vibration Mountings & Controls, Inc.

2. Description: All-directional isolator with restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.

    a. Housing: Cast-ductile iron or welded steel.
    b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.4 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.

f. Vibration Eliminator Co., Inc.
g. Vibration Isolation.
h. Vibration Mountings & Controls, Inc.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.

    a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    b. Top housing with attachment and leveling bolt.

2.5 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Ace Mountings Co., Inc.
    b. California Dynamics Corporation.
    c. Isolation Technology, Inc.
    d. Kinetics Noise Control, Inc.
    e. Mason Industries, Inc.
    f. Novia; A Division of C&P.
    g. Vibration Eliminator Co., Inc.
    h. Vibration Isolation.
    i. Vibration Mountings & Controls, Inc.

2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

    a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
    b. Top plate with threaded mounting holes.
    c. Internal leveling bolt that acts as blocking during installation.

3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
4. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
5. Minimum Additional Travel: 50 percent of the required deflection at rated load.
6. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
7. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.6 HOUSED-RESTRAINED-SPRING ISOLATORS

A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ace Mountings Co., Inc.
b. California Dynamics Corporation.
c. Isolation Technology, Inc.
d. Kinetics Noise Control, Inc.
e. Mason Industries, Inc.
f. Vibration Eliminator Co., Inc.
g. Vibration Isolation.
h. Vibration Mountings & Controls, Inc.

2. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.

a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.

3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 VIBRATION CONTROL DEVICE INSTALLATION

A. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.

END OF SECTION 230548.13

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to *this* Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Duct labels.
4. Valve tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

C. Valve numbering scheme.

D. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Brady Corporation.
b. Brimar Industries, Inc.
c. Carlton Industries, LP.
d. Champion America.
e. Craftmark Pipe Markers.
f. emedco.

g. Kolbi Pipe Marker Co.
h. LEM Products Inc.
i. Marking Services, Inc.
j. Seton Identification Products.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
3. Letter Color: Black.
4. Background Color: White.
5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Carlton Industries, LP.
5. Champion America.
6. Craftmark Pipe Markers.
7. emedco.
8. Kolbi Pipe Marker Co.
9. LEM Products Inc.
10. Marking Sevices Inc.
11. Seton Identification Products.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

2.3 DUCT LABELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Brady Corporation.
2. Brimar Industries, Inc.
3. Carlton Industries, LP.
4. Champion America.
5. Craftmark Pipe Markers.
6. emedco.
7. Kolbi Pipe Marker Co.
8. LEM Products Inc.
9. Marking Sevices Inc.
10. Seton Identification Products.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

F. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

2.4 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Carlton Industries, LP.
5. Champion America.
6. Craftmark Pipe Markers.
7. emedco.
8. Kolbi Pipe Marker Co.
9. LEM Products Inc.
10. Marking Sevices Inc.
11. Seton Identification Products.

B. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass beaded chain.

C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

C. Pipe Label Color Schedule:

1. Refrigerant Piping: Black letters on a safety-white background.

3.5 DUCT LABEL INSTALLATION

A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For supply ducts.
2. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.

B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.6 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape: 1-1/2 inches, round.
2. Valve-Tag Colors: Natural.

3. Letter Colors: White.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

a. Constant-volume air systems.

2. Testing, Adjusting, and Balancing Equipment:

a. Motors.
b. Condensing units.

3. Sound tests.
4. Vibration tests.
5. Duct leakage tests.
6. Control system verification.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Needs for coordination and cooperation of trades and subcontractors.
d. Proposed procedures for documentation and communication flow.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.

D. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

E. Certified TAB reports.

F. Sample report forms.

G. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.6 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
2. TAB Technician: Employee of the TAB specialist and certified by AABC as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

A. Subject to compliance with requirements, available TAB specialists that may be engaged include, but are not limited to, the following:

1. Tech Test.
2. Coastal Air Balance.

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine system pumps to ensure absence of entrained air in the suction piping.

O. Examine operating safety interlocks and controls on HVAC equipment.

P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" and SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check condensate drains for proper connections and functioning.

J. Check for proper sealing of air-handling-unit components.

K. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
    c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
    d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:

    a. Measure static pressure directly at the fan outlet or through the flexible connection.
    b. Measure static pressure directly at the fan inlet or through the flexible connection.
    c. Measure static pressure across each component that makes up the air-handling system.
    d. Report artificial loading of filters at the time static pressures are measured.

3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
4. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.

1. Measure airflow of submain and branch ducts.
2. Adjust submain and branch duct volume dampers for specified airflow.
3. Re-measure each submain and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.

1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure inlets and outlets airflow.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after they have been adjusted.

D. Verify final system conditions.

1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm that total airflow is within design.

3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust if necessary.
6. Measure and record all operating data.
7. Record final fan-performance data.

3.7 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.8 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record fan and motor operating data.

3.9 SOUND TESTS

A. After the systems are balanced and construction is Substantially Complete, measure and record sound levels at 2 locations as designated by the Architect.

B. Instrumentation:

1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
4. The accuracy of the sound-testing meter shall be plus or minus one decibel.

C. Test Procedures:

1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.

2. Equipment should be operating at design values.
3. Calibrate the sound-testing meter prior to taking measurements.
4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment off.
6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment operating.
7. Take readings no closer than 36 inches from a wall or from the operating equipment and approximately 60 inches from the floor, with the meter held or mounted on a tripod.
8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.

D. Reporting:

1. Report shall record the following:

   a. Location.
   b. System tested.
   c. dBA reading.
   d. Sound pressure level in each octave band with equipment on and off.

2. Plot sound pressure levels on NC worksheet with equipment on and off.

3.10 VIBRATION TESTS

A. After systems are balanced and construction is Substantially Complete, measure and record vibration levels on equipment having motor horsepower equal to or greater than 10.

B. Instrumentation:

1. Use portable, battery-operated, and microprocessor-controlled vibration meter with or without a built-in printer.
2. The meter shall automatically identify engineering units, filter bandwidth, amplitude, and frequency scale values.
3. The meter shall be able to measure machine vibration displacement in mils of deflection, velocity in inches per second, and acceleration in inches per second squared.
4. Verify calibration date is current for vibration meter before taking readings.

C. Test Procedures:

1. To ensure accurate readings, verify that accelerometer has a clean, flat surface and is mounted properly.
2. With the unit running, set up vibration meter in a safe, secure location. Connect transducer to meter with proper cables. Hold magnetic tip of transducer on top of the bearing, and measure unit in mils of deflection. Record measurement, then move transducer to the side of the bearing and record in mils of deflection. Record an axial reading in mils of deflection by holding nonmagnetic, pointed transducer tip on end of shaft.

3. Change vibration meter to velocity (inches per second) measurements. Repeat and record above measurements.
4. Record CPM or rpm.
5. Read each bearing on motor, fan, and pump as required. Track and record vibration levels from rotating component through casing to base.

D. Reporting:

1. Report shall record location and the system tested.
2. Include horizontal-vertical-axial measurements for tests.
3. Verify that vibration limits follow Specifications, or, if not specified, follow the General Machinery Vibration Severity Chart or Vibration Acceleration General Severity Chart from the AABC National Standards. Acceptable levels of vibration are normally "smooth" to "good."
4. Include in report General Machinery Vibration Severity Chart, with conditions plotted.

3.11 DUCT LEAKAGE TESTS

A. Witness the duct pressure testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified tolerances.

C. Report deficiencies observed.

3.12 CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify temperature control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of lockout or interlock systems.
6. Verify the operation of valve and damper actuators.
7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.13 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 10 percent, minus 5 percent.

2. Air Outlets and Inlets: Plus 10 percent, minus 5 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.14 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.

b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Unit arrangement and class.
g. Discharge arrangement.
h. Sheave make, size in inches, and bore.
i. Center-to-center dimensions of sheave and amount of adjustments in inches.
j. Number, make, and size of belts.
k. Number, type, and size of filters.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.

f. Preheat-coil static-pressure differential in inches wg.
g. Cooling-coil static-pressure differential in inches wg.
h. Heating-coil static-pressure differential in inches wg.
i. Outdoor airflow in cfm.
j. Return airflow in cfm.
k. Outdoor-air damper position.
l. Return-air damper position.

F. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Airflow rate in cfm.
i. Face area in sq. ft..
j. Minimum face velocity in fpm.

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h.
b. Airflow rate in cfm.
c. Air velocity in fpm.
d. Entering-air temperature in deg F.
e. Leaving-air temperature in deg F.
f. Voltage at each connection.
g. Amperage for each phase.

G. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.

c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

H. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

I. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.15 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following duct services:

1. Indoor, exposed supply and outdoor air.
2. Indoor, exposed return located in unconditioned space.
3. Indoor, exposed exhaust between isolation damper and penetration of building exterior.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. CertainTeed Corporation.
b. Johns Manville; a Berkshire Hathaway company.
c. Knauf Insulation.
d. Manson Insulation Inc.
e. Owens Corning.

2.2 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F. Comply with ASTM C 656, Type II, Grade 6. Tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Johns Manville; a Berkshire Hathaway company.

B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. 3M.
b. CertainTeed Corporation.
c. Johns Manville; a Berkshire Hathaway company.
d. Nelson Firestop; a brand of Emerson Industrial Automation.
e. Thermal Ceramics.
f. Unifrax Corporation.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Eagle Bridges - Marathon Industries.
    c. Foster Brand; H. B. Fuller Construction Products.
    d. Mon-Eco Industries, Inc.

C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Eagle Bridges - Marathon Industries.
    c. Foster Brand; H. B. Fuller Construction Products.
    d. Mon-Eco Industries, Inc.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Knauf Insulation.
    d. Vimasco Corporation.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Childers Brand; H. B. Fuller Construction Products.

b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Knauf Insulation.
e. Mon-Eco Industries, Inc.
f. Vimasco Corporation.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Vimasco Corporation.

2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
3. Service Temperature Range: 0 to plus 180 deg F.
4. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 6 oz./sq. yd. with a thread count of 5 strands by 5 strands/sq. in. for covering ducts.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Foster Brand; H. B. Fuller Construction Products.
    b. Vimasco Corporation.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Alpha Associates, Inc.

2.10 TAPES

A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Avery Dennison Corporation, Specialty Tapes Division.
    b. Compac Corporation.
    c. Ideal Tape Co., Inc., an American Biltrite Company.
    d. Knauf Insulation.
    e. Venture Tape.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

B. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Avery Dennison Corporation, Specialty Tapes Division.
    b. Compac Corporation.
    c. Ideal Tape Co., Inc., an American Biltrite Company.
    d. Knauf Insulation.
    e. Venture Tape.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.11 SECUREMENTS

A. Bands:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ITW Insulation Systems; Illinois Tool Works, Inc.
    b. RPR Products, Inc.

2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) AGM Industries, Inc.
        2) Gemco.
        3) Hardcast, Inc.
        4) Midwest Fasteners, Inc.
        5) Nelson Stud Welding.

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) AGM Industries, Inc.
        2) CL WARD & Family Inc.
        3) Gemco.
        4) Hardcast, Inc.

5) Midwest Fasteners, Inc.
6) Nelson Stud Welding.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      1) AGM Industries, Inc.
      2) Gemco.
      3) Midwest Fasteners, Inc.

   b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
   d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

4. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      1) AGM Industries, Inc.
      2) Gemco.
      3) Hardcast, Inc.
      4) Midwest Fasteners, Inc.

   b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
   d. Adhesive-backed base with a peel-off protective cover.

5. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

   a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      1) AGM Industries, Inc.

2) Gemco.
3) Hardcast, Inc.
4) Midwest Fasteners, Inc.
5) Nelson Stud Welding.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. C & F Wire.

2.12 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

E. Insulation Installation at Floor Penetrations:

1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Impale insulation over pins and attach speed washers.
    f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.

B. Insulate duct access panels and doors to achieve same fire rating as duct.

C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, exposed supply and outdoor air.
2. Indoor, exposed return located in unconditioned space.
3. Indoor, exposed exhaust between isolation damper and penetration of building exterior.

B. Items Not Insulated:

1. Fibrous-glass ducts.
2. Factory-insulated plenums and casings.
3. Vibration-control devices.
4. Factory-insulated access panels and doors.

3.9 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed and exposed, square and round, supply and return-air duct and plenum insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density.

B. Concealed and exposed, square and round, outdoor and exhaust-air duct and plenum insulation shall be the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.

END OF SECTION 230713

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulating the following HVAC piping systems:

1. Condensate drain piping, indoors and outdoors.
2. Refrigerant suction and hot-gas piping, indoors and outdoors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Establish and maintain clearance requirements for installation of insulation and for space required for maintenance.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Aeroflex USA, Inc.
b. Airex Manufacturing.
c. Armacell LLC.
d. K-Flex USA.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Aeroflex USA, Inc.
b. Armacell LLC.
c. Foster Brand; H. B. Fuller Construction Products.
d. K-Flex USA.

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller Construction Products.
c. Knauf Insulation.
d. Vimasco Corporation.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

2.4 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Childers Brand; H. B. Fuller Construction Products.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Foster Brand; H. B. Fuller Construction Products.
b. Vimasco Corporation.

2.5 TAPES

A. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Avery Dennison Corporation, Specialty Tapes Division.
b. Compac Corporation.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Venture Tape.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

L. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

M. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

N. For above-ambient services, do not install insulation to the following:

1. Testing agency labels and stamps.
2. Nameplates and data plates.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

E. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable

insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 FINISHES

A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.10 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

B. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

C. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

3.11 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Refrigerant Suction and Hot-Gas Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Flexible Tubing:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 2 inches thick.

END OF SECTION 230719

SECTION 232300 - REFRIGERANT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Refrigerant pipes and fittings.
2. Refrigerant piping valves and specialties.
3. Refrigerants.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of valve, refrigerant piping, and piping specialty.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to 2010 ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.7 PRODUCT STORAGE AND HANDLING

A. Store piping with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Suction Lines for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Liquid Lines: 535 psig.

2.2 COPPER TUBE AND FITTINGS

A. Copper Tube: ASTM B 88, Type K or L and ASTM B 280, Type ACR.

B. Wrought-Copper Fittings: ASME B16.22.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8/A5.8M.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch-long assembly.
4. Working Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

2.3 VALVES AND SPECIALTIES

A. Provide valves and specialties as per HVAC equipment manufacturer’s recommendations, requirements and instructions.

B. Diaphragm Packless Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Danfoss Inc.
b. Heldon Products; Henry Technologies.
c. Parker Hannifin Corp.
d. Paul Mueller Company.

2. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
3. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
4. Operator: Rising stem and hand wheel.
5. Seat: Nylon.
6. End Connections: Socket, union, or flanged.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 275 deg F.

C. Packed-Angle Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Danfoss Inc.
b. Heldon Products; Henry Technologies.
c. Parker Hannifin Corp.
d. Paul Mueller Company.

2. Body and Bonnet: Forged brass or cast bronze.
3. Packing: Molded stem, back seating, and replaceable under pressure.
4. Operator: Rising stem.
5. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
6. Seal Cap: Forged-brass or valox hex cap.
7. End Connections: Socket, union, threaded, or flanged.
8. Working Pressure Rating: 500 psig.
9. Maximum Operating Temperature: 275 deg F.

D. Check Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Apollo Flow Controls; Conbraco Industries, Inc.
b. Danfoss Inc.
c. Emerson Climate Technologies.
d. Heldon Products; Henry Technologies.
e. Parker Hannifin Corp.
f. Paul Mueller Company.

2. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
3. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
4. Piston: Removable polytetrafluoroethylene seat.
5. Closing Spring: Stainless steel.

6. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
7. End Connections: Socket, union, threaded, or flanged.
8. Maximum Opening Pressure: 0.50 psig.
9. Working Pressure Rating: 500 psig.
10. Maximum Operating Temperature: 275 deg F.

E. Service Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Emerson Climate Technologies.
    c. Heldon Products; Henry Technologies.
    d. Parker Hannifin Corp.
    e. Paul Mueller Company.
    f. Refrigeration Sales, Inc.

2. Body: Forged brass with brass cap including key end to remove core.
3. Core: Removable ball-type check valve with stainless-steel spring.
4. Seat: Polytetrafluoroethylene.
5. End Connections: Copper spring.
6. Working Pressure Rating: 500 psig.

F. Solenoid Valves: Comply with AHRI 760 and UL 429; listed and labeled by a National Recognized Testing Laboratory (NRTL).

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Emerson Climate Technologies.
    c. Heldon Products; Henry Technologies.
    d. Parker Hannifin Corp.
    e. Paul Mueller Company.

2. Body and Bonnet: Plated steel.
3. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
4. Seat: Polytetrafluoroethylene.
5. End Connections: Threaded.
6. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 24 or 115-V ac coil.
7. Working Pressure Rating: 400 psig.
8. Maximum Operating Temperature: 240 deg F.

G. Safety Relief Valves: Comply with 2010 ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Heldon Products; Henry Technologies.
    c. Parker Hannifin Corp.
    d. Paul Mueller Company.

2. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
3. Piston, Closing Spring, and Seat Insert: Stainless steel.
4. Seat: Polytetrafluoroethylene.
5. End Connections: Threaded.
6. Working Pressure Rating: 400 psig.
7. Maximum Operating Temperature: 240 deg F.

H. Thermostatic Expansion Valves: Comply with AHRI 750.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Emerson Climate Technologies.
    c. Heldon Products; Henry Technologies.
    d. Paul Mueller Company.

2. Body, Bonnet, and Seal Cap: Forged brass or steel.
3. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
4. Packing and Gaskets: Non-asbestos.
5. Capillary and Bulb: Copper tubing filled with refrigerant charge.
6. Suction Temperature: 40 deg F.
7. Superheat: Adjustable or Nonadjustable.
8. Reverse-flow option for heat-pump applications.
9. End Connections: Socket, flare, or threaded union.
10. Working Pressure Rating: 700 psig.

I. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Heldon Products; Henry Technologies.
    c. Parker Hannifin Corp.

2. Body, Bonnet, and Seal Cap: Ductile iron or steel.
3. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
4. Packing and Gaskets: Non-asbestos.
5. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.

6. Seat: Polytetrafluoroethylene.
7. Equalizer: Internal or External.
8. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter and 24 or 115-V ac coil.
9. End Connections: Socket.
10. Throttling Range: Maximum 5 psig.
11. Working Pressure Rating: 500 psig.
12. Maximum Operating Temperature: 240 deg F.

J. Straight-Type Strainers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Heldon Products; Henry Technologies.
    c. Parker Hannifin Corp.

2. Body: Welded steel with corrosion-resistant coating.
3. Screen: 100-mesh stainless steel.
4. End Connections: Socket or flare.
5. Working Pressure Rating: 500 psig.
6. Maximum Operating Temperature: 275 deg F.

K. Angle-Type Strainers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Heldon Products; Henry Technologies.
    c. Parker Hannifin Corp.

2. Body: Forged brass or cast bronze.
3. Drain Plug: Brass hex plug.
4. Screen: 100-mesh monel.
5. End Connections: Socket or flare.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 deg F.

L. Moisture/Liquid Indicators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Danfoss Inc.
    b. Emerson Climate Technologies.
    c. Heldon Products; Henry Technologies.

d. Parker Hannifin Corp.

2. Body: Forged brass.
3. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
4. Indicator: Color coded to show moisture content in parts per million (ppm).
5. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
6. End Connections: Socket or flare.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 240 deg F.

M. Replaceable-Core Filter Dryers: Comply with AHRI 730.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Danfoss Inc.
   b. Emerson Climate Technologies.
   c. Heldon Products; Henry Technologies.
   d. Parker Hannifin Corp.

2. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
3. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
4. Desiccant Media: Activated alumina or charcoal.
5. Designed for reverse flow for heat-pump applications.
6. End Connections: Socket.
7. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
8. Maximum Pressure Loss: 2 psig.
9. Working Pressure Rating: 500 psig.
10. Maximum Operating Temperature: 240 deg F.

N. Permanent Filter Dryers: Comply with AHRI 730.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Danfoss Inc.
   b. Emerson Climate Technologies.
   c. Heldon Products; Henry Technologies.
   d. Parker Hannifin Corp.

2. Body and Cover: Painted-steel shell.
3. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
4. Desiccant Media: Activated alumina or charcoal.
5. Designed for reverse flow for heat-pump applications.
6. End Connections: Socket.

7. Access Ports: NPS 1/4 connections at entering and leaving sides for pressure differential measurement.
8. Maximum Pressure Loss: 2 psig.
9. Working Pressure Rating: 500 psig.
10. Maximum Operating Temperature: 240 deg F.

O. Receivers: Comply with AHRI 495.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Heldon Products; Henry Technologies.

2. Comply with 2010 ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
3. Comply with UL 207; listed and labeled by an NRTL.
4. Body: Welded steel with corrosion-resistant coating.
5. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
6. End Connections: Socket or threaded.
7. Working Pressure Rating: 500 psig.
8. Maximum Operating Temperature: 275 deg F.

P. Liquid Accumulators: Comply with AHRI 495.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Emerson Climate Technologies.
    b. Heldon Products; Henry Technologies.
    c. Parker Hannifin Corp.

2. Body: Welded steel with corrosion-resistant coating.
3. End Connections: Socket or threaded.
4. Working Pressure Rating: 500 psig.
5. Maximum Operating Temperature: 275 deg F.

2.4 REFRIGERANTS

A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Arkema Inc.
    b. DuPont Fluorochemicals Div.
    c. Genetron Refrigerants; Honeywell International Inc.
    d. Mexichem Fluor Inc.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-410A

A. Suction Lines NPS 1-1/2 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed or soldered joints.

B. Suction Lines NPS 1-3/4 to NPS 4 for Conventional Air-Conditioning Applications: Copper, Type L, drawn-temper tubing and wrought-copper fittings with soldered joints.

C. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications:

1. NPS 5/8 and Smaller: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
2. NPS 3/4 to NPS 1-1/4: Copper, Type K, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
3. NPS 1-1/2 to NPS 2: Copper, Type L, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

D. Safety-Relief-Valve Discharge Piping:

1. NPS 5/8 and Smaller: Copper, Type ACR, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.
2. NPS ¾ to NPS 1-1/4: Copper, Type K, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.
3. NPS 1-1/2 to NPS 2: Copper, Type L, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

3.2 VALVE AND SPECIALTY APPLICATIONS

A. Install valves and specialties as per HVAC equipment manufacturer’s recommendations and instructions.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Refer to Section 230923 "Direct Digital Control (DDC) System for HVAC" and Section 230993.11 "Sequence of Operations for HVAC DDC" for solenoid valve controllers, control wiring, and sequence of operation.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Section 083113 "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in protective conduit where installed belowground.

N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

O. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.
2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

R. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

S. Identify refrigerant piping and valves according to Section 230553 "Identification for HVAC Piping and Equipment."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.4 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

3.5 HANGERS AND SUPPORTS

A. Comply with requirements for pipe hangers and supports specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.

4. Spring hangers to support vertical runs.
5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod diameters:

1. NPS 1/2: Maximum span, 60 inches; minimum rod, 1/4 inch.
2. NPS 5/8: Maximum span, 60 inches; minimum rod, 1/4 inch.
3. NPS 1: Maximum span, 72 inches; minimum rod, 1/4 inch.
4. NPS 1-1/4: Maximum span, 96 inches; minimum rod, 3/8 inch.
5. NPS 1-1/2: Maximum span, 96 inches; minimum rod, 3/8 inch.
6. NPS 2: Maximum span, 96 inches; minimum rod, 3/8 inch.
7. NPS 2-1/2: Maximum span, 108 inches; minimum rod, 3/8 inch.
8. NPS 3: Maximum span, 10 feet; minimum rod, 3/8 inch.
9. NPS 4: Maximum span, 12 feet; minimum rod, 1/2 inch.

3.6 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

B. Prepare test and inspection reports.

3.7 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.8 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.
4. Open refrigerant valves except bypass valves that are used for other purposes.
5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 232300

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 DEFINITIONS

A. OSHPD: Office of Statewide Health Planning and Development (State of California).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
5. Design Calculations: Calculations for selecting hangers and supports.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

B. Welding certificates.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
3. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.

C. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.

D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."

E. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

F. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are dimensions of sheet metal and include interior insulation where applicable.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts exposed to weather, construct of Type 304 or Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All longitudinal seams shall be Pittsburgh lock seams unless otherwise specified for specific application.

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. For ducts exposed to weather, construct of Type 304 or Type 316 stainless steel indicated by manufacturer to be suitable for outdoor installation.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Ductmate Industries, Inc.
b. Elgen Manufacturing.
c. Linx Industries (formerly Lindab).
d. McGill AirFlow LLC.
e. MKT Metal Manufacturing.
f. SEMCO LLC.
g. Set Duct Manufacturing.
h. Sheet Metal Connectors, Inc.

i. Spiral Manufacturing Co., Inc.
j. Stamped Fittings Inc.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

D. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in "Duct Schedule" Article.

D. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested in accordance with ASTM D 3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
5. Shop-Applied Coating Color: Black or White.
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

E. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

F. Tie Rods: Galvanized steel, 1/4-inch-minimum diameter for lengths 36 inches or less; 3/8-inch-minimum diameter for lengths longer than 36 inches.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 6 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.

6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
9. Service: Indoor or outdoor.
10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

J. Install fire, combination fire/smoke, and smoke dampers where indicated on Drawings and as required by code, and by local authorities having jurisdiction. Comply with requirements in

Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.

K. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

M. Elbows: Use long-radius elbows wherever they fit.

1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.

N. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class B.
4. Outdoor, Return-Air Ducts: Seal Class B.

5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class B.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class A.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class B.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Test the following systems:

    a. Ducts with a Pressure Class Higher Than 2-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
5. Test for leaks before applying external insulation.
6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
7. Give seven days' advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.8 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. For cleaning of existing ductwork, see Section 230130.52 "Existing HVAC Air Distribution System Cleaning."

C. Use duct cleaning methodology as indicated in NADCA ACR.

D. Use service openings for entry and inspection.

1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

E. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

F. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

G. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.

4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.9 STARTUP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.10 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.

B. Supply Ducts:

1. Ducts Connected to Constant-Volume Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

2. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

C. Return Ducts:

1. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

2. Ducts Connected to Equipment Not Listed above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B if negative pressure; A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

2. Ducts Connected to Equipment Not Listed above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B if negative pressure; A if positive pressure.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

2. Ducts Connected to Equipment Not Listed Above:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B.
c. SMACNA Leakage Class for Rectangular: 4.
d. SMACNA Leakage Class for Round and Flat Oval: 4.

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.

2. Stainless-Steel Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

G. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
4) Radius-to Diameter Ratio: 1.5.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

H. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

    a. Rectangular Main to Rectangular Branch: 45-degree entry.
    b. Rectangular Main to Round Branch: Conical spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

    a. Velocity 1000 fpm or Lower: 90-degree tap.
    b. Velocity 1000 to 1500 fpm: Conical tap.
    c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Manual volume dampers.
3. Control dampers.
4. Fire dampers.
5. Combination fire and smoke dampers.
6. Flange connectors.
7. Turning vanes.
8. Duct-mounted access doors.
9. Flexible connectors.
10. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.

B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts.

C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. American Warming and Ventilating; a Mestek Architectural Group company.
2. Cesco Products; a division of MESTEK, Inc.
3. Flex-Tek Group.
4. Greenheck Fan Corporation.

5. Lloyd Industries, Inc.
6. Nailor Industries Inc.
7. NCA Manufacturing, Inc.
8. Pottorff.
9. Ruskin Company.
10. Safe Air - Dowco Products.
11. United Enertech.
12. Vent Products Co., Inc.

B. Description: Gravity balanced.

C. Maximum Air Velocity: 2000 fpm.

D. Maximum System Pressure: 2-inch wg.

E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded corners or mechanically attached.

F. Blades: Multiple single-piece blades, center pivoted, maximum 6-inch width, 18 ga. thick galvanized steel, airfoil, with sealed edges.

G. Blade Action: Parallel.

H. Blade Seals: TPE.

I. Blade Axles:

1. Material: Plated steel.
2. Diameter: 0.20 inch.

J. Tie Bars and Brackets: Galvanized steel.

K. Return Spring: Adjustable tension.

L. Bearings: Steel ball or synthetic pivot bushings.

M. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.

2.4 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Aire Technologies.

b. American Warming and Ventilating; a Mestek Architectural Group company.
c. Flexmaster U.S.A., Inc.
d. Flex-Tek Group.
e. McGill AirFlow LLC.
f. Nailor Industries Inc.
g. Pottorff.
h. Ruskin Company.
i. Safe Air - Dowco Products.
j. Trox USA Inc.
k. United Enertech.
l. Vent Products Co., Inc.

2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames:

a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
b. Mitered and welded corners.
c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Opposed-blade design.
c. Stiffen damper blades for stability.
d. Galvanized-steel, 0.064 inch thick.

6. Blade Axles: Galvanized steel.
7. Bearings:

a. Oil-impregnated bronze or Molded synthetic.
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.

B. Low-Leakage, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. American Warming and Ventilating; a Mestek Architectural Group company.
b. Elgen Manufacturing.
c. Flex-Tek Group.
d. McGill AirFlow LLC.
e. Nailor Industries Inc.
f. Pottorff.
g. Ruskin Company.
h. Safe Air - Dowco Products.
i. Trox USA Inc.

j. United Enertech.
k. Vent Products Co., Inc.

2. Comply with AMCA 500-D testing for damper rating.
3. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
4. Suitable for horizontal or vertical applications.
5. Frames:

    a. Hat or U shaped.
    b. 0.094-inch-thick, galvanized sheet steel.
    c. Mitered and welded corners.
    d. Flanges for attaching to walls and flangeless frames for installing in ducts.

6. Blades:

    a. Multiple or single blade.
    b. Opposed-blade design.
    c. Stiffen damper blades for stability.
    d. Galvanized, roll-formed steel, 0.064 inch thick.

7. Blade Axles: Galvanized steel.
8. Bearings:

    a. Oil-impregnated bronze.
    b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

9. Blade Seals: Neoprene.
10. Jamb Seals: Cambered aluminum.
11. Tie Bars and Brackets: Galvanized steel.
12. Accessories:

    a. Include locking device to hold single-blade dampers in a fixed position without vibration.

C. Jackshaft:

1. Size: 0.5-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

D. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.5 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. American Warming and Ventilating; a Mestek Architectural Group company.
2. Arrow United Industries.
3. Cesco Products; a division of MESTEK, Inc.
4. Flex-Tek Group.
5. Greenheck Fan Corporation.
6. Lloyd Industries, Inc.
7. McGill AirFlow LLC.
8. Metal Form Manufacturing, Inc.
9. Nailor Industries Inc.
10. NCA Manufacturing, Inc.
11. Pottorff.
12. Ruskin Company.
13. Safe Air - Dowco Products.
14. United Enertech.
15. Vent Products Co., Inc.
16. Young Regulator Company.

B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat or U shaped.
2. 0.094-inch-thick, galvanized sheet steel.
3. Mitered and welded corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Opposed-blade design.
3. Galvanized-steel.
4. 0.064-inch-thick single skin.
5. Blade Edging: Closed-cell neoprene.

E. Blade Axles: 1/2-inch-diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

F. Bearings:

1. Oil-impregnated bronze.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.6 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Air Balance; a division of MESTEK, Inc.
2. Aire Technologies.
3. American Warming and Ventilating; a Mestek Architectural Group company.
4. Arrow United Industries.
5. Cesco Products; a division of MESTEK, Inc.
6. Greenheck Fan Corporation.
7. Nailor Industries Inc.
8. NCA Manufacturing, Inc.
9. Pottorff.
10. Prefco.
11. Ruskin Company.
12. Safe Air - Dowco Products.
13. United Enertech.
14. Vent Products Co., Inc.
15. Ward Industries; a brand of Hart & Cooley, Inc.

B. Type: Static; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.

D. Fire Rating: 1-1/2 and 3 hours.

E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.05 thick, as indicated, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

G. Mounting Orientation: Vertical as indicated.

H. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

2.7 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Aire Technologies.
2. American Warming and Ventilating; a Mestek Architectural Group company.
3. Cesco Products; a division of MESTEK, Inc.
4. Greenheck Fan Corporation.

5. Nailor Industries Inc.
6. Pottorff.
7. Ruskin Company.
8. Safe Air - Dowco Products.
9. United Enertech.

B. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.

D. Fire Rating: 1-1/2 and 3 hours.

E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded corners and mounting flange.

F. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.

G. Smoke Detector: Integral, factory wired for single-point connection.

H. Blades: Roll-formed, horizontal, interlocking, 0.063-inch- thick, galvanized sheet steel.

I. Leakage: Class I.

J. Rated pressure and velocity to exceed design airflow conditions.

K. Mounting Sleeve: Factory-installed, 0.039-inch- thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone calking.

L. Master control panel for use in dynamic smoke-management systems.

M. Damper Motors: Two-position action.

N. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.

6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz.
8. Coordinate requirements with fire alarm contractor.

O. Accessories:

1. Auxiliary switches for signaling, fan control or position indication.
2. Momentary test switch, damper mounted.
3. Integrals smoke detector.

2.8 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. CL WARD & Family Inc.
2. Ductmate Industries, Inc.
3. Hardcast, Inc.
4. Nexus PDQ.
5. Ward Industries; a brand of Hart & Cooley, Inc.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.9 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Aero-Dyne Sound Control Co.
2. CL WARD & Family Inc.
3. Ductmate Industries, Inc.
4. Duro Dyne Inc.
5. Elgen Manufacturing.
6. Hardcast, Inc.
7. METALAIRE, Inc.
8. SEMCO LLC.
9. Ward Industries; a brand of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Double wall.

2.10 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Aire Technologies.
2. American Warming and Ventilating; a Mestek Architectural Group company.
3. Cesco Products; a division of MESTEK, Inc.
4. CL WARD & Family Inc.
5. Ductmate Industries, Inc.
6. Elgen Manufacturing.
7. Flexmaster U.S.A., Inc.
8. Greenheck Fan Corporation.
9. McGill AirFlow LLC.
10. Nailor Industries Inc.
11. Pottorff.
12. United Enertech.
13. Ventfabrics, Inc.
14. Ward Industries; a brand of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

    a. Double wall, rectangular.
    b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
    c. Hinges and Latches: 1-by-1-inchbutt or piano hinge and cam latches.
    d. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

    a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
    b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
    c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches.
    d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.

4. Factory set at 3.0- to 8.0-inch wg.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.11 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. 3M.
2. CL WARD & Family Inc.
3. Ductmate Industries, Inc.
4. Flame Gard, Inc.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 0.0528-inch carbon steel.

D. Fasteners: Carbon steel. Panel fasteners shall not penetrate duct wall.

E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.12 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. CL WARD & Family Inc.
2. Ductmate Industries, Inc.
3. Duro Dyne Inc.
4. Elgen Manufacturing.
5. Hardcast, Inc.
6. JP Lamborn Co.
7. Ventfabrics, Inc.
8. Ward Industries; a brand of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

2.13 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Compliance with ASHRAE/IESNA 90.1-2004 includes Section 6.4.3.3.3 - "Shutoff Damper Controls," restricts the use of backdraft dampers, and requires control dampers for certain applications. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers according to UL listing.

H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. At outdoor-air intakes and mixed-air plenums.
3. Downstream from control dampers, backdraft dampers, and equipment.
4. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
5. At each change in direction and at maximum 50-foot spacing.
6. Upstream from turning vanes.
7. Control devices requiring inspection.
8. Elsewhere as indicated.

I. Install access doors with swing against duct static pressure.

J. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

K. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

L. Install flexible connectors to connect ducts to equipment.

M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

N. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceiling-mounted ventilators.
2. In-line centrifugal fans.

1.3 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on actual Project site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.8 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

1.

2.2 CEILING-MOUNTED VENTILATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Acme Engineering & Manufacturing Corp.
2. American Coolair Corporation.
3. Broan-NuTone LLC.
4. Carnes Company.
5. FloAire National.
6. Greenheck Fan Corporation.
7. JencoFan.
8. Loren Cook Company.
9. PennBarry.
10. S & P USA Ventilation Systems, LLC.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Plastic, louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
3. Isolation: Rubber-in-shear vibration isolators.
4. Manufacturer's standard roof jack or wall cap, and transition fittings.

G. Capacities and Characteristics:

a. Reference schedule on drawings.

2.3 IN-LINE CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Acme Engineering & Manufacturing Corp.
2. American Coolair Corporation.
3. Ammerman.
4. Breidert Air Products.
5. Carnes Company.
6. FloAire National.
7. Greenheck Fan Corporation.
8. Hartzell Fan Incorporated.
9. JencoFan.
10. Loren Cook Company.
11. Peerless Blowers.
12. PennBarry.
13. Quietaire Inc.

B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Drive Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.

D. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

E. Accessories:

1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
2. Companion Flanges: For inlet and outlet duct connections.

F. Capacities and Characteristics:

1. Reference schedule on drawing.

2.4 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Enclosure Type: Totally enclosed, fan cooled.

2.5 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Equipment Mounting:

1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

C. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

D. Support suspended units from structure using threaded steel rods and elastomeric hangers or spring hangers having a static deflection of 1 inch. V

E. Install units with clearances for service and maintenance.

F. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.

C. Replace fan and motor pulleys as required to achieve design airflow.

D. Lubricate bearings.

END OF SECTION 233423

SECTION 233713.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Round ceiling diffusers.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers.
2. Section 233713.23 "Air Registers and Grilles" for adjustable-bar register and grilles, fixed-face registers and grilles, and linear bar grilles.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 ROUND CEILING DIFFUSERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. METALAIRE, Inc.
2. Nailor Industries Inc.
3. Price Industries.
4. Titus.

B. Devices shall be specifically designed for variable-air-volume flows.

C. Material: Aluminum.

D. Finish: Baked enamel, color selected by Architect.

E. Face Style: Three cone.

F. Mounting: Duct connection.

G. Pattern: Fully adjustable.

H. Dampers: Radial opposed blade.

I. Accessories:

1. Equalizing grid.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

D. Insulate the entire top/back side (including frames) of all supply air diffusers where the back of the diffuser is exposed above a ceiling or in the wall of an unconditioned space. Contractor has the option to purchase manufacturer insulated diffusers or provide and install insulation on the diffuser that matches supply air ductwork insulation type and thickness as specified in section 230713 “Duct Insulation.” Insulation shall fully cover surrounding metal items (lay-in ceiling grid, supports, etc. in contact with the supply air grilles/registers to prevent condensation.

3.3 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.13

SECTION 233713.23 - REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adjustable blade face grilles.
2. Fixed face grilles.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
2. Section 233713.13 "Air Diffusers" for various types of air diffusers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

B. Source quality-control reports.

PART 2 - PRODUCTS

2.1 REGISTERS

A. Adjustable Blade Face Register:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Krueger.
    b. METALAIRE, Inc.
    c. Nailor Industries Inc.
    d. Price Industries.
    e. Titus.

2. Material: Aluminum.
3. Finish: Baked enamel, color selected by Architect.
4. Face Blade Arrangement: Horizontal spaced 3/4 inch apart.
5. Core Construction: Integral.
6. Frame: 1-1/4 inches wide.
7. Mounting: Countersunk screw.
8. Damper Type: Adjustable opposed blade.
9. Accessories:

    a. Front-blade gang operator.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate registers and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where registers and grilles are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install registers and grilles level and plumb.

B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements

for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

D. Insulate the entire top/back side (including frames) of all supply air grilles/registers where the back of the grille is exposed above a ceiling or in the wall of an unconditioned space. Contractor has the option to purchase manufacturer insulated grilles/registers or provide and install insulation on the grille/register that matches supply air ductwork insulation type and thickness as specified in section 230713 “Duct Insulation.” Insulation shall fully cover surrounding metal items (lay-in ceiling grid, supports, etc.) in contact with the supply air grilles to prevent condensation.

3.3 ADJUSTING

A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.23

SECTION 236313 - AIR-COOLED REFRIGERANT CONDENSERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes packaged, air-cooled refrigerant condensers for outdoor installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each air-cooled refrigerant condenser. Include rated capacities, operating characteristics, furnished specialties, and accessories. Include equipment dimensions, weights and structural loads, required clearances, method of field assembly, components, and location and size of each field connection.

B. Shop Drawings: For air-cooled refrigerant condensers. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For air-cooled refrigerant condensers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
2. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members to which air-cooled refrigerant condensers will be attached.
2. Liquid and vapor pipe sizes.
3. Refrigerant specialties.

4. Piping including connections, oil traps, and double risers.
5. Evaporators.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-cooled refrigerant condensers to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Standard for Refrigeration Systems."

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 03.

B. Coordinate location of refrigerant piping and electrical rough-ins.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Carrier Corporation; a unit of United Technologies Corp.
2. Colmac Coil Manufacturing, Inc.
3. Coolenheat Inc.
4. Dunham-Bush, Inc.
5. Engineered Air.
6. Heatcraft Refrigeration Products LLC.
7. Trane.
8. USA Coil & Air.
9. YORK; a Johnson Controls company.

2.2 MANUFACTURED UNITS

A. Description: Factory assembled and tested; consisting of casing, condenser coils, condenser fans and motors, and unit controls.

B. Refrigerant: R-410A.

C. Condenser Coil: Factory tested at 425 psig.

1. Tube: seamless copper.
2. Coil Fin: Aluminum.
3. Coating: Anti-Corrosion Treatment
4. Circuit: To match compressors.

D. Condenser Fans and Drives: Propeller fans with aluminum or galvanized-steel fan blades, for vertical air discharge; directly driven with permanently lubricated ball-bearing motors with integral current- and thermal-overload protection.

1. Weather-proof motors with rain shield and shaft slinger.
2. Extend grease lines to outside of casing.

E. Operating and Safety Controls: Include condenser fan motor thermal and overload cutouts; 115-V control transformer, if required; magnetic contactors for condenser fan motors and a nonfused factory-mounted and -wired disconnect switch for single external electrical power connection.

1. Fan Cycling Control: Head pressure switches or Ambient thermostats.

F. Casings: Galvanized or zinc-coated steel treated and finished with manufacturer's standard paint coating, designed for outdoor installation with weather protection for components and controls, and with the following:

1. Removable panels for access to controls, condenser fans, motors, and drives.
2. Plated-steel fan guards.
3. Lifting eyes.

2.3 CAPACITIES AND CHARACTERISTICS

A. Reference Mechanical Schedule.

2.4 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Enclosure Type: Totally enclosed, fan cooled.
2. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 0.9.

2.5 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate air-cooled refrigerant condensers according to ARI 460.

B. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of air-cooled refrigerant condensers.

B. Examine roughing-in for refrigerant piping systems to verify actual locations of piping connections before equipment installation.

C. Examine walls, floors, and roofs for suitable conditions where air-cooled condensers will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.

B. Equipment Mounting:

1. Install air-cooled condenser refrigerant condensers on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete" or Section 033053 "Miscellaneous Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

C. Maintain manufacturer's recommended clearances for service and maintenance.

D. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

3.3 CONNECTIONS

A. Install piping adjacent to machine to allow service and maintenance.

B. Refrigerant Piping: Connect piping to unit with pressure relief, service valve, filter-dryer, and moisture indicator on each refrigerant-circuit liquid line. Refrigerant piping and specialties are specified in Section 232300 "Refrigerant Piping."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Perform electrical test and visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Complete manufacturer's starting checklist.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
5. Verify proper airflow over coils.

C. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

D. Air-cooled refrigerant condensers will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:

    a. Inspect for physical damage to unit casing.
    b. Verify that access doors move freely and are weathertight.
    c. Clean units and inspect for construction debris.
    d. Verify that all bolts and screws are tight.
    e. Adjust vibration isolation and flexible connections.
    f. Verify that controls are connected and operational.

2. Lubricate bearings on fan motors.
3. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
4. Adjust fan belts to proper alignment and tension.
5. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
6. Measure and record airflow and air temperature rise over coils.
7. Verify proper operation of capacity control device.
8. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

9. AFTER startup and performance test, lubricate bearings.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-cooled refrigerant condensers.

END OF SECTION 236313

SECTION 237313.16 - INDOOR, SEMI-CUSTOM AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes insulated, double-wall-casing, indoor, semi-custom air-handling units that are factory assembled using multiple section components.

1.3 ACTION SUBMITTALS

A. Product Data: For each air-handling unit.

1. Unit dimensions and weight.
2. Cabinet material, metal thickness, finishes, insulation, and accessories.
3. Fans:

a. Certified fan-performance curves with system operating conditions indicated.
b. Certified fan-sound power ratings.
c. Fan construction and accessories.
d. Motor ratings, electrical characteristics, and motor accessories.

4. Certified coil-performance ratings with system operating conditions indicated.
5. Dampers, including housings, linkages, and operators.
6. Filters with performance characteristics.

B. Delegated-Design Submittal: For vibration isolation indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include design calculations for selecting vibration isolators and for designing vibration isolation bases.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Mechanical-room layout and relationships between components and adjacent structural and mechanical elements.

2. Support location, type, and weight.
3. Field measurements.

B. Source quality-control reports:

C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air-handling units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set for each air-handling unit.
2. Gaskets: One set for each access door.

1.7 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate sizes and locations of structural-steel support members, if any, with actual equipment provided.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

E. Structural Performance: Casing panels shall be self-supporting and capable of withstanding positive/negative 8-inch wg> of internal static pressure, without exceeding a midpoint deflection of 0.0042 inch/inch of panel span.

F. Casing Leakage Performance: ASHRAE 111, Class 6 leakage or better at plus or minus 8 inch wg.

2.2 CAPACITIES AND CHARACTERISTICS

A. Reference schedule on drawing.

2.3 INDOOR, SEMI-CUSTOM AIR-HANDLING UNIT MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Buffalo Air Handling.
2. Carrier Corporation; a unit of United Technologies Corp.
3. Coil Company, LLC.
4. Daikin Applied.
5. Dunham-Bush, Inc.
6. ENVIRO-TEC; by Johnson Controls, Inc.
7. Heresite Protective Coatings.
8. Trane.
9. USA Coil & Air.
10. YORK; a Johnson Controls company.

2.4 UNIT CASINGS

A. Frame: Modular and providing overall structural integrity without reliance on casing panels for structural support.

B. Casing Joints: Hermetically sealed at each corner and around entire perimeter.

C. Outside Casing Wall:

1. Material: Galvanized steel, minimum 16 gauge thick.
2. Material: Aluminum, minimum 14 gauge thick.
3. Factory Finish: Provide manufacturer's standard finish.

D. Inside Casing Wall:

1. Material: Galvanized steel, solid, minimum 18 gauge thick.

E. Floor Plate:

1. Material: Galvanized steel, minimum 16 gauge thick.
2. Material: Aluminum, minimum 14 gauge thick.

F. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

G. Casing Insulation:

1. Materials: Injected polyurethane foam insulation.
2. Casing Panel R-Value: Minimum R-6.
3. Insulation Thickness: 1 inches.
4. Thermal Break: Provide continuity of insulation with no through-casing metal in casing walls, floors, or roofs of air-handling unit.

H. Panels, Doors, and Windows:

1. Panels:

   a. Fabrication: Formed and reinforced, double-wall and insulated panels of same materials and thicknesses as casing.
   b. Fasteners: Two or more camlock type for panel lift-out operation. Arrangement shall allow panels to be opened against airflow
   c. Gasket: Neoprene, applied around entire perimeters of panel frames.
   d. Size: Large enough to allow unobstructed access for inspection and maintenance of air-handling unit's internal components.

2. Doors:

   a. Fabrication: Formed and reinforced, double-wall and insulated panels of same materials and thicknesses as casing.
   b. Hinges: A minimum of two ball-bearing hinges or stainless-steel piano hinge and two wedge-lever latches, operable from inside and outside. Arrange doors to be opened against airflow. Provide safety latch retainers on doors so that doors do not open uncontrollably.
   c. Gasket: Neoprene, applied around entire perimeters of panel frames.
   d. Size: Large enough to allow for unobstructed access for inspection and maintenance of air-handling unit's internal components.

I. Condensate Drain Pans:

1. Construction:

   a. Single-wall, stainless-steel sheet.

2. Drain Connection:

   a. Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end or both ends of pan.

3. Slope: Minimum 0.125-in./ft. slope, to comply with ASHRAE 62.1, in at least two planes to collect condensate from cooling coils including coil piping connections, coil headers, and return bends and from humidifiers and to direct water toward drain connection.
4. Length: Extend drain pan downstream from leaving face for distance to comply with ASHRAE 62.1.
5. Width: Entire width of water producing device.
6. Depth: A minimum of 2 inches deep.
7. Pan-Top Surface Coating for Galvanized-Steel Drain Pans: Asphaltic waterproofing compound.

8. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

2.5 FAN, DRIVE, AND MOTOR SECTION

A. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.

1. Shafts: With field-adjustable alignment.

a. Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.
b. Designed to operate at no more than 80 percent of first critical speed at top of fan's speed range.

B. Forward-Curved, Centrifugal Fan Wheels: Inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; steel or aluminum hub swaged to backplate and fastened to shaft with setscrews.

C. Fan Shaft Bearings:

1. Prelubricated and Sealed, Ball Bearings: Self-aligning, pillow-block type with an L-50 rated life of 200,000 hours according to ABMA 9.
2. Grease-Lubricated, Tapered-Roller Bearings: Self-aligning, pillow-block type with double-locking collars and two-piece, cast-iron housing with or without grease lines extended to outside unit and an L-50 rated life of 200,000 hours according to ABMA 11.
3. Grease-Lubricated Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing with or without grease lines extended to outside unit and an L-50 rated life of 200,000.

D. Internal Vibration Isolation: Fans shall be factory mounted with manufacturer's standard vibration isolation mounting devices having a minimum static deflection of 1 inch.

E. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Enclosure Type: Totally enclosed, fan cooled.
2. NEMA Premium Efficient motors as defined in NEMA MG 1.
3. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
4. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
5. Mount unit-mounted disconnect switches on exterior of unit.

2.6 COIL SECTION

A. General Requirements for Coil Section:

1. Comply with AHRI 410.
2. Fabricate coil section to allow removal and replacement of coil for maintenance and to allow in-place access for service and maintenance of coil(s).
3. For multizone units, provide air deflectors and air baffles to balance airflow across coils.
4. Coils shall not act as structural component of unit.

B. Cooling Coils:

1. Refrigerant Coil:

a. Tubes: Copper.
b. Fins:
1) Fin Spacing: Maximum 12 fins per inch.

c. Fin and Tube Joints: Mechanical bond.
d. Headers: Seamless-copper headers with brazed connections.
e. Frames: Galvanized steel.
f. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.

2.7 AIR FILTRATION SECTION

A. Panel Filters:

1. Description: Pleated factory-fabricated, self-supported, disposable air filters with holding frames.
2. Filter Unit Class: UL 900.
3. Media: Interlaced glass, synthetic or cotton fibers coated with nonflammable adhesive.
4. Filter-Media Frame: Beverage board with perforated metal retainer, or metal grid, on outlet side.

B. Side-Access Filter Mounting Frames:

1. Particulate Air Filter Frames: Match inner casing and outer casing material, and insulation thickness. Galvanized steel or Aluminum track.

a. Prefilters: Incorporate an integral 2-inch- thick track with same access as primary filter.
b. Sealing: Incorporate positive-sealing device to ensure seal between gasketed material on channels to seal top and bottom of filter cartridge frames to prevent bypass of unfiltered air.

2.8 MATERIALS

A. Steel:

1. ASTM A 36/A 36M for carbon structural steel.
2. ASTM A 568/A 568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A 240/A 240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A 653/A 653M.

D. Aluminum: ASTM B 209.

E. Corrosion-Resistant Coating: Coat with a corrosion-resistant coating capable of withstanding a 3000-hour salt-spray test according to ASTM B 117.

1. Standards:

a. ASTM B 117 for salt spray.
b. ASTM D 2794 for minimum impact resistance of 100 in-lb.
c. ASTM B 3359 for cross hatch adhesion of 5B.

2. Application: Immersion or Spray.
3. Thickness: 1 mil.
4. Gloss: Minimum gloss of 60 on a 60-degree meter.

2.9 SOURCE QUALITY CONTROL

A. AHRI 430 Certification: Air-handling units and their components shall be factory tested according to AHRI 430 and shall be listed and labeled by AHRI.

B. Refrigerant Coils: Factory tested to minimum 450-psig internal pressure and to minimum 300-psig internal pressure while underwater, according to AHRI 410 and ASHRAE 33.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine casing insulation materials and filter media before air-handling unit installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.

C. Examine roughing-in for steam, hydronic, and condensate drainage piping systems and electrical services to verify actual locations of connections before installation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Equipment Mounting:

1. Install air-handling units on cast-in-place concrete equipment bases.
2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

B. Arrange installation of units to provide access space around air-handling units for service and maintenance.

C. Do not operate fan system until filters permanent are in place. Replace temporary filters used during construction and testing, with new, clean filters.

D. Install filter-gauge, static-pressure taps upstream and downstream of filters. Mount filter gauges on outside of filter housing or filter plenum in accessible position. Provide filter gauges on filter banks, installed with separate static-pressure taps upstream and downstream of filters.

E. Connect duct to air-handling units with flexible connections. Comply with requirements in Section 233300 "Air Duct Accessories."

3.3 PIPING CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to air-handling unit, allow for service and maintenance.

C. Connect piping to air-handling units mounted on vibration isolators with flexible connectors.

D. Connect condensate drain pans using NPS 1-1/4, ASTM B 88, Type M copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

E. Refrigerant Piping: Comply with applicable requirements in Section 232300 "Refrigerant Piping." Install shutoff valve and union or flange at each supply and return connection.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Leak Test: After installation, fill water and steam coils with water, and test coils and connections for leaks.
2. Charge refrigerant coils with refrigerant and test for leaks.
3. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. HEPA Filters: Pressurize housing to a minimum of 3-inch wg or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter with soapy water to check for air leaks.
5. HEPA Filters: Pressurize housing to a minimum of 3-inch wg or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter for air leaks according to ASME AG-1, pressure-decay method.
6. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Air-handling unit or components will be considered defective if unit or components do not pass tests and inspections.

F. Prepare test and inspection reports.

3.7 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that shipping, blocking, and bracing are removed.

3. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
4. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
5. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
6. Verify that zone dampers fully open and close for each zone.
7. Verify that face-and-bypass dampers provide full face flow.
8. Verify that outdoor- and return-air mixing dampers open and close, and maintain minimum outdoor-air setting.
9. Comb coil fins for parallel orientation.
10. Verify that proper thermal-overload protection is installed for electric coils.
11. Install new, clean filters.
12. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.

B. Starting procedures for air-handling units include the following:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm.
2. Measure and record motor electrical values for voltage and amperage.
3. Manually operate dampers from fully closed to fully open position and record fan performance.

3.8 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air-handling system testing, adjusting, and balancing.

3.9 CLEANING

A. After completing system installation and testing, adjusting, and balancing air-handling unit and air-distribution systems and after completing startup service, clean air-handling units internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-handling units.

END OF SECTION 237313.16

SECTION 238239.16 - PROPELLER UNIT HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes propeller unit heaters with electric-resistance heating coils.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. PTFE: Polytetrafluoroethylene plastic.

C. TFE: Tetrafluoroethylene plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include location and size of each field connection.
4. Include details of anchorages and attachments to structure and to supported equipment.
5. Include equipment schedules to indicate rated capacities, operating characteristics, furnished specialties, and accessories.
6. Wiring Diagrams: Power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For propeller unit heaters to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Airtherm; a Mestek company.
2. CCI Thermal Technologies, Inc.
3. Engineered Air.
4. Reznor.
5. Rosemex Products.
6. Trane.

2.2 DESCRIPTION

A. Assembly including casing, coil, fan, and motor in horizontal discharge configuration with adjustable discharge louvers.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 2021.

D. Comply with UL 823.

2.3 PERFORMANCE REQUIREMENTS

A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.4 HOUSINGS

A. Finish: Manufacturer's standard baked enamel applied to factory-assembled and -tested propeller unit heaters before shipping.

B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

C. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.

2.5 COILS

A. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in steel or corrosion-resistant metallic sheath with fins no closer than 0.16 inch. Element ends shall be enclosed in terminal box. Fin surface temperature shall not exceed 550 deg F at any point during normal operation.

1. Circuit Protection: One-time fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters.
2. Wiring Terminations: Stainless-steel or corrosion-resistant material.

2.6 FAN AND MOTOR

A. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.

B. Motor: Permanently lubricated. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

2.7 CONTROLS

A. Control Devices:

1. Wall-mounted thermostat.

2.8 CAPACITIES AND CHARACTERISTICS

A. Reference schedule on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive propeller unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical connections to verify actual locations before unit-heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install propeller unit heaters to comply with NFPA 90A.

B. Install propeller unit heaters level and plumb.

C. Suspend propeller unit heaters from structure with all-thread hanger rods and elastomeric hangers. Hanger rods and attachments to structure are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

D. Install wall-mounted thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

3.3 CONNECTIONS

A. Comply with safety requirements in UL 1995.

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Units will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust initial temperature set points.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain propeller unit heaters.

END OF SECTION 238239.16

SECTION 26 05 00

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions, and Division 1 -General Sections included in DIVISION 26 Specifications are as follows:

SECTION 26 05 00 - ELECTRICAL GENERAL PROVISIONS
SECTION 26 05 01 - ELECTRICAL RELATED WORK
SECTION 26 05 19 - LOW VOLTAGE ELECTRICAL CONDUCTORS AND CABLES
SECTION 26 05 26 - GROUNDING
SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
SECTION 26 05 53 - ELECTRICAL IDENTIFICATION
SECTION 26 05 83 - ELECTRICAL CONNECTIONS FOR EQUIPMENT
SECTION 26 22 13 - LOW-VOLTAGE TRANSFORMERS
SECTION 26 24 16 - PANELBOARDS
SECTION 26 27 26 - WIRING DEVICES
SECTION 26 28 13 - OVERCURRENT PROTECTIVE DEVICES
SECTION 26 28 16 - CIRCUIT DISCONNECTS
SECTION 26 29 15 - PUMP CONTROL PANEL
SECTION 26 32 13 - STANDBY POWER SYSTEM GAS GENERATOR SET
SECTION 26 51 00 - LIGHTING
SECTION 40 63 00 - SCADA EQUIPMENT

1.02 DESCRIPTION OF WORK:

A. This Section specifies several categories of provisions for electrical work, including: (1) Certain adaptive expansions of requirements specified in DIVISION 1, (2) General performance requirements within the electrical systems as a whole, and (3) General work to be performed as electrical work because of its close association.

B. These Specifications and accompanying Drawings are intended to describe complete workable systems of the various types. Items of materials, work, or equipment not mentioned but normally necessary for the proper execution of this work, shall be provided as if specifically called for, at no additional cost to the Owner.

1.03 SUMMARY OF ELECTRICAL WORK:

A. Drawings: Refer to the Electrical Drawings for graphic representations, schedules and notations showing electrical work.

1. The Drawings show approximate locations only of feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Engineer reserves the right to make reasonable changes in locations indicated before roughing in without additional cost to the Owner.

2. Because of the small scale of the Drawings, it is not possible to indicate all of the
offsets, fittings, and accessories required. The Contractor shall investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.

B. Specifications:

1. Refer to the DIVISION 16 sections for the primary technical specifications of electrical work .

2. General Outline: This section of the specifications covers furnishing materials, equipment, constant competent supervision, special tools, test equipment, technicians, and labor necessary for installation of a complete working electrical system, all as indicated on the plans of in these Specifications.

C. Scope:

1. Under this part of the contact, electrical facilities will be constructed in association with THE DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM

2. The work shall include but not necessarily be limited to the following:

a. Electrical duct banks, cables, pullboxes, etc.
b. Power distribution systems - feeder & branch circuits, panels, wiring, transformers, devices, disconnect switches, etc.
c. Installation and / or wiring connections of integral part of equipment furnished under other Divisions.
d. Power wiring and connections of mechanical equipment.
e. Electrical Service Entrances.
f. Grounding systems.

g. Raceway systems.
h. Lighting systems-fixtures / lamps / auxiliaries wiring / connections / etc.
i. SCADA system raceways and auxiliary devices.
j. Installation and / or wiring connections of Owner supplied equipment (if any).
k. Temporary electrical services for construction.
l. All required sleeves, thimbles, anchors, hangers, bolts, miscellaneous structural steel, cutting, etc., for the complete installation of the electrical systems serving the building.

1.04 COORDINATION OF ELECTRICAL WORK:

A. General: Refer to the DIVISION 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contract documents are diagrammatic in showing certain physical relationships which must be established within the electrical work, and in its interface with other work including utilities and mechanical work, and that such establishment is the exclusive responsibility of the Contractor.

B. Arrange electrical work in a neat, well organized manner with exposed conduit and similar services running parallel with primary lines of the building construction, and with a minimum of 8’-0” overhead clearance or as directed by the Engineer.

C Advise other trades of openings required in their work for the subsequent move-in of large units of electrical work (equipment).

D. Submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

E. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

F. Refer to equipment specifications in Divisions 2 through 15 for rough-in requirements.

G. Verify all dimensions by field measurements.

H. Arrange for sleeves, slots, and openings in other building components to allow for electrical installations.

I. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

J. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

K. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.

L. Where mounting heights are not detailed or dimensioned, install electrical services and overhead equipment services and overhead equipment to provide the maximum headroom possible.

M. Install electrical equipment to facilitate maintenance and repair or replacement of equipment for ease of disconnecting, with minimum of interference with other installations.

N. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

O. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

1.05 TEMPORARY ELECTRICITY:

A. Furnish and install all necessary temporary power, metering, lighting or wiring that is
required to insure quality workmanship everywhere.

B. Furnish and install area distribution boxes so located that the individual trades may use their own construction-type extension cords to obtain proper power and artificial lighting at all points where required by inspectors and for safety.

1.06 QUALITY ASSURANCE, STANDARDS:

A. General: In addition to standards specified in individual work sections, the following standards are imposed, as applicable to the work in each instance:

NFPA 70, National Electrical Code

The electrical installation shall conform to the requirements of the 2020 edition of the National Electrical Code (NEC-NFPA 70).

NEMA/ANSI/ASTM

Electrical material shall be built and tested in accordance with the applicable standards of the National Electrical Manufacturer's Association (NEMA); the American National Standards Institute (ANSI); and the American Society of Testing and Materials (ASTM).

Underwriters' Laboratories (UL)

Electrical materials shall be new and unused and shall be listed, inspected, approved and labeled by Underwriters' Laboratories, Inc., where such labeling service is available.

NFPA-101, Life Safety Code

OSHA Code of Federal Regulations (for construction practices)

Applicable state and local codes/ordinances.

B. Manufacturers: Only firms regularly engaged in manufacture of electrical products of types required, whose products have been in satisfactory use in similar service for not less than 3 years, shall be utilized.

C. Installers Qualifications: Only firms with at least 5 years of successful installation experience on projects with electrical work similar to that required for this project.

1.07 ELECTRICAL SUBMITTALS:

A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 Section: SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES for submittal definitions, requirements, and procedures.

B. Submittal of shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Data submitted from subcontractors and material suppliers directly to the Engineer will not be processed.

C. ELECTRICAL SUBMITTALS: Submit to the Engineer for review, complete descriptive and dimensional data on the following materials which Contractor proposes to use. (Comply with Section 01340).

1. Panelboards
2. Lighting Fixtures
3. Fuses
4. Transformers
5. Lamps
6. Safety Switches

7. Circuit Breakers
8. Wiring Devices
9. Motor Controls
10. MANUAL Transfer Switches
11. Conductors
12. Main Switchgear
13. Conduits
14. Pullboxes
15. SCADA Equipment: Enclosure, PLC with I/O, UPS, radio or cell modem as indicated, antenna, cables
16. Conduit Expansion Fittings and Bonding Straps, where indicated
17. Wood Service Entrance Poles for Electrical Service Rack
18. Rough Sawn treated pole line timbers, and associated hardware
19. Roof system over service equipment, where indicated
20. Grounding clamps and devices

D. Corrections or comments made on shop drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents, Plans and Specifications. Shop Drawings will be checked for general conformance wit hthe design concept of the project and general compliance with information given in the contract documents. Review of Shop Drawings shall not relieve the Contractor from responsibility for confirming and correlating all quantities and dimensions, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner. Review of shop drawings shall not permit any deviation from Plans and Specifications. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance.

E. See Section 01340 - Submittals, for number of copies of shop Drawings to be submitted.

1.08 PRODUCT OPTIONS AND SUBSTITUTIONS:

A. Refer to the Instructions to Bidders, Specification Section 00100, for requirements in selecting products and requesting substitutions.

B. Any item not specified herein but submitted for approval as a substitute for the specified item shall be accompanied by manufacturer's documentation stating/illustrating the following applicable information in addition to the specific information requested in other sections:

1. Dimensions/weight.

2. Electrical ratings-voltage, amperage, short circuit capability, etc.

3. Construction - gauge of steel/aluminum, paint finish/application method, color NEMA type, etc.

4. Warranty.

5. Local manufacturer's representative or nearest stocking distributor.

6. Length of time the product has been available to the public.

1.09 DELIVERY, STORAGE AND HANDLING:

A. Deliver products to project properly identified with names, model numbers, types,
grades, compliance labels, and similar information needed for distinct identifications, adequately packaged and protected to prevent during shipment, storage, and handling.

B. Store equipment and materials at the site, unless offsite storage is authorized in writing. Protect stored equipment and materials from damage.

C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

1.10 RECORD DOCUMENTS:

A. Refer to the Division 1 Section 01720 for requirements. The following paragraphs supplement the requirements of Division 1.

B. In addition to the information required by Division 1 for Maintenance Data, include the following information:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, routing and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routing preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

4. Servicing instructions and lubrication charts and schedules.

1.11 WARRANTIES:

A. Refer to the General Conditions for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.

B. Compile and assemble the warranties specified in Division 26, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment to include date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

1.12 CLEANING:

A. Refer to the Division 1 Section: PROJECT CLOSEOUT or FINAL CLEANING for general requirements for final cleaning.

B. Clean and restore to original finish all equipment prior to final acceptance.

1.13 GUARANTEE:

A. The work installed shall be kept in perfect working order for one year from date of final written acceptance of the project, said guarantee to be based upon defective materials and/or workmanship. Furnish free of cost to the Owner materials and labor necessary to comply with this guarantee.

1.14 WIRING FOR EQUIPMENT BY OTHERS:

A. Electrical service for all equipment furnished under this Specification shall be roughed-in and connected under this Section. It is the responsibility of the Contractor to obtain correct roughing-in dimensions and requirements for this equipment.

B. Owner supplied equipment, when furnished as part of the project, shall be connected electrically. Connection/interconnection of that equipment shall be part of DIVISION 26 00 00 and shall comply with other DIVISION 26 00 00 Basic Material and Methods Sections.

C. Under other DIVISIONS, unless otherwise noted, equipment will be furnished such as: Motors, flow meters, pressure switches, etc. Connection/interconnection of that equipment shall be part of DIVISION 26 00 00 and shall comply with other DIVISION 26 00 00 Basic Material and Methods Sections.

D. Apparatus required for pump or motor controls will be furnished as specified under DIVISION 15 - Mechanical Work, unless indicated otherwise. Control wiring shall be furnished and installed as work under DIVISION 26 Electrical.

1.15 INSTALLATION OF EQUIPMENT SUPPLIED BY OWNER:

A. Electrical service for all equipment furnished by Owner shall be rough-in and connected under this Section. It is the responsibility of the Contractor to obtain correct roughing-in dimensions and requirements for this equipment.

B. Contractor shall provide all conduit and wiring to interface the pumps/motors with the related control devices as required. It shall be the Contractors obligation to request and obtain all shop drawings and wiring requirement from the Owner for the Owner provided items.

1.16 TESTS AND BALANCING:

A. At such times as the Engineer directs, the contractor shall conduct operating tests to demonstrate that the electrical systems are installed and will operate properly and in accordance with the requirements of this Specification. Tests shall be performed in the presence of the Engineer's representative. The Contractor shall furnish instruments and personnel required for such tests.

B. Contractor shall perform tests in the presence of the Engineer to show that the power and lighting loads are equally divided among phases of feeders serving each piece of equipment and each panelboard.

C. Any work and materials tested and found varying from the requirements of the Drawings and Specifications shall be replaced by the Contractor without additional cost to the Owner.

D. This requirement is in addition to specific tests such as high-potential tests, meggar test, phasing tests, generator testing, etc. which may be called for in other sections.

1.17 WORKMANSHIP:

A. Install all materials and electrical components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all components of the system shall be perpendicular or parallel. In general, workmanship shall conform to guidelines set for the in N.E.C.A. manuals.

1.18 SAFETY:

A. It shall be the Contractor's responsibility to do all things necessary in the pursuit of the installation or testing to provide safe conditions in which to work.

1.19 MOUNTING HEIGHTS:

A. Unless otherwise noted on the Drawings or required by the Engineer, the following mounting heights shall apply.

B. Upon approval of the Engineer, mounting heights may be adjusted.

C. Heights of Outlets - all heights measured from finished floor to centerline of device.

1. Wall Switches	46"
2. Receptacle Outlet	48", unless indicated otherwise

D. Heights of Disconnect Switches, Protective Devices, Controllers, etc.

E. The mounting height of disconnect switches, circuit breakers, motor controllers, push button station, and other similar devices and equipment will vary depending upon location and whether individually or group mounted. For convenience and safety, operating levers, handles or buttons shall be mounted no more than 80 inches above the finished floor line. Mount specifically as indicated when mounting height dimensions are given.

F. Individual devices or pieces of equipment unless otherwise specified, shall be located so that the operating handle, lever or button is located approximately 5'-0" above the finished floor line.

G. Panelboards shall be located so that the highest overcurrent protective device is a maximum of 80" above the floor.

H. Push button stations shall be located 4'-6" above the floor.

1.20 SAFETY:

A. It shall be the Contractor's responsibility to do all things necessary in the pursuit of the installation or testing to provide safe conditions in which to work.

END OF SECTION

SECTION 26 05 01

ELECTRICAL RELATED WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. Extent of electrical related work required by this section is indicated on drawings and/or specified in other Division 26 sections.

B. Types of electrical related work specified in this section include the following:

1. Excavating, Trenching and Backfill for Electrical Work.

2. Cutting and patching.

3. Painting.

1.03 PROJECT CONDITIONS:

A. Existing Utilities: Locate and protect existing utilities and other underground work in a manner which will ensure that no damage to personnel or property or service interruption will result from excavating and backfilling.

B. Protect property from damage which might result from excavating and backfilling.

C. Protect persons from injury at excavations by barricades, warnings and illumination.

D. Coordinate excavations with weather conditions, to minimize possibility of washouts,
settlements and other damages and hazards.

PART 2 - PRODUCTS

2.01 EXCAVATING FOR ELECTRICAL WORK:

A. Backfill Materials:

1. Sub-base Material: A graded mixture of gravel, sand, crushed stone or crushed slag.
2. Backfill Material: Soil material for compacting to required densities, and complying with AASHTO Designation M 145. Group A-1, A-2-4, A-2-5, or A-3.

Drainage Fill Material: Washed and uniformly graded gravel, crushed stone or crushed slab, with 100% passing a 1-1/2" sieve and not more than 5% passing a No. 4 sieve.

PART 3 - EXECUTION

3.01 EXCAVATION, TRENCHING AND BACKFILLING:

A. Perform all excavation of every description and of whatever substances encountered to the depths indicated on the Drawings or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or not suitable for backfill shall be removed and wasted or removed from jobsite as indicated on the drawings or as directed by Engineer, at no additional cost to Owner.

B. Sheeting and shoring shall be done as necessary for the protection of the work and for the safety of personnel. Provide necessary pumping at all times to maintain a dry working condition in all trenches. Unless otherwise indicated, excavations shall be by open cut except that short sections of a trench may be tunneled if, in the opinion of the Engineer, the conduit can be safely and properly and properly installed and backfill can be properly tamped in such tunneled sections.

C. No excavation or trenches shall be cut near or under footings without first consulting Engineer.

D. Bottom of trench shall be shaped to give substantially uniform circumferential support to lower third of each pipe. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe and to prevent sudden offset to flow line. As work progresses, interior of pipe shall be cleared of dirt and superfluous materials of every description.

E. Wherever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the Engineer, is encountered in the

bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with coarse sand, fine gravel, or other suitable material, as approved by the Engineer.

F. Trenches for utilities shall be of a depth that will provide the following minimum depth of cover from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown:

1. 24-Inch Minimum Cover - Electrical Conduit under 600 volts, unless indicated otherwise.
2. 36-Inch Minimum Cover - Electrical Conduit over 600 volts.

G. Backfill shall be installed in layers 6” deep, adequately wetted (if approved by Engineer) and tamped using materials as noted above. The surfaces shall be graded to a reasonable uniformity and the mounting over trenches left in a uniform and neat condition as approved by the Engineer.

H. Carefully plan all work to avoid existing utilities and other inferences. Engineer has not attempted to indicate all existing underground utilities. Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling and, if damaged, shall be repaired by the Contractor at his expense. Prior to doing any excavation with power tools, carefully investigate and locate any existing conduit, pipes, and other lines, so as to avoid them during excavation.

3.02 CUTTING AND PATCHING

A. This Article specifies the cutting and patching of electrical equipment components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Refer to the Division section: CUTTING AND PATCHING for general requirements for cutting and patching.

C. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of electrical installation.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

F. Perform cutting, fitting, and patching of electrical equipment and materials required to:

1. uncover work to provide for installation of ill-timed work;

2. remove and replace defective work not conforming to requirements of the Contract Documents;

3. remove samples of installed work as specified for testing;

4. install equipment and materials in existing structures;

5. upon written instructions from the Engineer uncover and restore work to provide for Engineer's observation of concealed work.

G. Cut, remove and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new work.

H. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

I. Locate, identify, and protect electrical services passing through remodeling or demolition are and serving other areas required to be maintained operational. When service must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover.

3.03 PAINTING:

A. Exposed conduits, supports, pull boxes, etc., shall be painted as described under other Division of these Specifications. The Contractor shall be responsible for having electrical items painted to the finish called for on the Drawings. Factory painted equipment shall have finish restored to Manufacturer's finish if scratched or damaged before acceptance or use by Owner.

END OF SECTION

SECTION 26 05 19

LOW VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 16 Basic Materials and Methods section, and is part of each Division 16 section making reference to wires and cables specified herein.

C. Refer to Section 16055, “ELECTRICAL IDENTIFICATION,” for wire and cable color coding instructions.

1.02 DESCRIPTION OF WORK:

A. Extent of electrical wire and electrical cable work is indicated by drawings and schedules.

B. Types of wire, cable and connectors in this section include the following:

1. Control cable.
2. Fixture wires.
3. Ground wire.
4. Power cable.

C. Applications for wire, cable and connectors required for project are as follows:

1. Power distribution circuitry.

2. Lighting circuitry.

3. Appliance and equipment circuitry.

4. Motor-branch circuitry.

1.03 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacturer of electrical wire and cable products of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than five (5) years.

B. Installer's Qualifications: Firm with at least five (5) years of successful installation experience with projects utilizing electrical wiring and cabling work similar to that required for this project.

C. UL Compliance: Comply with applicable requirements of UL Std. 83, "Thermoplastic-Insulated Wires and Cables," and Std. 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors."

D. UL Compliance: Provide wiring/cabling and connector products which are UL-listed and labeled.

E. ETL Compliance: Provide wiring/cabling and connector product which are ETL-listed and labeled.

F. NEMA/ICEA Compliance: Comply with NEMA/ICEA Std. Pub./No.'s WC 5, "Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy," and WC-30, "Color Coding of Wires and Cables," pertaining to electrical power type wires and cables.

G. IEEE Compliance: Comply with applicable requirements of IEEE Stds. 82, "Test Procedures for Impulse Voltage Tests on Insulated Conductors," and Std. 241, "IEEE Recommended Practice for Electrical Power Systems in Commercial Buildings" pertaining to wiring systems.

H. ASTM Compliance: Comply with applicable requirements of ASTM B1, 2, 3, 8 and D-753. Provide copper conductors with conductivity of not less than 98% at 20° C (68°F).

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's data on Medium Voltage Cable and connectors.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Deliver wire and cable properly packaged in factory-fabricated type containers, or wound on NEMA-specified type wire and cable reels.

B. Store wire and cable in clean dry space in original container. Protect products from weather, damaging fumes, construction debris and traffic.

C. Handle wire and cable carefully to avoid abrading, puncturing, tearing wire and cable insulation and sheathing. Ensure dielectric resistance integrity of wires/cables is maintained.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of wire and cable):

1. Wire and Cable (Under 600V)
   a. American Insulate Wire and Cable.
   b. Cerro Wire and Cable Co.
   c. Phelps Dodge Wire & Cable.
   d. Rome Cable Corp.
   e. Cablec.
   f. Tamaqua

2.02 WIRE AND CABLE:

A. General: Except as otherwise indicated, provide wire, cable and connectors of manufacturer's standard materials, as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for the installation.

2.03 CONDUCTORS UNDER 600V:

A. Provide factory-fabricated wire of sizes, ratings, materials and types indicated for each service. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements and NEC standards. Select from the following types, materials, conductor configuration, insulation and coverings:

1. UL Type: THHN.
2. UL Type: THWN.
3. UL Type: XHHW.
4. Material: Copper.
5. Conductors: Concentric-lay-stranded (standard flexibility).

2.04 CONNECTORS:

A. General: Provide UL-type factory-fabricated, metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Where not indicated, provide proper selection as determined by

Installer to comply with project's installation requirements, NEC and NEMA standards. Select from the following, those types, classes, kinds and styles of connectors to fulfull project requirements.

B. Under 600V

1. Type: Pressure.
2. Type: Crimp.
3. Type: Threaded.
4. Class: Insulated.
5. Kind: Copper, or aluminum alloy bar, factory insulated.
6. Style: Butt connection.
7. Style: Elbow connection.
8. Style: Combined "T" and straight connection.
9. Style: "T" connection.
10. Style: Two-bolt or four-bolt parallel connection.
11. Style: Tap connection.
12. Style: Pigtail connection.
13. Style: Wirenut connection.

PART 3 - EXECUTION

3.01 INSPECTION:

A. General: Install electrical cables and wires as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in accordance with recognized industry practices.

B. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.

C. Do not pull conductors into raceways until raceway system (including all outlets, cabinets, bushings and fittings) is completed. Verify that all work of other trades which may cause conductor damage is completed. Use only approved cable lubricants when necessary.

D. Pull conductors together where more than one is being installed in a raceway.

E. Use pulling compound or lubricant, where necessary; compound must not deteriorate conductor or insulation.

F. Use pulling means, including fish tape, cable or rope which cannot damage raceway.

G. Install exposed cable, parallel and perpendicular to surfaces or exposed structural members and follow surface contours, where possible.

H. Keep conductor splices to minimum.

I. Use splice and tap connectors which are compatible with conductor material.

J. The system shall be properly grounded and continuously polarized throughout.

K. In general, conductors shall be of the same size from the last protective device to the load.

L. On termination at branch circuit outlets leave a minimum of eight inches (8") free conductor for installation of devices and fixtures.

M. Cover uninsulated splices, joints and free ends of conductor with rubber and friction tape or PVC electrical tape. Plastic insulating caps may serve as insulation.

N. Do not use mechanical means to pull wire No. 8 or smaller.

O. Use only U.L. listed lubricants.

P. Branch circuit conductors shall not be smaller than #12 AWG and shall be sized as required by the load served and for specific N.E.C. requirements.

Q. Branch circuit wires which come within 3" of a ballast within a light fixture, e.g., wires running through end-to-end connected fluorescent fixtures, must be rated for 90°C.

R. Control circuit conductors shall be #14 AWG.

S. All single conductor cables shall be installed in conduit.

T. Ground conductors shall have green insulation.

U. Use anti-short insulating bushings to protect wires at the ends of the armor on Type AC cable.

V. Wiring, Emergency System: Wiring from emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of other wiring and equipment and shall not enter the same raceway, cable, box or cables with other wiring.

3.02 FIELD QUALITY CONTROL:

A. Below 600 Volts:

1. General Branch Circuit Wiring:
2. Prior to energization, test cable and wire for continuity of circuitry, and also for short circuits.
3. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.
4. Feeder Circuit Wiring:
5. Megger test and record results on all feeder conductors illustrated on the one line diagram. The Engineer will supply the form for readings and test results. Submit results to Engineer for record purposes. The megger used for testing shall be line powered, and the Manufacturer's User Manual shall be with the instrument used.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Division 16 Basic Materials and Methods sections apply to work of this section.

1.02 QUALITY ASSURANCE:

A. Electric Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.

B. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment", and 869, "Electrical Service Equipment", pertaining to grounding and bonding of systems, circuits and equipment In addition, comply with UL Std. 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products which are UL-listed and labeled for their intended usage.

C. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 151 and 152 pertaining to grounding and bonding of systems, circuits and equipment.

1.03 NEMA COMPLIANCE:

A. Stds. Pub/No. LA1 Surge Arresters
Stds. Pub/No. FB1 Fittings, Cast metal boxes and conduit bodies for conduit assembly.

1.04 DESCRIPTION OF WORK:

A. Extent of grounding work is indicated by drawings and schedules.

B. Main electric service equipment, conduit work, motors, panelboards and other electrical equipment shall be effectively and permanently grounded to a grounding electrode. This electrode shall be the nearest grounding grid riser.

Grounding connections and conductor sizes shall be in accordance with requirements of the National Electrical Code, Article 250, and local ordinances, and as described herein.

C. The building system shall be grounded through grounding grid system as detailed on the drawings.

D. A separate grounding conductor, sized in accordance with NEC Table 250-95 shall be provided in the conduit with the circuit conductors for all branch circuits and feeder circuits. The grounding conductor may be bare or insulated copper; however, if this conductor is insulated, the insulating covering shall be a green color. Conduit runs shall be increased in size where necessary to accommodate the grounding conductor in addition to circuit conductors. The electrical continuity of all conduit runs shall be verified and corrected where necessary.

E. Additional grounding conductors and conduit shall be provided as shown on the drawings. All conduit for grounding system conductors, not run in conduit with circuit conductors shall be schedule 80 PVC rigid conduit.

F. All electrical equipment enclosures and conductor enclosures shall be grounded. This includes but is not limited to metal raceways, outlet boxes, cabinets, switch boxes, motor frames, transformer cases and metallic enclosure for all electrical equipment.

G. Under no circumstances shall neutral conductors again be grounded after they have been grounded once at the transformer secondary. Consult with the ENGINEER about this connection.

H. Types of grounding in this Section include the following:

1. Grounding:

    a. Underground metal water piping.
    b. Metal building frames.
    c. Grounding electrodes.
    d. Grounding rods.
    e. Grounding loops.
    f. Separately derived systems.
    g. Service equipment.
    h. Enclosures.
    i. Systems.
    j. Equipment.

I. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.

PART 2 - PRODUCTS

2.01 GROUNDING:

A. Materials and Components:

General: Except as otherwise indicated, provide each electrical grounding system indicated, with assembly of materials including, but not necessarily 1imited to, cables/wires, connectors, terminals (solderless lugs), grounding rods/electrodes and plate electrodes, bonding a jumper braid, and other items and accessories needed for complete installation. Where more than one type meets indicated requirements, selection is Installer's option. Where materials or components are not otherwise indicated, comply with NEC, NEMA and established industry standards for applications indicated.

B. General: Provide conduit, tube, duct and fittings complying with other Division 16 sections.

C. Electrical Bonding Jumpers

D. Bonding Jumper Braid: Copper braided tape, constructed of 30-gage bare copper wires and properly sized for indicated applications.

E. Flexible Jumper Strap: Flexible flat conductor, 480 strands of 30-gage bare copper wire, 3/4" wide, 9-1/2" long, 48,250 CM. Protect braid with copper bolt hole ends with holes sized for 3/8" dia. bolts.

F. Electrical Grounding Conductors:
Unless otherwise indicated provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC.

G. Bonding Connectors, Terminals and Clamps:
Provide electrical bonding plates, connectors terminals and clamps as recommended by bonding plate, connector, terminal and clamp manufacturers for indicated applications.

H. Ground Rods and Plates:

1. Ground Rods: Steel with copper welded exterior, 3/4" dia. x 10'.

I. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, solder, soldering flux, bonding straps, as recommended by accessories manufacturers for type services indicated.

J. Ground rod clamps and other connections shall be specifically UL Listed for the purpose.

PART 3 - EXECUTION

3.01 INSTALLATION OF GROUNDING SYSTEMS:

A. Install electrical grounding systems as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure grounding and ground-fault protection devices comply with requirements. Comply with requirements of NEC, NESC, and NEMA standards for installation of grounding and ground-fault protection systems and devices.

B. Coordinate with other electrical work as necessary to interface installation of grounding system and ground-fault protection devices with other work.

C. Weld or bolt cable connections to ground rods.

D. Install braided type bonding jumpers with ground clamps on water meter piping to electronically bypass water meter.

E. Install No. 6 copper bonding jumper across water heater cold water pipes to electrically bypass water heater.

F. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.

G. Ground electrical service system neutral at service entrance equipment to grounding electrodes.

H. Ground each separately-derived system neutral to:

1. Effectively grounded structural steel member.
   Grounding Grid

I. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductors in raceways and cables, receptacle ground connectors, and plumbing systems.

J. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.

K. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.

L. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.

M. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.

3.02 FIELD QUALITY CONTROL:

A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester. Where tests show resistance-to-ground is over 25 ohms, or less, by driving additional ground rods; then retest to demonstrate compliance. ALTERNATELY, drive two ground rods, interconnected, minimum 6' apart, and skip the grounding test.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. This section is a Division 26 Basic Materials and Methods section, and is part of each Division 26 section making reference to electrical raceways, wiring boxes and fittings specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of raceways is indicated by drawings and schedules.

B. Types of raceways in this section include the following:

1. Rigid metal conduit, galvanized, or aluminum, as indicated.

2. Rigid nonmetallic conduit, schedule 80 PVC.

3. Flexible metal conduit.

4. Liquid-tight flexible metal conduit.

5. STAINLESS STEEL conduit and fittings, only where specifically indicated.

C. Application of DUXSEAL putty, or equivalent UL Listed product, to seal all conduit entries to preclude moisture entry. This does not replace the “poured” conduit seal required to meet NEC hazardous location areas.

D. Extent of electrical box and electrical fitting work is indicated by drawings and schedules.

E. Types of electrical boxes and fittings in this section include the following:

1. Outlet boxes.

2. Junction boxes.
3. Pull boxes.
4. Conduit bodies.
5. Bushings.
6. Locknuts.
7. Knockout closures.

1.03 QUALITY ASSURANCE:

A. UL Compliance: Comply with applicable requirements of UL 50, UL 514-Series, and UL 886 pertaining to electrical boxes and fittings. Provide electrical boxes and fittings which are UL-listed and labeled.

B. NEMA Compliance: Comply with applicable requirements of NEMA Stds/Pub No.'s OS1, OS2, and Pub 250 pertaining to outlet and device boxes, covers and box supports.

PART 2 – PRODUCTS

2.01 METAL CONDUIT AND TUBING:

A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) for each service indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill wiring requirements, and comply with applicable portions of NEC for raceways.

B. Rigid THREADED ALUMINUM Conduit: Provide rigid aluminum, threaded type conforming to ANSI C80.5 and UL 6A. A UL LABEL or UL IMPRINT shall be present on each 10' length of aluminum conduit. 10' lengths of aluminum conduit without the UL Label or Imprint will be rejected.

C. Provide matching fittings of "copper free" aluminum.

D. Flexible Metal Conduit: UL 1. Formed from continuous length of spirally wound, interlocked zinc-coated strip steel.

E. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct a single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).

F. Rigid Aluminum Conduit Fittings: Cast aluminum.

G. Conduit Bodies: Provide aluminum conduit bodies of types, shapes, and sizes as required to fulfill job requirements and NEC requirements. Construct conduit bodies with threaded-conduit-entrance ends, removable metal covers, and corrosion-resistant screws. Myers entrance hubs shall be GROUNDING TYPE.

H. Type 316 STAINLESS STEEL conduit and matching fittings, including EYS conduit fittings, Type 316 Stainless Steel, where specifically indicated.

2.02 NONMETALLIC CONDUIT AND DUCTS:

A. General: Provide Schedule 80 nonmetallic conduit, ducts, and fittings of types, sizes and weights wall thicknesses for each service indicated. Where types and grades are not indicated, provide Schedule 80 PVC. There is NO Schedule 40 PVC conduit used on this project.

B. Electrical Plastic Conduit:

1. Extra Heavy Wall Conduit: Schedule 80, 90 degree C, UL-rated, constructed of polyvinyl chloride and conforming to NEMA TC-2, for direct burial, or encased use, UL-listed and in conformity with NEC Article 352.

2. PVC Conduit and Tubing Fittings: NEMA Studs. Pub No. TC-3, matched to conduit/tubing type and material.

3. PVC Utilities Duct Fittings: ANSI NEMA TC-9, match to duct type and material.

4. Conduit, Tubing, and Duct Accessories: Provide conduit, tubing and duct accessories of types, sizes and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.

5. There is NO Schedule 40 PVC conduit used on this project.

2.03 BOXES AND FITTINGS: FABRICATED MATERIALS

A. Interior Outlet Boxes: Provide galvanized flat rolled sheet steel interior masonry wiring boxes, single gang/double gang as required, 1-1/2 inches deep, as a minimum size. All boxes shall be constructed with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box covers and wiring devices.

B. Manufacturer: Subject to compliance with requirements, provide interior outlet boxes and accessories of one of the following:

1. Appleton Electric Co.
2. RACO, Inc.
3. Steel City/Midland-Ross Corp.

C. Weatherproof Outlet Boxes: Provide corrosion-resistant cast-metal weatherproof outlet wiring boxes, of types, shapes and sizes, including depth of boxes to suit each respective location and installation; construct with threaded conduit ends and with threaded screw holes for securing box covers and wiring devices.

D. Manufacturer: Subject to compliance with requirements, provide weatherproof outlet boxes of one of the following:

1. Adalet-PLM, Div. of Scott & Fetzer Co.
2. Appleton Electric Co.
3. Bell Electric/Square
4. Crouse-Hinds

E. Junction and Pull Boxes: Provide galvanized code-gage sheet steel boxes in enclosed interior locations, and cast metal boxes, unless indicated otherwise, in exterior locations, with screw-on covers; of types, shapes and sizes to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

F. Manufacturer: Subject to compliance with requirements, provide junction and pull boxes of one of the following:

1. Appleton Electric Co.
2. O/Z Gedney Co.

G. Bushings, Knockout Closures and Locknuts: Provide corrosion-resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit respective installation requirements and applications.

H. Manufacturer: Subject to compliance with requirements, provide bushings, knockout closures, locknuts and connectors of one of the following:

1. Adalet-PLM Div; Scott Fetzer Co.

2. AMP, Inc.
3. Arrow-Hart Div; Crouse-Hinds Co.
4. Appleton Electric Co.; Emerson Electric Co.
5. Bell Electric; Square D Co.
6. Midland-Ross Corp.
7. Midwest Electric; Cooper Industries, Inc.
8. OZ/Gedney Co.; General Signal Co.
9. RACO Div.; Harvey Hubbell, Inc.
10. Thomas & Betts Co., Inc.

I. Conduit Bodies: Provide galvanized cast-metal conduit bodies, of types, shapes and sizes, to suit respective locations and installation; construct with threaded-conduit-entrance ends, removable covers, cover gaskets and corrosion-resistant screws.

J. Manufacturer: Subject to compliance with requirements, provide conduit bodies of one of the following:

1. Adalte-PLM, Div. of Scott & Fetzer Co.
2. Appleton Electric Co.
3. Crouse-Hinds Co.
4. Killark Electric Mfg. Co.
5. OZ/Gedney Co.
6. Pyle-National Co.
7. Spring City Electrical Co.

PART 3 – EXECUTION

3.01 INSPECTION:

A. Examine areas and conditions under which raceways are to be installed, and substrate which will support raceways. Notify Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF RACEWAYS:

A. General: Install raceways as indicated; in accordance with manufacturer's written installation instructions, and in compliance with NEC and NECA's

"Standards of Installation". Install units plumb and level, and maintain manufacturer's recommended clearances.

B. Coordinate with other work including wires/cables, boxes and panel work, as necessary to interface installation of electrical raceways and components with other work.

3.03 INSTALLATION OF CONDUITS:

A. General: Install conduits in a "neat and workmanlike" manner, parallel to structure components. The governing standard and defining document for "neat and workmanlike" manner shall be NECA 1 – 2006, "Standard Practices for Good Workmanship in Electrical Contracting" (ANSI), and the Local Electrical Inspector, whichever is more stringent.

B. Mechanically fasten together metal conduits, enclosures, and raceways for conductors to form continuous electrical conductor. Connect to electrical boxes, fittings and cabinets to provide electrical continuity and firm mechanical assembly.

C. Avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat surfaces with corrosion inhibiting compound before assembling.

D. Install miscellaneous fillings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application. Install expansion fittings in raceways every 200' linear run or wherever structural expansion joints are crossed.

E. Use roughing-in dimensions of electrically operated unit furnished by manufacturer. Set conduit and boxes for connection to units only after review of dimensions and after checking location with other trades.

F. Provide nylon pull cord in empty conduits. Test conduits required to be installed, but left empty, with ball mandrel. Clear any conduit which rejects ball mandrel. Pat costs involved for restoration of conduit and surrounding surfaces to original conditions.

G. Conduit Installation:

1. Provide rigid threaded aluminum conduit, with matching material threaded couplings for service entrance, for all outdoor applications, *unless indicated otherwise.* Nipples for joining service entrance enclosures shall use grounding type aluminum myers hubs. Locknuts and sealing locknuts are not acceptable substitutes.

2. Use Schedule 80 PVC conduit underground for all power and lighting, unless indicated otherwise.
3. Conduit entrances into disconnect and other electrical gear and enclosures shall be made by transitioning the PCV using a F/M PVC adapter, to an aluminum grounding type myers hub for enclosure entrance.
4. Grounding type myers hubs might not be supplied with a lug for grounding in some instances. In those cases, provide an aluminum alloy lug to attach to the myers hub. Bond all myers hubs to the grounding bar or bus in that enclosure, using individual or looped grounding wires sized as per NEC Table 250-122, for the largest circuit OCP in that grounding wire loop.
5. Make all grounding connections using liberal coatings of oxidation inhibiting compound, applied to the connection before the wire is landed. Do not apply oxidation inhibiting compound “after the fact”.

H. Use flexible conduit from outdoor outlet boxes to lighting fixtures, if there are any in the project.

I. Use liquid-tight flexible conduit where subjected to one or more of the following conditions:

1. Final 24” of connection to outdoor motors and equipment.
2. Moist or humid atmosphere where condensation can be expected to accumulate.
3. Corrosive atmosphere.
4. Subjected to water spray or dripping oil, water or grease.
5. But do NOT use it in “Hazardous” locations.
6. For conduit-to-conduit interconnections where rigid conduit connections are not feasible (at the top of the Down Tube, for example)

J. Cut conduits straight, properly ream and cut threads for heavy wall conduit deep and clean.

K. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.

L. Size conduits to meet NEC, unless indicated specifically otherwise, except no conduit smaller than 3/4 inch shall be embedded in concrete or masonry.

M. Fasten conduit terminations in indoor sheet metal enclosures by use of grounding type myers hubs, only where specifically indicated. Otherwise, use double locknuts. All conduits entering outdoor enclosures shall use only grounding type myers hubs. Bond the grounding terminals to the ground bar, using green ground wire sized the same as the grounding conductor run with the circuit contained in the specific conduit.

N. Conduits are not to cross under drain lines or under sewerage lines. Notify the Engineer in case of conflicts, for resolution.

O. Conduits are not to cross under water lines. Notify the Engineer in case of conflicts, for resolution.

P. Use of running threads at conduit joints and terminations is prohibited. Where required, use 3-piece union or split coupling.

Q. Complete installation of electrical raceways before starting installation of cables/wires within raceways.

R. Support vertical conduit of any size at a maximum of every 10 feet, unless indicated otherwise, with clamp hangers.

S. Support conduit within 18” of every box or enclosure.

T. In addition to other conduit support requirements, conduits shall be securely fastened within eighteen (18) inches of each box, cabinet or other conduit termination.

U. Conduits Underground and Below Slabs:

1. Raceways installed underground shall be rigid Schedule 80 PVC, unless indicated otherwise. Note that type 304 or type316 stainless steel conduits and fittings may be specifically indicated for certain locations.

2. Under concrete slabs install conduits larger than 1”. All conduit under slabs shall be hung from slab utilizing stainless steel 1/4” rod every four (4) feet (minimum), if hanging is required due to soil conditions on site.

V. Conduits in Concrete Slabs:

1. Place conduits between bottom reinforcing steel and top reinforcing steel.

2. Conduits may run at angles through the slab.

3. Separate conduits by not less than diameter of larger conduit to ensure proper concrete bond.

4. Conduits crossing in slab must be reviewed for proper cover by Engineer.

5. Embedded conduit diameter is not to exceed 1/3 of slab thickness.

6. Conduits run in slabs must have a minimum of 3” concrete cover.

7. Install conduits so as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.

W. Exposed Conduits:

1. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of the structure.

2. Install exposed conduit work so as not to interfere with other trades. Coordinate to avoid conflicts.

3. Support exposed conduits by use of hangers, clamps, or clips. Support conduits on each side of bends and on spacing not to exceed the following:

    a. Conduit up to 1": support every 6'-0"
    b. 1-1/4" and over: support every 8'0", unless specifically indicated otherwise

4. Install PVC conduits in accordance with NEC and in compliance with local utility practices.

X. Non-Metallic Conduits:

1. Non-metallic conduit as hereinafter specified shall be used where indicated.

2. Non-metallic conduit installed underground shall be installed in a concrete envelope, ONLY WHERE SPECIFICALLY INDICATED. Otherwise, do NOT provide concrete encasement. Ninety degree elbows turning upward shall be PVC, unless indicated otherwise. Concrete envelope, where used, shall extend to 6" above grade with edges chamfered 1" at 45 degrees where conduit rises out of the ground, all unless indicated otherwise.

3. Make solvent cemented joints for PVC conduit in accordance with recommendations of manufacturer. This includes the use of PVC Cleaner, and PVC Primer on all conduit joints and fittings, BEFORE applying the PVC Cement.

4. Install PVC conduits in accordance with NEC and in compliance with local utility practices.

Y. Non-Metallic Conduit Fittings:
1. Schedule 80 PVC

Z. Conduits shall utilize grounding type myers hubs for entrances into all outdoor enclosures, unless specifically indicated otherwise. Myer hubs shall match the adjoining conduit material, except myers hubs for PVC conduits shall be aluminum.

AA. Bushings for terminating conduits smaller than 1-1/4" shall have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable installations.

BB. Install insulated type bushing for terminating conduits 1-1/4" and larger. Bushings shall have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.

CC. Bushing of standard or insulated type shall have screw type grounding terminal.

DD. Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings and plugs shall be specifically designed for their particular application. Fittings shall match the adjacent conduit, except myer hubs for PVC shall be aluminum, grounding type, unless Type 316 Stainless Steel is specifically called out. Bond all myers hubs to the grounding bar or bus in that enclosure, using individual or looped grounding wires sized as per NEC Table 250-122, for the largest circuit OCP in that grounding wire loop.

EE. Provide "DUXSEAL" putty, or an equivalent UL Listed, pliable conduit sealant in the ends of all conduits where they enter enclosures, to preclude moisture entry. The sealant shall effectively adhere to all conductors at the end of the conduit, to form a moisture-stop barrier. This means every conduit terminating into an outdoor enclosure, and every indoor enclosure. This does not apply to branch circuit conduits entering 4" and 6" junction boxes. NOTE that this "putty" does NOT take the place of a "sealing conduit body" (EYS, for example) as required by the NEC for "hazardous" locations. Such "sealing conduit bodies" (conduit seals, poured conduit seals) shall be installed where specifically indicated on the drawings.

3.04 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS:

A. General: Install electrical boxes and fittings where indicated, complying with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.

C. Provide weatherproof outlet boxes for interior and exterior locations exposed to weather or moisture.

D. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install boxes and conduit bodies in those locations which ensure ready accessibility of electric wires.

F. Use pulling means, including fish tape, cable or rope which cannot damage raceway.

G. Mounting heights are specified on the drawing and in Section 16010.

H. DO NOT install aluminum products in concrete.

I. Provide electrical connections for installed boxes.

J. Subsequent to installation of boxes, protect boxes from construction debris and damage.

3.05 GROUNDING:

A. Upon completion of installation work properly ground electrical boxes and demonstrate compliance with requirements.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. This section is a Division 16 Basic Materials and Methods section, and is part of each Division 16 section making reference to electrical identification specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of electrical related identification is indicated by drawings, schedules and within this Section.

B. Types of electrical identification specified in this section include the following:

1. Cable/Conductor identification.

2. Operational instructions and warnings.

3. Danger signs.

4. Equipment/system identification signs.

PART 2 - PRODUCTS

2.01 Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of marker):

W. H. Brady Co.
Electro Products Division/3M
National Band and Tag Co.
Panduit Corp.
Seton Nameplate Co.
Ideal Industries, Inc.
T&B/Thomas & Betts

2.02 ELECTRICAL IDENTIFICATION MATERIALS:

A. General:

1. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application.

B. Color-Coded Plastic Tape:

1. Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils thick by 1-1/2" wide. Provide color as required to identify conductor/conduit.

C. Cable/Conductor Identification Bands:

1. Wire Markers: Provide manufacturer's standard vinyl-cloth self-adhesive wrap-around, pre-numbered plastic coated type, white background with black imprinting as required for specific application.

2. Color-Coded Plastic Tape: Provide manufacturer's standard self-adhesive vinyl tape. Unless otherwise indicated, provide colors according to applicable codes or standards.

D. Operational Instructions and Warnings:

1. Provide manufacturer's standard pre-printed or partially pre-printed or partially pre-printed accident-prevention and operational tags, of plasticize card stock with matte finish suitable for writing, approximately 3-1/4" x 5-5/8", with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording (as examples: "DANGER", CAUTION, DO NOT OPERATE").

2. Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings, of sizes suitable for application areas and adequate for visibility, with proper wording for each application (as examples: "208V", EXHAUST FAN", "RECTIFIER"). Unless otherwise indicated or required by governing regulations, provide orange signs with black lettering.

E. Danger and Caution Signs:

1. Provide manufacturer's standard "DANGER" signs of baked enamel finish on 20-gage steel, of standard red, black and white graphics, 14" x 10" size except where 10" x 7" is the largest size which can be applied where needed and except where larger size is needed for adequate vision, and with/wording: "DANGER HIGH VOLTAGE UNAUTHORIZED PERSONNEL KEEP OUT."

2. Provide manufacturer's standard "CAUTION" signs of pressure sensitive polyester, with adhesive back coating, 2-1/4" x 9". Wording shall be as scheduled. (Example: Caution0-480 Volts; Caution-Buried Cable).

F. Equipment/System Identification Signs:

1. Provide engraved stock melamine plastic-laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated black and white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2. Thickness: 1/16", for units up to 20 sq. in. or 8" length, 1/8" for larger units.

G. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

2.03 LETTERING AND GRAPHICS

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

PART 3 - EXECUTION

3.01 APPLICATION AND INSTALLATION:

A. General Installation Requirements:

1. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.

2. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

B. Cable/Conductor Identification:

1. Apply cable/conductor identification on each cable and conductor in each box/enclosure/cabinet where wires are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical work.

2. Conductors shall be clearly and permanently identified.

3. All control circuit and instrument circuit terminations shall be identified.

4. For conductors #6 and smaller, conductor color coding shall be color insulation. For conductor color coding of wire larger than #6, use self-adhesive wraparound tape markers. Use markers at all panelboards, boxes, outlets, switches, circuit breakers and control centers.

5. All ground conductors and these only: Green.

C. Equipment/System Identification Signs:

1. Provide engraved plastic-laminate, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated black and white core (letter color; except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2. Thickness: 1/16" for units up to 20 sq. in. or 8" in length, 1/8" for larger units.

D. Fasteners: Self-tapping stainless steel screws, except where contact-type permanent adhesive where screws cannot or should not penetrate substrate.

3.02 LETTERING AND GRAPHICS:

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

	Ground Conductor:	Green
208Y/120V:	Phase Conductors:	Black, red, blue.
	Neutral Conductor:	White

		Brown, yellow, orange
480/277V:	Neutral Conductor:	Gray

B. Junction Box Identification:

1. Apply panel and circuit identification numbers on the cover of all boxes located above ceilings or exposed. Utilize black lettering for normal power circuits and red lettering for emergency power circuits.

C. Danger and Caution Signs:

1. In addition to installation of danger signs required by governing regulations and authorities install appropriate danger signs at locations indicated below and at locations subsequently identified by Installer of electrical work as constituting similar dangers for persons in or about project

Type sign (Danger/Caution)	Location
Danger	Main Switchgear

D. Equipment/System Identification:

1. Install engraved plastic-laminate sign on each major unit of electrical equipment in building unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, ½" high lettering on 1-1/2" high sign (2" high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for the following pieces of electrical equipment:

   a. Panelboards, electrical cabinets and enclosures.

   b. Recess panel/doors to electrical facilities.

   c. Major electrical switchgear.

   d. Motor control centers.

   e. Power transfer equipment.

   f. Transformers.

   g. Power generating units.

E. Install signs at locations indicated, or, where not otherwise indicated, at location for

best convenience of viewing without interference with operation and maintenance of
equipment. Secure to substrate with fasteners, except use adhesive where fasteners
should not or cannot penetrate the substrate.

END OF SECTION

SECTION 26 05 83

ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. This section is a Division 16 Basic Materials and Methods section, and is part of each Division 15 and Division 16 section making reference to electrical connections specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of electrical connections for equipment is indicated by drawings and schedules. Electric connections are hereby defined to include, but not necessarily limited to, connections for providing electrical power to equipment, splices, and taps.

B. Refer to Division 15 sections for controls furnished integrally with equipment; not work of this section.

C. Refer to Division 15 sections for control system wiring; not work of this section.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of product):

1. Adalet-PLM Div, Scott and Fetzer Co.
2. AMP Product Corp.
3. Arrow-Hart Div, Crouse-Hinds Co.
4. Burndy Corp.
5. Ideal Industries, Inc.
6. Penn Union
7. Scotch - 3M Division
8. T and B/Thomas & Betts Corp.

2.02 MATERIALS AND COMPONENTS:

A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinking insulating tubing, cable ties, solderless wire nuts, and other items and accessories as needed to complete splices and termination of types indicated.

B. Metal Conduit, Tubing and Fittings:

C. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements and comply with NEC requirements for raceways. Provide products complying with Division-16 basic electrical materials and methods section “Raceways”, and in accordance with the following listing of metal conduit, tubing and fittings:

1. Rigid steel conduit.
2. Rigid metal conduit fittings.
3. Flexible metal conduit.
4. Flexible metal conduit fittings.
5. Liquid-tight flexible metal conduit.
6. Liquid-tight flexible metal conduit fittings.
7. Rigid schedule 80 PVC conduit and fittings. There is NO schedule 40 PVC conduit on this project.

D. Wire, Cable and Connectors:

E. Wire: Unless otherwise indicated, provide wires/conductors for electrical connections which match wires/conductors of wiring supplying power.

F. Connectors and Terminals: Provide electrical connectors and terminals as recommended by connector and terminal manufacturer for intended applications.

G. Electrical Connection Accessories:

H. Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, solder, electrical soldering flux, wire nuts and cable ties as recommended for use by accessories manufacturers for type services indicated.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL CONNECTIONS:

A. Install electrical connections as indicated, in accordance with connector manufacturer's written instructions and with recognized industry practices, and complying with requirements of NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements.

B. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Wherever possible, mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

C. Coordinate installation of electrical connections for equipment with equipment installation work.

D. Cover splices with electrical insulation equivalent to, or of higher rating than, insulation on conductors being spliced.

E. Prepare cables and wires, by cutting and stripping, covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated.

F. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.

H. Provide flexible conduit for motor connections, and other electrical equipment connections, where subject to movement and vibration.

I. Provide liquid-tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subjected to one or more of the following conditions:

    1. Exterior location.
    2. Moist or humid atmosphere where condensate can be expected to accumulate.
    3. Corrosive atmosphere.
    4. Water spray.

5. Dripping oil, grease, or water.

J. Fasten identification markers to each electrical power supply wire/cable conductor which indicates their voltage, in accordance with Division-16 section “Electrical Identification”. Affix markers on each terminal conductor, as close as possible to the point of connection.

3.02 FIELD QUALITY CONTROL:

A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirements. Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION

SECTION 26 22 13

LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. Extent of transformer work is indicated by drawing and schedules.

B. Types of transformers specified in this section include:
1. Dry-type transformers.

C. Refer to other Division 26 sections for electrical wiring connections required in conjunction with transformers; not work of this section.

D. Electrical wiring connections for transformers are specified in applicable Division 26 sections.

1.03 QUALITY ASSURANCE:

A. ANSI Compliance: Comply with applicable requirements of ANSI Standards C57-.12.19, C57-.12.51, and C57.12.50 pertaining to dry type transformers.

B. NEMA Compliance: Comply with applicable portions of NEMA Std. Pub./No.'s T~ 1, and TR 27 and ST-20 pertaining to distribution transformers.

C. NESC Compliance: Comply with applicable portions of National Electrical Safety Code (ANSI Std. C2) pertaining to indoor and outdoor installation of transformers.

1.04 SUBMITTAL:

A. Product Data: Submit manufacturer’s technical product data including rated KVA, frequency, primary and secondary voltages, percent taps, impedance and % impedance at 75°C, sound level in decibels, and standard published data.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of transformer):

1. General Electric Company.
2. Hevi-Duty Electric Div., General SignalCorp.,
3. Sorgel Electric Div., Square D Co.
4. Westinghouse Electric Corp.
5. Siemens-ITE
6. Schneider Electric

2.02 DISTRIBUTION TRANSFORMERS:

A. General: Except as otherwise indicated, provide manufacturer is standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for complete installation.

B. Dry-type Distribution Transformers (600V and Below):

C. General: Except as otherwise indicated, provide manufacturer's standard materials and components as indicated by published product information, designed and constructed as recommended by manufacturer, and as required for complete installation.

D. Dry-Type Distribution Transformers: Provide factory-assembled, general-purpose, ventilated, self-cooled, dry-type distribution transformers where shown; of sizes, characteristics, and rated capacities indicated three-phase; 60-hertz, 30 kv BIL, 4.0% impedance with 480-volts delta connection primary and 208/120 volts secondary wye connected. Provide primary winding with taps as shown below for de-energized tap-changing operation. Insulate with Class 220 insulation and rate for continuous operation at KVA. Limit transformer surface temperature to accommodate primary and secondary coil wiring connections and with connectors installed. Limit terminal compartment temperature to 75°C when transformer is operating continuously at rated load suitable for copper or aluminum wiring. Core and coil assemblies shall be isolated from enclosure with suitable vibration absorbers. Cushion-mount transformer above with external vibration isolation supports; sound-level ratings not to exceed those listed below as determined in accordance with ANSI/NEMA standards.

E. Electrically ground core and coils to transformer enclosure by means of flexible metal grounding strap. Provide transformers with fully-enclosed sheet steel

enclosures. Apply manufacturer's standard light gray indoor enamel over cleaned and phosphatized steel enclosure.

Size KVA Three Phase	Taps 2 1/2%	Insulation Class °C	Rise above 40°C	Sound Level (dB)
15 - 150	2+4-	220°C	115°C	45

F. Equipment Identification : Provide transformer identification nameplates complying with Division 16 Basic Materials and Methods Section "Electrical Identification." Nameplates should read as they are identified on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION OF TRANSFORMERS:

A. Install transformers as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, ANSI and IEEE standards, and in accordance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate transformer installation work with electrical raceway and wire/cable work, as necessary for proper interface.

C. Install units on vibration mounts comply with manufacturer's indicated installation method.

D. Connect transformer units to electrical wiring system; comply with requirements of other Division 16 sections.

E. Install label nameplate as required.

F. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std. 486B and B.

3.02 GROUNDING:

A. Provide equipment grounding connections for power/distribution transformers as indicated. Tighten connectors to comply with tightening torques specified in UL Std. 486A to assure permanent and effective grounding.

3.03 TESTING:

A. Upon completion of installation of transformers, energize primary circuit at rated voltage and frequency from normal power source and test transformers, including, but not limited to, audible sound levels, to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Materials and Methods section, and is a part of each Division 26 section making reference to panelboards specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of panelboard work is indicated by drawings and schedules.

B. Refer to other Division 16 sections for cable wire, overcurrent devises, electrical raceway work required in connection with panelboards; not work of this section.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of panelboard and enclosure):

1. General Electrical Company
2. ITE
3. Cutler-Hammer
4. Square D

2.01 PANELBOARDS:

A. General: Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicated, which comply with manufacturer's standard materials, design and construction in accordance with published product information; equip with number of unit panelboard devices as required for complete installation. Where types, sizes, or ratings are not indicated, comply with NEC, UL and established industry standards for applications indicated.

B. Lighting and Appliance Type:

C. Provide dead-front, safety constructed, factory-assembled circuit breaker type panelboards in sizes and ratings indicated. Equip with panelboard unit devices, of types, ratings and characteristics indicated on the Panelboard Schedule.

D. For 3-phase panelboards, bus bar connections to the branch circuit breakers shall be the distributed phase type. For single-phase 3-wire panelboards, bussing shall be such that any two adjacent single-pole breakers are connected to opposite polarities. All current-carrying parts of the bus shall be copper. All connections to the bus shall be bolt-on, unless noted otherwise. Unless otherwise noted, neutral bus shall be full size and ground bar shall be included.

E. Each panelboard shall be fully rated for the short circuit rating equal to or greater than the rating shown on the Panelboard Schedule. This rating shall be established by testing per U.L. Standard 67, with overcurrent devices mounted in the panelboard.

F. Panelboard shall be listed by Underwriters' Laboratories as class CTL type and bear the U.L. label.

G. Panelboard Enclosure: Provide galvanized sheet steel cabinet type enclosures, in NEMA types as indicated on the drawings, minimum 16 gauge thickness, UNLESS INDICATED TO BE OF DIFFERENT CONSTRUCTION. Construct with multiple knockouts and wiring gutters sized per latest N.E.C. requirements. Provide doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed steel door hinges and door swings as indicated. Equip with interior circuit-directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor. Design enclosure for surface or recessed mounting as indicated on drawings and/or Schedules. Provide enclosures fabricated by same manufacturer as panelboards, and which match properly with panelboards to be enclosed.

H. Panelboard Accessories: Provide panelboard accessories and devices including, but not necessarily limited to, circuit breakers, ground-fault protection units, etc., as recommended by panelboard manufacturer for ratings and applications indicated and specified in other Division 16 Sections.

I. Panelboards shall be capable of accepting copper or aluminum wire (60 degrees or 75 degrees).

J. Panelboards shall comply with U.L. 67, NEMA Standards No. 250.

K. Panelboard Enclosures: Panelboard assembly shall be enclosed in a steel cabinet. CHECK PANEL SCHEDULE FOR TYPE OF NEMA ENCLOSURE, AND MATERIAL. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutters shall be sized in accordance with UL Standard 67. Cabinets shall be equipped with a four-piece front without door and have concealed, self-adjusting trim clamps. Fronts shall be full-finished steel with rust-inhibiting primer and baked enamel finish.

L. Panelboard Accessories: Provide panelboard accessories and devices including, but not necessarily limited to, circuit breakers, ground-fault protection units, etc., as recommended by panelboard manufacturer for ratings and applications indicated and specified in other Division 16 sections.

M. Panelboards shall be capable of accepting copper or aluminum wire (60 degrees or 75 degrees).

N. Panelboards shall comply with U.L. 67, NEMA Standards No. 250.

PART 3 – EXECUTION

3.01 INSTALLATION OF PANELBOARDS:

A. General: Install panelboards and enclosures where indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate installation of panelboards and enclosures with cable and raceway installation work.

C. Anchor panelboard assemblies firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.

D. Provide electrical connections within enclosures.

E. Fill out (typewritten) panelboard's circuit directory card upon completion of installation work.

F. Install circuit breakers of rating indicated.

G. Label panelboards in accordance with SECTION 16055 with designations as shown on schedules and drawings and warning labels as specified.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Materials and Methods section, and is part of each Division 26 section making reference to wiring devices specified herein.

1.02 DESCRIPTION OF WORK:

A. The extent of wiring device is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.

B. Types of electrical wiring devices in this section include the following:

1. Receptacles.
2. Switches.
3. Wall Plates.

PART 2 - PRODUCTS

2.01 FABRICATED WIRING DEVICES:

A. Manufacturers: Subject to compliance with requirements, provide receptacles, plugs and switches of the following (for each type of wiring device):

1. DEVICES & PLATES:
   a. Harvey Hubbell, Inc.
   b. Pass and Seymour
   c. General Electric

2. DIMMERS:
   a. Lutron
   b. Prescolite

B. General: Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and complying with NEMA Stds. Pub. No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements, and complying with NEC and NEMA standards for wiring devices. Provide ivory color devices and wallplates except as otherwise selected. Color selection of devices and wallplates be verified by Contractor with Architect. All devices of similar types shall be by the same manufacturer.

C. Receptacles:

1. Duplex: Provide duplex “specification grade” receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke and mounting yoke provided with automatic grounding feature between mounting screws and yoke, 15 ampere or 20 ampere as indicated, 125-volts, with metal plaster ears, back and side wiring, yoke shall be one piece brass construction, receptacle face shall be heavy duty high impact nylon. NEMA configuration 5-15R or 5-20R as indicated.

2. Simplex: Provide single “specification grade” receptacles, 2-pole, 3-wire grounding, with green hexagonal equipment ground screw, ground terminals and poles internally connected to mounting yoke and mounting yoke provided with automatic grounding feature between mounting screws and yoke, 20 amperes, 125 volts, with metal plate ears, (back and) side wiring, NEMA configuration 5-20R unless otherwise indicated.

3. Ground-Fault Interrupter: Provide “specification grade” duplex receptacles, ground-fault circuit interrupters (GFCI), and feed-thru type, capable of protecting connected downstream receptacles on single circuit, grounding type UL-rated Class A, 20-amperes rating, 120-volts, 60 Hz, with solid-state ground-fault sensing and signaling, with 5 milliamperes ground-fault trip level; equip with 20-ampere plug configuration, NEMA 5-20R and with local test/reset buttons.

2.02 SWITCHES:

A. General: All switches shall be provided with automatic grounding clip on mounting yoke; silver cadmium oxide contacts; neoprene bumper pads to cushion handle; one piece rivetless spring contact arm and terminal plate.

1. Single Pole Toggle: Provide “specification grade” flush, quiet, AC-type, single-pole toggle switches, 20-amperes, 120-volts AC, with mounting yoke insulated from mechanism; equip with plaster ears, switch handle, side-wired screw terminals (and backwiring with clamp type terminals).

2. Double-Pole Toggle: Provide “specification grade” flush, quiet, double-pole toggle switches, 20-amperes, 120-volts AC, with mounting yoke insulated from mechanism; equip with plaster ears, switch handle, side-wired screw terminals (and backwiring with clamp type terminals).

3. Three-Way Toggle: Provide “specification grade” flush, quiet, AC-type, three-way switches, 20-amperes, 120-volts AC, with mounting yoke insulated from mechanism; equip with plaster ears, switch handle, side-wired screw terminals (and backwiring with clamp type terminals).

2.03 WIRING DEVICE ACCESSORIES:

A. Wall Plates: Provide wall plates for wiring devices, of types, sizes, and with ganging and cutouts as indicated on drawings (or schedules). Construct with metal screws for securing plates to devices, provide wall plates possessing the following additional construction features:

1. Material and Finish: 0.04” thick, type 302 satin finished stainless.

2. Material and Finish: Nylon, color ot be selected, ONLY in enclosed finished spaces.

B. Weatherproof Covers: Provide die cast aluminum, or plastic "bubble cover" wet location, cover closed where indicated. Covers shall be UL LISTED "WEATHERPROOF WHILE IN USE".

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install wiring devices as indicated, in compliance with manufacturer’s written instructions, applicable requirements of NEC and NECA’s “Standard of Installation,” and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other work, including painting, electrical box and wiring work, as necessary to interface installation of wiring devices with other work, furniture locations, and door swings.

C. Verify location of all devices with Architect/Engineer before beginning construction.

D. Install wiring devices only in electrical boxes which are clean, free from excess building materials, dirt and debris.

E. Install stainless steel wallplates in interior areas where device boxes are flush (concealed).

F. Install stainless steel wallplates in unfinished spaces.

G. Install weatherproof "While In Use" covers at all damp or exposed locations, as indicated on drawings.

H. Delay installation of wiring devices until wiring work is completed.

I. Delay installation of wall plates until after painting work is completed.

J. Protect wiring devices during painting.

K. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds. 486A and B. Use properly scaled torque indicating hand tool.

3.02 PROTECTION OF WALL PLATES AND RECEPTACLES:

A. Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items which have been damaged, including those burned and scored by faulty plugs.

3.03 GROUNDING:

A. Provide electrically continuous, tight grounding connections for wiring devices, unless otherwise indicated.

3.04 TESTING:

A. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.

END OF SECTION

SECTION 26 28 13

OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Materials and Methods section, and is part of each Division 26 section making reference to overcurrent protective devices specified.

1.02 DESCRIPTION OF WORK:

A. Extent of overcurrent protective device work is indicated by drawings and schedules.

B. Types of overcurrent protective devices in this section include the following:

1. Circuit breakers (600 volts and below).
2. Fuses (600 volts and below).

C. Refer to other Division 16 sections for cable/wire and connector work required in conjunction with overcurrent protective devices; not work of this section.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type and rating of overcurrent protective device):

1. Circuit Breakers:
   a. General Electric Co.
   b. I.T.E.
   c. Square D Co.
   d. Cutler-Rammer

2. Fuses:

a. Bussmann Mfg. Co.
b. Gould Shawmut
c. Littelfuse

B. Circuit Breakers:

C. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information and as required for a complete installation.

D. Molded-Case circuit. Breakers:

1. Provide bolt-on factory-assembled , molded-case circuit breakers of frame size, trip and interrupting rating as shown on the Panel Schedule and Drawings.

2. Provide breakers (100 & 150 ampere frame) with non-interchangeable permanent trip units. Provide thermal and instantaneous magnetic trips in each pole. Breakers above 150-ampere frame size shall have interchangeable trip units with non adjustable bi-metallic thermal trip and adjustable magnetic trips. Construct with overcenter trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Provide twist-to-trip device on face for mechanically tripping circuit breakers. Construct breakers for mounting and operating, within specified ratings, in any physical position and in an ambient temperature of 40 degrees C. Provide with mechanical screw type removable connector lugs, AL/CU rated, for full frame amperes.

3. All molded case circuit breakers shall be listed per U.L. 489 to continuously carry 80% of its nameplate rating (unless noted otherwise) and shall B meet the requirements of NEMA AB1, and' the NEC-NFPA 70-84.

4. Accessories for molded case breakers shall include (when indicated on drawings and schedules auxiliary switch, shunt trip, undervoltage release, bell alarm, motor operator, and mechanical interlocks.

2.02 FUSES:

A. General: Except as otherwise indicated, provide fuses of types, sizes and ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, and construction in accordance with published product information and with industry standards and configurations.

B. Class L Time-Delay Fuses: Provide UL Class L time-delay fuses, 600V, 60 HZ., with ampere rating as shown on drawings, with 200,000 RMS symmetrical interrupting current rating for protecting transformers, motors, above 600 amperes.

C. Class L Fast-Acting Fuses: Provide UL Class L fast-acting fuses, 600V, 60 Hz., with ampere rating as shown on drawings, with 200,000 RMS symmetrical interrupting current rating for protecting main feeders above 600 amperes .

D. Class RK5 Time-Delay Fuses: Provide UL Class RK5 time-delay fuses rated as shown on drawings, 60 Hz., with 200,000 RMS symmetrical interrupting current rating for protecting motors, transformers, feeders, etc. below 600 amperes .

PART 3 - EXECUTION

3.01 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES:

A. Install overcurrent protective devices as indicated in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.

B. Coordinate with other work, including electrical wiring work, necessary to interface installation of overcurrent protective devices with other work.

C. Fasten circuit breakers without mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cables.

D. Set field-adjustable circuit breakers for trip settings as indicated subsequent to installation of devices.

E. Install fuses, if any, in fused circuit breakers.

F. Provide spare fuses (3 of each ampere rating used).

G. Install fuses with amp labels showing, right side up, and with oxidation inhibiting compound on the fuse ferrules and fuseholder clips.

H. All fuses in each enclosure shall match in manufacturer, amp rating, and type of fuse.

3.02 ADJUST AND CLEAN:

A. Inspect circuit-breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

3.03 FIELD QUALITY CONTROL:

A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION

SECTION 26 28 16

CIRCUIT DISCONNECTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Divisions 1 Specification sections, apply to work of this section.

B. This section is a Division 26 Basic Materials and Methods section, and is part of each Division 26 section making reference to motor and circuit disconnect switches specified herein.

1.02 DESCRIPTION OF WORK:

A. Types of circuit disconnect switch work is indicated by drawings and schedules.

1.03 QUALITY ASSURANCE:

A. UL Compliance: Comply with requirements of UL 98, “Enclosed and Dead-Front Switches”. Provide circuit and motor disconnect switches which have been UL-listed and labeled.

B. NEMA Compliance: Comply with applicable requirements of NEMA Stds. Pub. No. KS 1, “Enclosed Switches” and 250, “Enclosures for Electrical Equipment (1000 Volts Maximum).

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products of one of the following (for each type of switch):

1. General Electric Co.
2. ITE
3. Square D Company
4. Cutler-Hammer

B. Heavy-Duty Safety Switches: Provide surface-mounted, heavy-duty type sheet-steel enclosed safety switches, of types, sizes and electrical characteristics indicated, horsepower rated, solid neutral, incorporating quick-make, quick-break type switches; so construct that blades are visible in OFF position with door open. Equip with operating handle which is integral part of enclosure base and whose position is easily recognizable, and is padlockable in OFF position; construct current carrying parts of high-conductivity copper, with silver-tungsten type switch contacts, and positive pressure type reinforced fuse clips. Provide NEMA type 3R enclosure outdoors, UNLESS INDICATED OTHERWISE.

C. All fusible switches shall accept Class R fuses and have provision for field installation of a U.L. listed rejection feature.

D. The U.L. short circuit rating shall be 200,000 RMS symmetrical amperes when Class RK5 fuses are used.

E. The U.L. listed short circuit rating shall be 10,000 RMS symmetrical amperes when Class H fuses are used.

F. All switches shall be U.L. listed for use with copper or aluminum wires (60 degrees or 75 degrees C).

PART 3 - EXECUTION

3.01 INSTALLATION OF CIRCUIT DISCONNECT SWITCHES:

A. Install disconnect switches where indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products fulfill requirements.

B. Coordinate circuit disconnect switch installation work with electrical raceway and cable work, as necessary for proper interface.

C. Install disconnect switches used for motor-driven appliances, and motors and controllers within sight of controller position unless otherwise indicated.

D. Label per SECTION 16055.

E. Circuit breakers for disconnecting air conditioning condensing units and other HVAC equipment containing more than one motor shall be HACR type.

F. Provide and install fuses where applicable.

3.02 GROUNDING:

A. Provide equipment grounding connections, sufficiently tight to assure a permanent and effective ground, for electrical disconnect switches where indicated.

3.03 FIELD QUALITY CONTROL:

A. Subsequent to completion of installation of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest.

END OF SECTION

SECTION 26 29 15

PUMP CONTROL PANEL FOR TWO POTABLE WATER WELL PUMPS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. Division 26 Basic Materials and Methods sections apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. Extent of work is indicated by drawings and schedules.

B. Provide (and install) a Pump Control Panel to operate and control two potable water well pumps, as well as other related equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Acceptable Manufacturers shall be (1) Control Systems, Inc. of Jackson, MS., (2) TESCO CONTROLS of Sacramento, CA., or (3) Xylem_Flygt of Rye Brook, NY. Submit any others for prior approval. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name or type, or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the bid. Except where noted, it is implied that “or approved equal” follows all specified items. Approval for substitutions will be granted by the Engineer to the Electrical Contractor only, through the General Contractor. Where two or more designations are listed, choice shall be optional with the Contractor.

B. Where products are specified to match owner’s existing items, only those items shall be provided and installed.

2.02 Pump Control Panel:

A. General: Furnish all equipment as shown on drawings in a weatherproof (NEMA 3RX), 304 stainless steel (dull finish) enclosure with rain tight cap and sealed bottom (individual enclosures supplied and installed

separately with conduit runs between enclosures is not acceptable). Along with exterior doors, the Pump Control Panel enclosure shall be furnished with hinged interior dead-front doors. Outer enclosure shall be constructed of 12-gauge, 304 stainless steel (dull finish to reduce glare). Doors shall be equipped with 316-stainless steel polished handles with 3-point latches and hasps for owner padlocks. Doors shall be hinged on the same side, for both sides of the Control Panel, and shall open to at least 90 degrees. All doors (exterior and interior) shall also be furnished with 304 stainless steel metal doorstops for use in windy conditions. All dead-front latches shall be 1/4 turn adjustable with 1/8" thick latching dog and knurled knob. All interior mounting hardware shall be stainless steel. Enclosure exterior shall be unpainted stainless steel, dull finish or white painted to reduce heating. Interior color including front and back of all hinged dead front doors, separation barriers and mounting backpans shall be painted WHITE with powder coat enamel.

The enclosure shall be compartmentalized such that the Controls section shall be isolated from the power sections. Space (SCADA/Controls Section) shall be available in the Pump Control Panel for the mounting of existing or new telemetry components (radio/modem, battery and charger). All openings shall be sealed to prevent entrance of insects and rodents. Each enclosure section shall have 12" long base legs, as measured from the bottom of the enclosure down to the floor.

The Pump Control Panel shall house the main circuit breaker, and backup generator circuit breaker with approved mechanical interlock to prevent both breakers from being closed concurrently. The main circuit breaker, generator circuit breaker, or power distribution block and all wiring shall be located behind an interior dead front door. Interlocks and circuit breaker operation shall be possible without opening the dead front door. Elapsed time meters, indicating devices and H.O.A. switches, where required, shall be mounted on the inside dead front door. Breaker cutouts for breaker toggle protrusion shall be supplied, to eliminate exposure to hazardous potentials. A physical lockout device shall be supplied on each motor circuit breaker. The control panel shall be thermostatically controlled by heating and cooling systems - without the use of an air conditioner - to maintain suitable climate conditions within the control panel. Lightning/surge protection and PFR power fail relay shall be furnished to protect the panel equipment from lightning, loss of power or utility power surges. Provide GFCI receptacle, intrusion switch and LED light with door activated switch in each panel section. All bussing and wire shall be copper. All wire shall be stranded with locking spade pressure connectors and labeled with clip-on permanent plastic wire markers. All circuit breakers and dead-front mounted devices (lights and switches) shall be equipped with engraved phenolic nameplates.

The generator cable entrance shall be a 3” PVC nipple conduit and 3” PVC 45 degree angled pass through with threaded cover attached by an appropriate stainless steel chain. This shall function as a simple cable pass through; no generator receptacle is required. The access nipple shall be located on the side of the panel near the Emergency breaker. The nipple location shall meet all NEC

clearance requirements. The Emergency breaker shall have lugs for generator wire connection.

Distribution blocks shall be furnished and installed as required for "fan-out" of control power and other 120V sources within the enclosure. The blocks shall be rated 300V at a minimum of 20 amperes and sized for the conductors served. Distribution blocks shall be Marathon or equal.

All 480 volt circuit breakers shall have minimum interrupting capacities at 35,000 amperes, and must exceed the available short circuit amperes shown on one line diagram. All 240 volt circuit breakers shall have minimum interrupting capacities at 35,000 amperes, and must exceed the available short circuit amperes shown on one line diagram.. All 120 volt breakers shall be minimally rated at 10,000 amperes interrupting capacity, and must exceed the available short circuit amperes shown on one line diagram.. Circuit breakers shall be of the indicating type, providing ON, OFF and TRIPPED positions of the operating handle. Circuit breakers shall be quick-make, quick-break, with a thermal-magnetic action, except when protecting motor feeders where motor circuit protector (MCP) breakers may be used. Circuit breakers shall be the bolted on type. The use of tandem or dual circuit breakers in a normal single- pole space to provide the number of poles or spaces specified is not acceptable. All multiple-pole circuit breakers shall be designed so that an overload on one pole automatically causes all poles to open. Circuit breakers shall meet the requirements of UL and NEMA AB l. Breakers shall be Cutler Hammer HMCP, QC or equal. All circuit breakers shall be heavy duty molded case circuit breakers conforming to Federal specification W-C-375B and shall be UL listed.

B. A Programmable Pump Controller is used to meet the Functional Description requirements with provided Variable Frequency Drive for each pump in the system, sized for the appropriate voltage and current required by the connected load not including the motor service factor. The minimum HP rating for each VFD drive shall be 100HP, at 480 volts. The unit shall be a minimum 6 pulse PWM type, including a Harmonics Filter to remove harmonics to the 18th harmonic, as follows:

a. The VFD shall be capable of running either variable or constant torque loads. In variable torque applications, the VFD shall provide a CT-start feature and be able to provide full torque at any speed up to the base speed of the motor. In either CT or VT mode, the VFD shall be able to provide its full rated output current continuously and 110% of rated current for 60 seconds.

b. The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor. DC Link reactor shall be installed so that power fluctuations to the DC Capacitors shall be reduced to increase Capacitor life. VFD’s without a DC link reactor shall provide a 5% impedance line side reactor.

c. Printed Circuit boards shall be conformal coated to reduce the corrosion effect from environmental gases and other conditions. The conformal coating must meet IEC 61721-3-3, Class 3C2.

d. VFD shall include circuitry to detect phase imbalance and phase loss on the input side of the VFD.

e. VFD shall auto-derate the output voltage and frequency to the motor if an input phase is lost. This result will maintain operation without decreasing the life expectancy of the VFD. The use of this feature shall be user selectable and export a warning during the event.

f. VFD shall auto-derate the output frequency by limiting the output current before allowing the VFD to trip on overload. The speed of the load can be reduced, but not stopped.

g. The ambient operating temperature of the VFD shall be -10ºC to 50ºC (14 to 122°F), with a 24-hour average not to exceed 45ºC. Storage temperatures shall be -13° F (-25° C) to149/158° F (65/70° C). 0 to 95% relative humidity, non-condensing.

h. VFD shall provide full torque to the motor, given input voltage fluctuations of up to +10% to -15% of the rated input voltage (525 to 690VAC, 380 to 480VAC, or 200 to 240VAC). Line frequency variation of ± 2% shall be acceptable. No side clearance shall be required for cooling of the units.

i. Provide three (3) CTs, one per phase, on the load wires leaving the VFD, going to the motor load. CT rating shall be 100 amps at midrange of the CT. Connect the CT leads to a terminal block, wired into an analog I/O card for providing current readings, when polled by the PLC.

C. Well Pump(s) start/stop control shall be as follows:

1. Pump P1 is the lead water well pump, which is started via signal from a pressure switch inside an enclosure in the existing Utilities Building. Pump P1 turns on when the water line pressure drops to 51#(psi), and runs until the cutoff pressure limit of 54# is reached. If the line pressure drops to 49#, Pump P2 turns on, regardless of whether or not Pump P1 is operative, and runs until the line pressure reaches 54#.

2. Whenever Pump P1 runs, the chlorine peristaltic pump(s) turn on and provide a pre-set dosage of chlorine (sodium hypochlorite) into the water flow.

3. Whenever Pump P2 runs, the chlorine peristaltic pump(s) turn on and provide a pre-set dosage of chlorine into the water flow, AND the ammonia peristaltic pump(s) also turn on to provide ammonia (ammonium sulfate) at a preset dosage into water from that well.

4. The suction inlets for Pump P1 and Pump P2 are at different levels, and in different aquifers. The aquifer for Pump P1 has enough ammonia in that water, but the aquifer for Pump P2 does not. Therefore, ammonia is added to the water pumped by Pump P2.

2.03 SCADA EQUIPMENT

A. List of PROCESS I/O in this project:

Equipment	Quantity	Input Signal Type	Total Analog Connections	Total Digital Connections	Measurement
Ultrasonic Flow Meter	2	Analog (4-20)	2	0	Flow Rate
Chlorine Analyzer	3	Analog (4-20)	3	0	Chlorine Concentration
Turbidity Analyzer	1	Analog (4-20)	1	0	Turbidity
Elevated Water Storage Tank Level Sensor	1	Analog (4-20)	1	0	Tank Level
Sodium Hypochlorite Tank Level Sensor	1	Digital	0	2	Low level alarm and Very Low Level Alarm
		Total	7	2	

Connect all of the above I/O into the new Pump Control Panel SCADA PLC.

LIST of ADDITIONAL I/O points to be added on this project:

1. Three (3) current CTs from the load wires for the VFD for Pump P1, analog

2. Pump P1 Running, digital.

3. Three (3) incoming line voltage readings for the VFD for Pump P1, analog

4. Three (3) current CTs from the load wires for the VFD for Pump P2, analog

5. Pump P2 Running, digital.

6. Three (3) incoming line voltage readings for the VFD for Pump P2, analog. Provide 3 voltage VTs.

7. Three (3) main incoming line voltage readings for the Pump Control Panel, analog. Provide 3 voltage VTs.

8. Three (3) incoming line voltage readings for the 200 amp Main Fused Disconnect Switch (FDS) in the Building, analog. Provide 3 voltage VTs.

Run conduit and wire as required for these 200 amp Main FDS line voltage I/O inputs into the Pump Control Panel SCADA section.

9. Water Line Pressure from the pressure sensor panel located in the Utilities Building, analog. There is a pressure gauge mounted on top of this sensor panel.

Provide exposed and underground conduit and Belden 3c#16 stranded BELDEN 100% shielded cable with PVC or XLPE outer jacket, from this sensor panel into the SCADA section of the Pump Control Panel SCADA PLC in the Filter Building.

10. The SCADA PLC in this project shall be manufactured by Red Group.

11. Provide UPS for and battery for 30 minutes backup time in case of "normal" power failure.

12. If required, provide a converter/adapter unit at each remote PLC to allow transmitting data over a cat 5 cable to the new PLC units in the Pump Control Panel SCADA section.

PART 3 - EXECUTION

3.01 INSTALLATION OF Pump Control Panel:

A. Install sections in parallel alignment with walls of the building.
B. Bolt sections to the concrete floor.
C. Connect all power, control and SCADA data wiring to provide a complete and operable system.

3.02 ADJUST AND CLEAN:

A. Clean Pump Control Panel of dirt and debris upon completion of installation.

B. Protect installed equipment from damage during remainder of construction period.

3.03 FIELD QUALITY CONTROL:

A. Upon completion of installation of equipment, and after circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

B. At the time of Substantial Completion, replace any parts or components not functioning correctly.

3.04 GROUNDING:

A. Provide tight equipment grounding connections for each control panel section.

3.05 MEASUREMENT AND PAYMENT:

A. No Direct Measurement will be paid. Payment will be the contract lump sum price for Electrical and Controls System. Include costs for pump control panel, pump controllers, SCADA equipment, SCADA data wiring, and all incidentals in Lump Sum price for Bid Item: Electrical and Controls System.

.

END OF SECTION

SECTION 26 32 13

STANDBY POWER SYSTEM GAS GENERATOR SET

PART 1. - GENERAL

1. SCOPE

A. Provide complete factory assembled generator set equipment with digital (microprocessor-based) electronic generator set controls, digital governor, and digital voltage regulator.

B. Provide factory testing, and on-site startup by a supplier authorized by the manufacturer.

C. The generator set manufacturer shall warrant all equipment provided under this section, whether or not it is manufactured by the generator set manufacturer, so that there is one source for warranty and product service. Technicians specifically trained and certified by the manufacturer to support the product and employed by the generator set supplier shall service the generator set

D. Certain parameters of the natural generator set requirements are indicated below, for quick referral. These items have been excerpted from locations indicated by (****) in the main body of these Specifications, which are still binding. Refer to the remainder of these Specifications for detailed requirements.

1. Standby KW rating: 250
2. Standby KVA rating: 500
3. Power Factor: 0.8
4. Set mounted radiator rating: 122 degrees "F", 50 degrees "C" ambient
5. Voltage: 277/480, 3Ph 4W Wye with Neutral
6. Voltage system: 60 cycle, 3 Phase, 4 wire
7. Voltage Selector Switch: None
8. RPM: 1800
9. Alternator minimum KVA motor starting capability at instantaneous 30% voltage dip: 1850 at 480v.
10. Alternator minimum KVA motor starting capability at 90% of sustained rated voltage: 2429
11. Alternator maximum temp. rise at rated load, above ambient, Degrees "C": 105 (ONE HUNDRED FIVE), Alternator frame size shall be HC5F.
12. Alternator excitation: PMG
13. Alternator wiring type: 12 lead, reconnectible
14. Engine minimum cubic inch displacement: 912 cid (14.9 L)
15. Engine minimum rated nameplate horsepower: 755 Standby
16. Number of cylinders: 6, turbocharged

17. Cycles: 4
18. EPA Emissions rating: EPA NSPS Stationary Emergency Tier 2
19. Starting voltage and control voltage: 12 VDC, or 24 VDC
20. Set mounted, 100% rated, 600 volt, 3 pole, main electronic circuit breaker, amps: 800 (eight hundred)
21. Fuel Tank: Subbase Tank, double walled, 36” nominal height, capacity 1,750 Gal. nominal
22. Muffler: Critical grade, enclosed inside the Weatherproof Enclosure
23. Weatherproof Housing: Aluminum Weatherproof Outdoor Housing, rated for 150mph wind
24. COVER over top of subbase fuel tank, to preclude water from accumulating on top of the tank. The “cover” shall consist of a minimum 10 gauge thickness mild steel sheet which is essentially flat, covering the entire top of the fuel tank, to be fabricated with all four edges turned downward 1” over the outside edges of the tank, resembling the top cover of a shoebox. The sheet metal cover shall have neatly made cutouts to allow access to every fitting, connection outlet, or other opening in the top of the subbase tank, with ample clear access distance to the outlet or fitting, for checking, service and repairs. There shall be such a cutout, suitably sized, to allow power and control conduits access to the main output circuit breaker on the alternator. Each of those cutouts shall be rimmed with a 1/2” high surrounding wall, welded continuous all around, to preclude any water from entering those access points. There shall be no sharp edges anywhere to cut or snag clothing or skin. Should a single-piece cover be too unwieldy to handle, the cover may be fabricated in two or three sections. The end of each adjoining section shall be turned upward for 1”, and one of the sections shall have a return downward lip to cover the joint. The entire assembly shall be hot dip galvanized after fabrication. Whether the cover is factory assembled before the generator set is placed on top of the subbase tank, or whether a field installed setup is performed, make provisions to secure the generator set to the subbase tank, as securely as if the cover were not present. This cover shall not be replaced by any scheme of gaskets and/or sealants. It is acceptable for water to enter the generator set enclosure due to “normal” water intrusion and to get on top of the cover, but none of the water shall get thru the cutouts and accumulate on top of the subbase fuel tank.
25. Automatic Transfer Switch (ATS) with Manual Bypass: 800 amps (Utility Service is rated 800 amps)
    a. Volts - 277/480
    b. Poles - four (4)
    c. Amps - 800, fully rated
    d. Time Delay Neutral-Yes
    e. Enclosure: Nema 4X , type 304 stainless steel
    f. Refer to the separate ATS spec section for complete parameters on the ATS

26. Warranty: 5 years on all Parts and Labor, (including travel and lodging), except for rattling sheet metal. Include water jacket heaters. Do not include belts or consumables. In case of radiator repairs, include new antifreeze. No exclusions, exceptions, or conditions.

2. CODES AND STANDARDS

A. The generator set and its installation and on-site testing shall conform to the requirements of the following codes and standards:

1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
2. IEC8528 part 4. Control Systems for Generator Sets
3. IEEE587 for voltage surge resistance.
4. NEMA ICS10-1993 – AC Generator sets.
5. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
6. UL508. The entire control system of the generator set shall be UL508 listed and labeled.
7. UL2200. The genset shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

B. The generator set and supplied accessories shall meet the requirements of the following standards:

1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
2. UL142 – Sub-base Tanks
3. UL1236 – Battery Chargers
4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

C. The control system for the generator set shall comply with the following requirements.

1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
2. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.
3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
4. FCC Part 15, Subpart B.
5. IEC8528 part 4. Control Systems for Generator Sets
6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality

assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.03 ACCEPTABLE MANUFACTURERS

Only approved bidders shall supply equipment provided under this contract. Equipment specifications for this project are based on microprocessor-based generator sets manufactured by Cummins Onan. Equipment by other suppliers that meets the requirement of this specification are acceptable, if approved not less than 2 weeks before scheduled bid date. Proposals must include a line by line compliance statement based on this specification.

PART 2. – PRODUCTS

1. GENERATOR SET

A. Ratings

1. The generator set shall operate at (****) RPM and at a voltage of: (****) Volts AC, (****) phase, (****)-wire, 60 hertz.
2. The generator set shall be rated at (****) KW, (****) KVA at 0.8 PF, standby rating, based on the following site conditions: Altitude 500ft., ambient temperatures up to (****) degrees F ((****) degrees C). The genset shall have a set mounted radiator rated for (****) degrees C at full rated load.
3. The generator set rating shall be based on emergency/standby service.

B. Performance

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load for both parallel and non-parallel applications. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.
3. The gas engine-generator set shall be capable of single step load pick up of 100% nameplate KW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
4. Motor starting capability shall be a minimum of (****) KVA at 90 % sustained rated voltage, and minimum (****) KVA at a 30% voltage dip. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified KVA load at near zero power factor applied to the generator set.

5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic. Telephone influence factor shall be less than 40.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.
2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight, and the enclosure door shall be gasketed. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations, which shall be factory wired to the set mounted main output circuit breaker.
2. Power connections to auxiliary devices shall be made at the devices, with required protection located at a remote electrical source. I.E., the water jacket heater and other heaters shall be connected to a 120 volt source supplied, when required, by the Owner.

2. Engine and Engine Equipment

A. The engine shall be gas, 4 cycle, radiator and fan cooled. Minimum displacement shall be (****) cubic inches, with (****) cylinders, rated minimum (****) HP at the standby rating. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable. This Generator Set engine shall meet "Tier 2" EPA emissions requirements. Engine accessories and features shall include:

1. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous or parallel states.

2. Skid-mounted radiator and cooling system rated for full load operation in (****) degrees F ((****) degrees C) ambient as measured at the generator air inlet, based on 0.5 in H_2O external static head. Radiator shall be sized based on a core temperature which is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The cooling system shall be filled with a 50/50-ethylene glycol/water mixture by the equipment manufacturer. Rotating parts shall be guarded against accidental contact.
3. Electric starter(s) capable of three complete cranking cycles without overheating.
4. Positive displacement, mechanical, full pressure, lubrication oil pump.
5. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
6. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.
7. Replaceable dry element air cleaner with restriction indicator.
8. Flexible supply and return fuel lines.
9. Engine mounted battery charging alternator, 100 ampere minimum, and solid-state voltage regulator.
10. Coolant Heater

    1. Engine mounted, thermostatically controlled, coolant heater(s) for the engine. Heater voltage shall be 120 or 208 volts. The coolant heater shall be UL499 listed and labeled.
    2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall be installed using quick disconnect couplers to isolate the heater for replacement of the heater element. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.
    3. The coolant heater shall be provided with a 12 VDC, or 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system. Heater(s) shall be rated for 120 volts input.
    4. The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 100F (40C) in a 40F ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

B. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer.

C. Starting and Control Batteries shall be calcium/lead antimony type, (****) volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors.

D. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The muffler(s) shall be (****) grade. Exhaust system shall be installed according to the engine manufacturer's recommendations and applicable codes and standards. The muffler shall be mounted INSIDE the weatherproof enclosure, and shall be insulated with mineral fiber jackets, secured with stainless hooks, eyelets, and stainless steel wire. The exhaust outlet pipe shall turn upward out of the top of the generator set weatherproof housing, and shall be topped with a hinged weatherproof cap.

P. Provide an oil drain extension line from the oil pan drain to the outside of the engine skid frame, with "outside" shutoff valve and cap. Provide a second "inside" shutoff valve at the oil pan before the extension hose. The outside valve shall have an adjacent label reading "Oil Drain". The drain and fittings shall be a minimum of 3/4" diameter.

3. AC GENERATOR

A. The AC generator shall be: synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system. Actual temperature rise measured by resistance method at full load shall not exceed (****) (****-words) degrees Centigrade.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

D. The subtransient reactance of the alternator shall not exceed 12 percent, based on the standby rating of the generator set.

E. Provide anti-condensation heater for the alternator, rated 120 volts, wired onto a labeled terminal strip in the main circuit breaker compartment.

F. Provide a set-mounted, 3-pole main output electronic circuit breaker, 100 percent rated, (****) amps, 600 volts, wired to the generator set output. Provide set mounted, pre-wired voltage selector switch, where indicated in Par. 1.01D, rated for multiple operating voltages).

4. GENERATOR SET CONTROL

The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

The control shall be mounted on the generator set. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

The generator set mounted control shall include the following features and functions:

A. Control Switches

1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or Manual position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage. The "Remote Device" shall be a dry contact closure.
2. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.
3. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.
4. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

B. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

1. Digital metering set, 0.5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three phase voltages (line to neutral or line to line) simultaneously.
2. The digital metering equipment shall be driven by a single microprocessor, to provide consistent readings and performance.

C. Generator Set Alarm and Status Display.

1. The generator set shall be provided with alarm and status indicating lamps to indicate non-automatic generator status, and existing warning and shutdown conditions. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright lighting conditions. The generator set control shall indicate the existence of the following alarm and shutdown conditions on an alphanumeric digital display panel:

   low oil pressure (alarm)
   low oil pressure (shutdown)
   oil pressure sender failure (alarm)
   low coolant temperature (alarm)
   high coolant temperature (alarm)
   high coolant temperature (shutdown)
   engine temperature sender failure (alarm)
   low coolant level (alarm or shutdown--selectable)
   fail to crank (shutdown)
   fail to start/overcrank (shutdown)
   overspeed (shutdown)
   low DC voltage (alarm)
   high DC voltage (alarm)
   weak battery (alarm)
   low fuel-daytank (alarm)
   high AC voltage (shutdown)
   low AC voltage (shutdown)
   under frequency (shutdown)
   over current (warning)
   over current (shutdown)
   short circuit (shutdown)
   over load (alarm)
   emergency stop (shutdown)
2. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

D. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control:

   engine oil pressure (psi or kPA)
   engine coolant temperature (degrees F or C)
   engine oil temperature (degrees F or C)
   engine speed (rpm)
   number of hours of operation (hours)
   number of start attempts
   battery voltage (DC volts)
2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

E. Engine Control Functions.

1. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.
2. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.
3. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting. The governor control shall be suitable for use in paralleling applications without component changes.
4. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.
5. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and actual failure conditions.

F. Alternator Control Functions:

1. The generator set shall include an automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching

characteristic, which shall reduce output voltage in proportion to frequency below a threshold of [58-59] HZ. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

2. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.
3. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.
4. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.
5. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.
6. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC (if system is 24 volts), or 12.5/16VDC (if system is 12 VDC). During engine cranking (starter engaged), the low voltage limit shall be disabled, and if DC voltage drops to less than 14.4 volts (if system is 24 volts), or 7.2 volts (if system is 12 volts), for more than two seconds a "weak battery" alarm shall be initiated.

G. The generator set shall be provided with a mounted main line circuit breaker, sized to carry the rated output current of the generator set on a continuous basis. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions. The Main Circuit Breaker shall be rated 600 volts, (****) amps.

2.05 BATTERY CHARGER

A. Provide a 10 amp equalizing / 2 amp battery trickle charger, rated 120 volts input, with output to match the engine start battery(s).

B. The battery charger shall be auto-adjusting for amperage output, depending on battery charge state.

C. Connect the battery charger output leads to the battery(s) terminals.

PART 3. - OPERATION

3.01 Sequence of Operation

A. Generator set shall start on receipt of a start signal from remote equipment. The start signal shall be via hardwired connection to the generator set.

B. The generator set shall complete a time delay start period as programmed into the control.

C. The generator set control shall initiate the starting sequence for the generator set. The starting sequence shall include the following functions:

1. The control system shall verify that the engine is rotating when the starter is signaled to operate. If the engine does not rotate after two attempts, the control system shall shut down and lock out the generator set, and indicate “fail to crank” shutdown.
2. The engine shall fire and accelerate as quickly as practical to start disconnect speed. If the engine does not start, it shall complete a cycle cranking process as described elsewhere in this specification. If the engine has not started by the completion of the cycle cranking sequence, it shall be shut down and locked out, and the control system shall indicate “fail to start”.
3. The engine shall accelerate to rated speed and the alternator to rated voltage. Excitation shall be disabled until the engine has exceeded programmed idle speed, and regulated to prevent over voltage conditions and oscillation as the engine accelerates and the alternator builds to rated voltage.

D. On reaching rated speed and voltage, the generator set shall operate as dictated by the control system in isochronous, synchronize, load share, load demand, or load govern state.

E. When all start signals have been removed from the generator set, it shall complete a time delay stop sequence. The duration of the time delay stop period shall be adjustable by the operator.

F. On completion of the time delay stop period, the generator set control shall switch off the excitation system and shall shut down.

1. Any start signal received after the time stop sequence has begun shall immediately terminate the stopping sequence and return the generator set to isochronous operation.

G. The Generator Set shall also be able to be started locally from the Control Panel.

H. In accordance with the 2017 NEC, Par. 700.10(D)(1) through (D)(3), the emergency start wiring circuit between the Generator Set and the ATS shall be continuously monitored for short circuits, open circuits, or any other malfunction which would disable normal operation of the start circuit. Loss of the integrity of the remote start circuit(s) shall initiate visual and audible annunciation of generator malfunction at the generator local and remote annunciator(s) and shall start the generator.
Proper operation of this condition shall be demonstrated on site by temporarily disconnecting any portion of the start circuit wiring.

PART 4. - OTHER REQUIREMENTS

4.01 Submittals. Within 10 days after award of contract, provide six sets of the following information for review:

- Manufacturer's product literature and performance data, sufficient to verify compliance to specification requirements.
- A paragraph by paragraph specification compliance statement, describing the differences between the specified and the proposed equipment.
- Manufacturer's certification of prototype testing.
- Manufacturer's published warranty documents.
- Shop drawings showing plan and elevation views with certified overall dimensions, as well as wiring interconnection details.
- Interconnection wiring diagrams showing all external connections required; with field wiring terminals marked in a consistent point-to-point manner.
- Manufacturer's installation instructions.

4.02 Factory Testing.

A. The generator set manufacturer shall perform a complete operational test on the generator set prior to shipping from the factory. A certified test report shall be provided. Equipment supplied shall be fully tested at the factory for function and performance.

B. Factory testing may be witnessed by the owner and consulting engineer. Costs for travel expenses will be the responsibility of the owner and consulting engineer. Supplier is responsible to notify the owner/engineer two weeks notice prior to testing.

C. Generator set factory tests on the equipment shall be performed at rated load and rated power factor (0.8 PF). Generator sets that have not been factory tested at rated power factor will not be acceptable. Tests shall include: run at full load, maximum power, voltage regulation, transient and steady-state governing, single step load pickup, and function of safety shutdowns.

4.03 On-Site Acceptance Test:

A. Provide startup and programming assistance to the Owner when the Owner is ready to commission the unit. Startup services shall include a half-day (four hours) of on-site instruction by a factory trained mechanic.

B. Provide any and all fluids required to start the generator set.

C. Provide FUEL necessary for startup, testing, and demonstrations to Owner. After all testing, etc., is complete, refill the fuel tank before final delivery to the Owner.

D. On-Site Generator Set Load Test:

1. In addition to the factory tests, an on-site load test shall be performed to verify the integrity of the generator set operation, and load handling capabilities (after shipment and setup on this jobsite).

2. If this generator is a backup power system for drainage pumps, or for sewage pumps, and if water is available to pump either by normal supply, or otherwise can be provided by the Owner, then the generator set shall be tested to demonstrate powering the pumps according to the controls design. If the controls allow multiple pumps to start or operate simultaneously, then the generator set load test shall include those conditions. Run the generator set in this mode for two hours, starting and letting the pumps cycle on level controls, as water is available, to simulate operation in an actual power outage.

3. Additionally, whether or not water is available to pump, the generator set shall be tested by connecting an inductive load bank at the set's full KW rating, or a resistive load bank equal to the full KVA rating (note that the KW rating does not equal the KVA rating for a Resistive load bank) of the generator set as a step load (100% full load as a single step), and run that 100% load on the generator set for two full hours. During that run time, all digitally-available engine and alternator parameters from control panel displays shall be recorded on a pre-printed 8-1/2" x 11" form, at 10 minute intervals during those two hours. The form shall be turned over to the Engineer at the end of the test.

4. The generator set and ATS start circuitry shall be tested for proper operation by turning off the source of normal commercial power, to simulate a normal power outage.

5. Provide all personnel, equipment, tools, connection cables and terminals as required to perform the load bank test. Make all required connections to perform the test. When the test has been successfully completed, disconnect

all testing equipment, cables and connections, and restore the generator set to the ready-to-run state.

4.04 Training

Provide 4 complete bound, “HARD COPY” Operation, Maintenance and Parts Manuals for the Generator Set, to the Owner. In addition, provide electronic copies of all generator publications, brochures, wiring diagrams, full size generator and ATS factory drawings, and full size drawings of any and all generator accessories provided on this project, in PDF format.

4.05 Service and support

A. The manufacturer of the generator set shall maintain service parts inventory at a central location which is accessible to the service location 24 hours per day, 365 days per year.

B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service for this make and model of generator set. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.

C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

4.06 Warranty

A. The generator set and associated equipment (including the Automatic Transfer Switch with Manual Bypass specified in another specification Section) shall be warranted for a period of not less than 5 years from the date of commissioning against defects in materials and workmanship.

B. The warranty shall be comprehensive. No deductibles or additional compensation shall be allowed for travel time, service hours, repair parts cost, etc. The warranty does not include vibrating sheet metal, nor replaceable items such as belts, hoses and fluids, but does include ALL other items, including water jacket heaters. If loss of antifreeze is due to radiator repairs or replacement, the warranty shall include replacement of the antifreeze.

C. In case of need for warranty work, the local service organization shall have a representative on site within 24 hours of written notification of the need. The “representative” shall be a bonafide service person capable of performing the needed repairs, and shall have the needed tools and NEW repair parts present, provided enough information detailing the problem is made available to the service organization before the service person is dispatched to the jobsite. Repairs shall be carried out and completed in a timely manner.

D. The contents of this warranty shall stand as written. There shall be NO deviations, exclusions, exceptions, modifications, nor conditions “attached” to the warranty provided to the Owner, unless the Owner agrees to same in writing. Provide a typed Warranty to this effect to the Owner. Do not substitute nor propose, pre-written factory warranties.

END OF SECTION

SECTION 26 51 00

LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. Division 16 Basic Materials and Methods sections apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. Extent of lighting fixture work is indicated by drawings and schedules.

B. Applications of lighting fixtures required for project include the following:

1. General interior lighting.
2. Emergency lighting.
3. Exterior lighting.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products as specified on the Fixture Schedule or approved equal. See other Division 16 Sections for procedure to submit.

2.02 LIGHTING FIXTURES:

A. General: Provide lighting fixtures, of sizes, types and ratings indicated, complete with, but not necessarily limited to, housings, lamps, lamp holders, reflectors, ballasts, starters and wiring.

B. Lamps: Lamps shall be provided in accordance with the Fixture Schedules.

PART 3 - EXECUTION

3.01 INSTALLATION OF LIGHTING FIXTURES:

A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Coordinate with other electrical work as appropriate to properly interface installation of interior lighting fixtures with other work.

C. Fasten fixtures securely to structural support and check to ensure that solid pendant fixtures are plumb.

3.02 ADJUST AND CLEAN:

A. Clean interior lighting fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during remainder of construction period.

3.03 FIELD QUALITY CONTROL:

A. Upon completion of installation of lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

B. At the time of Substantial Completion, replace lamps in interior lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Engineer. Furnish stock or replacement lamps amounting to 15% (but not less than one lamp in each case) of each type and size lamp used in each type fixture. Deliver replacement stock as directed to Owner's storage space.

3.04 GROUNDING:

A. Provide tight equipment grounding connections for each interior lighting fixture installation where indicated.

END OF SECTION

SECTION 31 23 00

EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Structural excavation shall consist of the removal of material for the construction of foundations for launching and receiving pits for horizontal directional drilling, and other excavation designated on the plans or in these specifications.

B. Structural excavation and backfill shall consist of furnishing material, if necessary, and placing and compacting backfill material around structures to the lines and elevations designated on the plans or specified or directed by the Engineer.

C. Structural excavation and backfill shall include the furnishing of all materials, equipment and incidentals which may be necessary to perform the excavations, place and compact the backfill, sheeting, bracing, and dewatering necessary. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the Engineer.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01390: Excavation Plan

B. Section 01410: Testing Laboratory Services

C. Section 31 23 33: Earth Excavation and Backfill in Trenches

D. Section 03 31 00: Concrete Formwork

1.03 QUALITY

A. Testing Agency:

In-place soil compaction tests to be performed by testing laboratory employed by Owner.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):

a. ASTM C 127, Density, Relative Density, and Absorbtion of Coarse Aggregate.
b. ASTM D 1557, Moisture-Density Relations of Soils Using 10-lb (4.5-kg) Hammer and 18-in (457-mm) Drop.
c. ASTM D 2487, Classification of Soils for Engineering Purpose.
d. ASTM D 4253, Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
e. ASTM D 4254, Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.04 JOB CONDITIONS

A. Time of construction should be kept to a minimum.

B. Sheeting, shoring and dewatering during construction should be properly designed to keep a stable excavation at all times to prevent disturbance of the in-place soils.

C. As specified in Section 02221, the Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., in conformance with the indicated foundation construction condition at each structure at all times throughout the period of construction.

D. As specified in Section 02221, the Contractor shall assume all responsibility for security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.

E. Excavated areas shall be cleared of all debris, water, slush, muck, and soft or loose earth and shall be conditioned to the entire satisfaction of the Engineer.

F. All excavated material unsuitable for use or which will not be used shall be removed from the site of the work by the Contractor. The Contractor shall remove and dispose of excess backfill material, at his expense.

G. All excavations encountering stumps, roots, logs, etc., at the grade of the pit shall be removed of such designated bottom items by the Contractor and refilled with proper material.

PART 2 - PRODUCTS

2.01 BACKFILL MATERIAL

A. The granular material (non-plastic) used in improvement/replacement as specified above shall be clean granular material, AASHTO A-3 or better. This select granular material shall be a clean, non-plastic material that is free of roots, clay lumps, and any other deleterious materials and shall not contain more than 10 percent (by weight) of material passing a No. 200 sieve.

B. The final six inches of depth around all structures not located within a pavement area shall be backfilled with topsoil and re-sodded as required.

2.02 BEDDING MATERIAL

Bedding material used for the foundation of any structures should consist of cohesionless soil described as clean sand with less than 10% passing the U.S. No. 200 Sieve.

Bedding material shall be placed in loose lifts of 10 inches and shall be compacted to at least 95% of maximum dry density in accordance with the Standard Proctor compaction test ASTM D 698.

2.03 GEOTEXTILE FABRIC

The contractor shall furnish geo-textile fabric that conforms to Section 1019 of the Louisiana Standard Specifications for Roads and Bridges, placed in accordance with the details shown on the plans.

PART 3 - EXECUTION

3.01 INSPECTION

A. The Contractor shall verify that preceding work affecting work of this Section has been satisfactorily completed.

B. Correct conditions adversely affecting work of this section.

3.02 REMOVAL OF UNSUITABLE MATERIALS

A. The Contractor shall remove unsuitable material from within the limits of the work specified in this section.

B. Materials meeting requirements for approved fill for pipe installations shall be stockpiled as necessary and in such a manner satisfactory to the Engineer. Excavated material will not be allowed as backfill material around structures.

C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

END OF SECTION

SECTION 31 23 33

EARTH EXCAVATION AND BACKFILL IN TRENCHES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section includes, except as elsewhere provided, trenching for installation of pipelines and appurtenances, including drainage, filling, backfilling, disposal of surplus material and restoration of trench surfaces.

B. Excavation shall extend to the width and depth shown on the drawings or as specified; or where not specified, Contractor shall confine his excavation to the least width practicable and shall provide suitable room for installing pipe, structures, and appurtenances.

C. The contractor shall furnish and place all sheeting, bracing, and supports and shall remove from the excavation all materials which are unsuitable for backfill or which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry, and in all respects, acceptable. The Contractor shall deposit limestone for pipe bedding, or limestone refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 00: Excavation, Backfill, Fill and Grading

PART 2 - PRODUCTS

2.01 RIVER SAND

River sand shall be used as backfill material under streets, state highways and driveways and shall be a good quality "Mississippi River Sand", free of roots, shells, or any other foreign matter, and should not have more than 10 percent (by weight) of material passing a No. 200 sieve.

2.02 LIMESTONE PIPE BEDDING

Limestone used as bedding materials shall be from a source approved by the LA DOTD. Materials shall conform to the following gradation:

For Pipe Less than 18" Diameter Use Size #78		For Pipe 18" Diameter and Larger Use Size #67	
Sieve size	% Passing*	Sieve Size	% Passing
3/4 inch	100	1 inch	100
1/2 inch	90 - 100	3/4 inch	90 - 100
3/8 inch	40 - 75	3/8 inch	20 – 55
#4	5 – 25	#4	0 – 10
#8	0 – 10	#8	0 – 5
#16	0 – 5		

Total by dry weight passing each sieve (U. S. Standard) Squart openings.

Relative densities of 75%, in accordance with ASTM D 4253 and D4254, are required.

2.03 SAND-SHELL MIXTURE

A. This mixture shall consist of 65% shell and 35% sand by weight.

B. This mixture may be used as an alternate for pipe foundation.

C. The sand-shell mixture shall be compacted to 75% relative density in accordance with ASTM D4253 and D4254 specifications.

2.04 CRUSHED CONCRETE

A. Crushed concrete used as a bedding material shall be limited to no more than 5% by weight of foreign materials such as wood, mortar and brick.

B. Crushed concrete shall meet all gradation and compaction requirements as specified for limestone material.

2.05 GEOTEXTILE FABRIC

The contractor shall furnish geo-textile fabric that conforms with Section 1019 of the Louisiana Standard Specifications for Roads and Bridges, placed in accordance with the details shown on the plans.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavation shall be open cuts with vertical sides using sheeting and bracing as required, all sheeting and bracing for excavations shall be in accordance with OSHA regulations.

B. In case the excavation for any pipeline, is ordered by the Engineer to be carried below the required depth, the Contractor shall fill the bottom of the excavation up to grade with bedding material, in a manner acceptable to the Engineer.

C. If the Contractor excavates below grade through error or for his own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he may be directed by the Engineer to excavate below grade as set forth in the preceding paragraphs; in which case the work of excavating below grade and finishing and placing the refill shall be performed at the Contractor's expense.

D. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

3.02 DISPOSAL OF MATERIALS

A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.

B. All excavated material which is either unsuitable for backfill or which will not be used for backfill in the same location (i.e., streets) shall be removed from the site of the work by the Contractor. The Contractor shall remove and dispose of excess backfill material, at his expense.

C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor. When required, it shall be re-handled and used in backfilling the trench or hauled to the owner's storage site.

3.03 EXCAVATION TO REMOVE STUMPS, ROOTS, LOGS

A. Stumps, roots, and logs, which are encountered within the trench area, shall be cut to a depth of one foot (1’) below the bottom of the trench. The Contractor shall fill this excavated space with bedding material.

B. When so required by the Engineer, the Contractor shall probe one foot (1') below the established bottom of the trench. If any stump, roots, logs, etc., are discovered by this probing, the Contractor shall cut them out just as if they had been visible in the trench.

C. Blasting will not be allowed for the removal of stumps.

3.04 TEST PITS

Test pits for the purpose of locating underground utilities or structures in advance of the construction may be excavated by the Contractor. Test pits shall be backfilled immediately after the desired information has been obtained. The backfilled surface shall be restored and maintained in a manner satisfactory to the Engineer. No additional compensation will be made for any test pits or restoration and shall be considered incidental to the appropriate bid item.

3.05 PLACEMENT OF BEDDING MATERIAL

A. Bedding shall conform to the details on the drawings. When laying pipe, the groove for the pipe and bell hole must be accurately shaped, and the bedding material must be closely packed under and around the pipe.

B. The bedding and pipe shall be enclosed in a geotextile fabric meeting the requirements of section 2.05 of this specification. Geotextile fabric shall be installed in accordance with the manufacturer's recommendations.

3.06 BACKFILL

A. As soon as practical after the pipe has been laid and jointed, backfill material (free from stones, pieces of lumber, and other foreign material) shall be hand placed and hand tamped to a depth over the top of the pipe as shown on the drawings.

B. Where the pipes are laid in developed areas, the trench shall be filled with approved backfill material to an elevation six inches (6") below the existing grade. The remainder of the trench shall be filled with top soil.

C. Where the pipes are laid in streets, the remainder of the trench above the bedding and up to the bottom of the specified paving shall be backfilled as shown on the drawings in layers not to exceed 2 feet, and shall be compacted to minimum 97% of maximum dry density at optimum water content in accordance with ASTM D-1557.

D. Backfill around manholes shall be compacted by flooding. All backfill shall be compacted, especially under and over pipes connected to the manholes.

E. Paving shall not be placed in backfill.

F. All road surfaces adjacent to back-filling operations shall be broomed and hose-cleaned immediately after backfilling. Dust control measures, as specified under Section 01560, shall be employed at all times.

3.07 RESTORING TRENCH SURFACE

A. Where the trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, the Contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, he shall immediately deposit additional fill to restore the level of the ground.

B. The surface of any driveway or any other area which is disturbed by the trench excavation, and which is not a part of the paved street, shall be restored by the Contractor to a condition at least equal to that existing before work began.

C. In sections where the pipeline passes through grassed areas, the Contractor shall re-grade and re-sod all disturbed areas.

3.08 PROTECTION

Guard rails, curbing, and fencing in the vicinity of the Contractor’s operations shall be adequately protected and, if necessary, removed and restored after backfilling. All curbing, fencing, or guard rails which are damaged during construction shall be replaced with material fully equal to that existing prior to construction.

END OF SECTION

SECTION 31 32 19

GEOTEXTILE FABRIC

PART 1 - GENERAL

1.01 SCOPE

This work consists of furnishing all labor, materials, equipment and incidentals required to furnish and install the geotextile fabric at the locations shown on the plans, or as directed, in conformance with manufacturer's directions and these specifications.

1.02 SUBMITTALS

The characteristics and properties of the geotextile fabric to be installed shall be submitted to the Engineer prior to the installation of the fabric in accordance with Section 01340.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

The geotextile fabric should meet or exceed the material requirements for Class C geotextile fabric as presented in Section 1019.01 of the Louisiana Standard Specifications for Roads and Bridges, Latest Edition.

2.02 MATERIALS

A. The geotextile fabric shall be a woven high strength fabric with high burst and puncture strength. It shall be a woven fabric composed of at least 85% by weight polyester, polyolefins or polyamides. Geotextile fabric shall meet the requirements as shown in the table below:

AOS US Sieve Min. (ASTM D4751)	50
Grab Tensile, lb., Min. (ASTM D4632-86)	130
Elongation, Min. (ASTM D4632-86)	50%
Burst Strength, psi., Min. (ASTM D3787)	210
Trapezoidal Tear, lb., Min. (ASTM D4533)	40
Puncture Resistance, lb., Min. (ASTM D4833)	40
Permittivity Sec min. (ASTM D4491)	1.0
Strength Retained at 150 hr. weatherometer, % min. (ASTM D4632; DOTD TR)	70

B. The manufacturer of the geotextile fabric shall have been normally engaged in the manufacture of the fabrication of this geotextile fabric for at least five continuous years.

2.03 FABRICATION

The geotextile fabric shall be furnished to the Contractor by the manufacturer as a continuous sheet in the widths required for installation in the trench. The length of each sheet shall be such that the total numbers of sheets to be joined in the field are minimized.

PART 3 - EXECUTION

3.01 HANDLING

A. The Contractor shall handle and store the sheets in accordance with the recommendations of the manufacturer to avoid any damage. Geotextile fabric shall be stored such that it is not exposed to sunlight.

B. Damaged geotextile fabric will not be acceptable for installation until and unless it has been replaced to the satisfaction of the Engineer.

3.02 INSTALLATION

A. The geotextile fabric shall be placed without folds or wrinkles and in accordance with manufacturer's recommendations. Laps shall be as recommended by the manufacturer but in no case shall be less than 24".

B. The recommendations of the manufacturer shall be followed during the installation of the fabric. Care shall be taken during pipe laying, embedment and backfilling operations to avoid damage to the geotextile fabric. Any portion of the fabric damaged during installation shall be removed and replaced or repaired to the satisfaction of the Engineer prior to continuing the installation of the geotextile fabric.

C. Field Joints. The number of field joints shall be minimized. Lap joints shall be used to join sections in the field.

END OF SECTION

SECTION 31 41 00

SHORING

PART I - GENERAL

1.01 SCOPE

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.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 3 06 00: Schedule of Earthwork

B. Section 3 09 03: Geotechnical Instrumentation and Monitoring of Earthwork

C. Section 3 23 00: Structural Excavation and Fill

1.03 SUBMITTALS

Prior to beginning sheeting and shoring operations, and as a part of the excavation plan, the Contractor shall submit, in writing to the Engineer, his proposed plan to comply with the requirements of this Section. The Contractor is solely responsible to design, provide, install and maintain support systems required to complete the work in a continuous safe manner. The submitted plan shall be designed and stamped by a Louisiana Registered Civil or Structural Engineer. The submittal shall also include but is not limited to information on driving method, driving equipment, leads and other equipment utilized directly during the sheeting, shoring and bracing operations. No excavation work shall be allowed to commence until the Contractor has fulfilled this requirement and received written approval to proceed from the Engineer.

1.04 SAFETY REQUIREMENTS

All sheeting, shoring, and bracing of excavations shall conform to requirements necessary to comply with local codes and authorities having jurisdiction.

Sheet pile installations will cause vibrations that may affect existing residences or underground utilities in the vicinity of the proposed excavation. Peak particle velocities due to sheet pile installation shall be monitored at critical locations with a seismograph during the installation of 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 Owner's testing lab. No driving operations shall take place without vibration monitoring on site and in place.

PART 2 - PRODUCTS

2.01 WOOD SHEETING

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.

2.02 STEEL SHEETING

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. Steel sheeting is recommended at all deep lift station and force main installations.

PART 3 - EXECUTION

3.01 PERFORMANCE

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 trench and below the excavated bottom. All trenches and structural excavations shall be properly sheeted, shored and braced.

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.

Wood sheeting shall be left in place 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.

Steel Sheeting shall be driven and extracted by either the vibratory or push/pull methods only. Impact driving or jetting shall not be allowed unless approved by the Engineer.

Steel sheeting, when determined necessary by the Contractor or when directed by the Engineer, shall be left in place and the upper part of sheeting shall be cut off 3 feet below the finished ground surface after backfilling. All bracing above this level shall be removed. The right of the Engineer to order sheeting and bracing left in place 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.

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

SECTION 31 50 00

EXCAVATION PLAN

PART 1 - GENERAL

1.01 SUBMITTALS

Prior to beginning excavation operations on the project, the Contractor shall submit in writing to the Engineer his proposed plan to comply with the requirements of this section and other applicable sections of the contract documents. The excavation plan shall be stamped and certified by a Professional Engineer registered in the state of Louisiana. Any subsequent deviation from the approved plan or amendments thereto must have the prior approval of the Engineer.

1.02 SAFETY REQUIREMENTS

The methods and operation outlined in the excavation plan shall comply with all local codes and laws, and authorities having jurisdiction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

The Contractor shall submit his proposed method of construction which shall include the methods for excavating, protection of existing utilities, dewatering, sheeting, shoring and bracing, and backfilling which he plans on using to perform the work included in the contract documents. A plan is required for the launching and receiving pits for horizontal directional drilling. All braced excavations shall be designed by using the wet soil densities shown on the boring log unless the Contractor can reasonably prove that he can supply an effective dewatering system which will dry and maintain the soil in a "moist" condition even during periods of wet weather. The plan shall include but not be limited to:

A. Type of major excavation equipment.

B. Sheeting, shoring and bracing plan per Section 02160.

C. Dewatering plan per Section 02140.

D. Hauling equipment, and proposed excavation quantities.

E. Proposed haul routes of excavation and material supply equipment

F. Handling and storage of materials on site.

G. Provisions for compliance with permits and regulations.

The Contractor shall include in his plan a section describing aspects of the project where a modification of the proposed plan will occur due to field conditions. This shall include a detailed explanation of the methods of construction which he plans to use in specific areas or as required by the Engineer. The Contractor shall have the excavation plan stamped and certified by a Professional Engineer registered in the state of Louisiana.

The Contractor shall submit to the Engineer a design of the sheet pile and dewatering systems to be used in the launching and receiving pits for horizontal directional drilling. The design shall also include a detailed plan for the sequence of dewatering operations as related to the progress of the excavation.

The Contractor shall revise his plan when the Contractor's construction operation being used on the project changes materially from the original submittal or as required by the Engineer.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1 - GENERAL

This material shall meet the requirements of Sections 1003.02, 1003.01 and 1003.03(d) (stone or crushed stone) of the latest edition of the Louisiana Department of Transportation and Development Standard Specifications for Roads and Bridges. It shall be compacted to 95% of ASTM D-698. This material shall be used as base course and as temporary street and drainage maintenance.

PART 2 - PRODUCT (NOT USED)

PART 3 - EXECUTION

Contractor is to compact the subgrade to the appropriate density of adjacent ground. He is to install a layer of compacted stone/crushed stone to the thickness, lines and grades shown on the drawings or as directed by the Engineer.

END OF SECTION

SECTION 32 15 40

AGGREGATE SURFACING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Special Provision Sections of the Specifications, apply to this Section.

1.2 GENERAL

A. Furnish and construct aggregate surface courses for driveway and ancillary work in accordance with these specifications, and in conformity with the lines, grades, thicknesses, and typical sections shown on the plans or already established and all incidentals necessary for a complete and working system.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Furnish materials complying with the following Louisiana Standard Specifications for Roads and Bridges 2016 Edition (LSSRB) Sections:

Stone	1003.1 & 1003.05.1
Water	1018.01
Lime	1018.02

B. Use uniformly blended aggregate surface course materials that have been sampled and approved prior to placement.

C. Unless otherwise approved in writing, use the same type material throughout the project.

2.2 EQUIPMENT.

A. Furnish and maintain equipment necessary to produce a finished product meeting the requirements of these specifications. Obtain approval of equipment prior to use.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. General: Obtain approval of the subgrade before placing aggregate surface course. Uniformly spread material removed from shoulders adjacent to the shoulder material.

B. Construct subgrade in accordance with requirements for structural fill to a depth of 10” for the access road. Install geofabric between subgrade and aggregate. Geotextile shall meet the following requirements:

Property	Units	Value	Test Method
Machine Grab Tensile Strength	Lb	315	ASTM D 4632
Cross-machine Grab Tensile Strength	Lb	315	ASTM D 4632
Machine Grab Tensile Elongation	%	15	ASTM D 4632
Cross Machine Grab Tensile Elongation	%	15	ASTM D 4632
CBR Puncture	Lb	900	ASTM D 6241
Trapezoid Tear	Lb	110	ASTM D 4533
UV Resistance (at 500 hr)	%	70	ASTM D 7238
Apparent Opening Size (max.)	U.S. Sieve (mm)	40 (0.42)	ASTM D 4751
Permittivity	Sec^{-1}	0.05	ASTM D 4491

The geotextile will be a woven fabric made of 100% polypropylene that satisfies the criteria for AASHTO M 288 Class 1 separation and stabilizes geotextiles, and the contractor will install it according to manufacturer’s recommendations.

C. Aggregate Surface Course: The aggregate surface course material shall conform to Section 401 and Subsections 1003.01 and 1003.05.1 of the LSSRB. The contractor shall place it in loose lifts up to 8 in. thick and uniformly compact it to a minimum of 98 percent of the standard Proctor maximum dry density or 80 percent relative density, whichever produces the greater maximum dry density. When using the Proctor test for compaction control, the moisture content shall be within about 2 percentage points of the optimum moisture content during compaction and it shall be maintained within 2 percentage points of the optimum moisture content until it is permanently covered.

3.2 PLACING MATERIALS

A. Place material directly on the prepared and approved subgrade. Do not place surface course on damaged subgrade.

B. Do not place or spread aggregate surfacing materials on adjacent Portland cement concrete or asphalt concrete pavements. Conduct aggregate surfacing operations so that pavement surfaces, edges, and joints are not damaged. Repairs to damaged areas shall be at no expense to the Owner.

3.3 MIXING.

A. Uniformly mix stone with lime per LADOTD specifications.

B. Add moisture to adequately control compaction.

3.4 SHAPING AND COMPACTING AGGREGATE SURFACE COURSE

A. General: Place material to required thickness, shape to the required section, and compact with an approved roller to a tight, uniform surface free from ruts and waves.

B. Stone and Recycled Portland Cement Concrete: After initial compaction, wet the surface as directed.

3.5 DIMENSIONAL TOLERANCES.

A. When specifying net section measurement, the thickness and width of completed aggregate surface course will be checked for acceptance in accordance with DOTD TR 602. Correct to plan dimensions areas with deficiencies in excess of the following tolerances as required at no additional cost to the Owner.

B. Thickness: Under-thickness shall not exceed 3/4 inch. Over-thickness may be waived at no additional cost to the Owner.

C. Width: Under-widths shall not exceed 3 inches for shoulders and 6 inches for roadways. Over-width may be waived at no additional cost to the Owner.

D. When using vehicular measurement, the engineer will take measurements to ensure the work's conformance to plan dimensions.

3.6 TESTING REQUIREMENTS

A. The following aggregate testing shall be provided by testing laboratory. Provide test reports to engineer in a timely manner.

B. Table 1 (see page 4) contains requirements for aggregate surface testing that contractor shall provide before construction begins. If there are changes in the material types or borrow sources during the course of the project, then the testing shown in Table 1 should be repeated for the new material or source.

Table 1
Required Laboratory Testing Program
Preconstruction Material Evaluation

Test	Method	Frequency	Criteria
Aggregate Surface Course	LADOTD Approved Material List (AML); LADOTD Section 401 and Subsections 1003.01 and 1003.05.1; ASTM D 4318; and ASTM C 136 or D 6913 or use LADOTD Equivalent	1 per aggregate source	**Sieve Analysis Passing No. 40 Sieve:** Nonplastic LL □ 25% PI □ 4%

C. Table 2 below contains requirements for laboratory testing during construction. The intent is to compare the materials installed at the site with those evaluated before construction began. Additionally, laboratory testing during the project provides control data for use during field testing.

Table 2
Required Laboratory Testing Program
Construction Testing and Conformance Monitoring

Test	Method	Frequency	Criteria
Aggregate Surface Course	LADOTD Approved Material List (AML); LADOTD Section 401 and Subsections 1003.01 and 1003.05.1; ASTM D 4318; and ASTM C 136 or D 6913 or use LADOTD Equivalent	1 per 2000 cubic yards or change in material or source	**Sieve Analysis Passing No. 40 Sieve:** Nonplastic LL □ 25% PI □ 4%
Relative Density for Aggregate	ASTM D 4253 and ASTM D 4254 or use LADOTD Equivalent	1 per 2000 cubic yards or change in material or source	N/A

D. Test results shall be forwarded to Engineer promptly upon completion.

3.7 MEASUREMENT AND PAYMENT

A. No measurement will be paid. Payment for aggregate surfacing shall be included in lump sum pay items.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and install chain link security fences and gates complete as shown on the drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 00: Excavation and Backfill for Structures

B. Section 03 30 00: Cast-in-place Concrete

1.03 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles and finished for chain-link fences and gates.

1. Fence and gate posts, rails and fittings
2. Chain-link fabric, reinforcements, and attachments
3. Gates and Hardware

B. Shop Drawings: Show locations of fences, gates, posts, rails, tension wires, details of extended posts, extension arms, gate wing, or other operation, hardware and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, sections, details of post anchorage, attachment, bracing and other required installation and operational clearances.

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide chain-link fences and gates capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Minimum post size and maximum spacing for wind velocity pressure: determine based on mesh size and pattern specified, and on the following minimum design wind pressures and according to CLFMI WLG 2445:

a. Wind Speed: 110 mph
b. Fence Height: As shown on drawings
c. Line Post Group: IA, ASTM F 1043, Schedule 40 steel pipe

2. Determine minimum post size, group and section according to ASTM F 1043 for framework up to 10 feet high and post spacing not to exceed 10 feet.

B. Lightning protection system: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member of company of the International Electrical Testing Association or is a nationally recognized testing laboratory as defined by OSHA in 29 CFR 1910.7 and that is acceptable to the authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified according to NETA ETT or the National Institute for Certification in Engineering Technologies, to supervise on-site testing specified in Part 3.

C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Engineer in writing.

2. Approval of mockups may become part of the completed work if undisturbed at time of substantial completion.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates as shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

B. Interruption of Existing Utility Service: Do not interrupt utility services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer no fewer than two days in advance of proposed interruption of utility services.

2. Do not proceed with interruption of utility services without Engineer's written permission.

1.07 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to comply with performance requirements.
b. Deterioration of metals, metal finishes, and other materials beyond normal
weathering.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products from qualified manufacturers having a minimum of five years experience manufacturing thermally fused chain link fencing will be acceptable by the Engineer as equal, if approved in writing, ten days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Chain-Link Fences and Gates: Master Halco, Inc., Steeelco Fence, Southwestern Wire, Merchants Metals or approved equivalent.

2.02 CHAIN-LINK FENCE FABRIC

A. Zinc-Coated Steel Fabric: ASTM A 392, Type II, with hot-dipped galvanized after weaving (GAW). Minimum required coating Class 2 (2.0 oz/sq. ft.).

B. Size: Helically wound and woven to height as indicated on drawings with 2" diamond mesh; 9-gauge (0.148 in. dia.) wire.

C. Selvage: The top and bottom of the fabric shall be twisted.

D. Strength: Minimum core wire tensile strength of 75,000 psi.

2.03 FENCE FRAMEWORK

A. Round Steel Pipe and Rails: Schedule 40 standard weight pipe, in accordance with ASTM F1083.

1. Coating: 1.80 oz/ft2 hot-dipped galvanized zinc coating, exterior and interior.
2. Fence Height: As shown on drawings.
3. Strength Requirement: High Strength Grade 50,000 psi yield.

    a. Top, Bottom or Middle Rail: 1.66 inches 2.27 lb/ft
    b. Line Post: 2.375 inches (10' 0" Max Spacing) 3.65 lb/ft
    c. End, Corner, Gate and Pull Post: 4.000 inches, 9.12 lb/ft

B. Swing Gates: Comply with ASTM F900 and the following:

1. Type: double and single swing, welded steel frame tubing.
2. Fabric Height: as indicated on the drawings.
3. Leaf Width: as indicated on the drawings.
4. Hardware: Latched permitting operation from both sides of gate, hinges, center stops, hold brackets. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.04 FITTINGS AND ACCESSORIES

A. General: Comply with Standard Specification ASTM F 626.

B. Post Caps: Comply with ASTM F626; pressed steel galvanized after fabrication. Provide the following:

1. Line post caps with loop to receive top rail. Minimum zinc coating of 1.20 oz/ft2.

2. Terminal post caps. Minimum zinc coating of 1.20 oz/ft2.

C. Rail Fittings: Comply with ASTM F626; pressed steel galvanized after fabrication with minimum zinc coating of 1.20 oz/ft2. Provide the following:

1. Top and Bottom Rail Sleeves: Round-steel tubing not less than 6 inches long.
2. Rail and Brace Ends: Attach rails securely to each gate, corner, pull and end post
3. Rail Clamps: Line and corner boulevard clamps for connection intermediate and bottom rails in the fence line-to-line posts.

D. Tension and Brace Bands: Galvanized pressed steel complying with ASTM F626, minimum steel thickness of 12 gauge (0.105 inch), minimum width of 3/4 inch and minimum zinc coating of 1.2 oz/ft2. Secure bands with 5/16 inch galvanized steel carriage bolts.

E. Tension Bars: In compliance with ASTM F626, galvanized steel one-piece length not less than 2 inches shorter than full height of chain-link fabric. Bars for 2” chain-link mesh shall have a minimum cross section of 3/16 inch by 3/4 inch. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

F. Truss Rod Assemblies: In compliance with ASTM F626. 3/8 inch diameter steel truss rod with pressed steel turnbuckle. Hot-dip galvanize after threading rod and turnbuckle. Minimum zinc coating of 1.20 oz/ft2.

G. Tie Wires, Clips and Fasteners: According to ASTM F 626.

1. Galvanized Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:

a. Hot-Dip Galvanized Steel: 9-gauge (0.148 inch-diameter) wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.

H. Barbed Wire Arms: Pressed steel or cast iron, with clips, slots, or other means for attaching strands of barbed wire, integral with post cap, for each post unless otherwise indicated, and as follows:

1. Provide line posts with arms that accommodate top rail or tension wire.
2. Provide corner arms at fence corner posts unless extended posts are indicated.
3. Single-Arm Type: Type I, slanted arm.

2.05 BARBED WIRE

A. Steel Barbed Wire: ASTM A 121, two-strand barbed wire, 0.099-inch diameter line wire with 0.080-inch diameter, four-point round barbs spaced not more than 5 inches on center.

1. Zinc Coating: Type Z, Class 3.

2.06 CAST-IN-PLACE CONCRETE

A. Materials: Portland cement complying with ASTM C 150, Type I aggregates complying with ASTM C 33 and potable. Measure, batch, and mix Project-site-mixed concrete according to ASTM C 94/C 94M.

1. Concrete Mixes: Normal-weight concrete air entrained with not less than 3000 psi compressive strength (28 days), 3-inch slump, and 1-inch maximum size aggregate.

2.07 FENCE GROUNDING

A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger

1. Material above finished grade: Copper
2. Material on or below finished grade: Copper
3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.

B. Connectors and grounding rods: Comply with UL 467

1. Connectors for Below-Grade Use: Exothermic welded type
2. Grounding Rods: Copper-clad steel, size: 5/8 by 96 inches

2.08 PROTECTIVE COATINGS

A. All chain-link fencing, gates, and accessories shall be hot-dipped galvanized in accordance with standard specifications ASTM A392, A153, F1083 as applicable. All steel shall be galvanized after fabrication.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance

1. Do not begin installation before final grading is completed, unless otherwise permitted by Engineer
2. Proceed with installation only after unsatisfactory conditions have been corrected

3.02 PREPARATION

A. Stake locations of fence lines, gates and terminal posts. Do not exceed intervals of 50 feet between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks and property monuments.

3.03 INSTALLATION, GENERAL

A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.

1. Install fencing as shown in the drawings. Fabric to be installed on exterior side of posts.

3.04 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters, depth and spacing indicated in the drawings, in firm, undisturbed soil.

B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

    1. Verify that posts are set plumb, aligned and at correct height and spacing, and hold in position during setting with concrete or mechanical devices
    2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

C. Terminal Posts: Locate terminal end, corner and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

D. Line Posts: Unless shown otherwise in the drawings, space line posts uniformly at 10 feet on centers.

E. Post Bracing and Intermediate rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end of gate posts and at both sides of corner and pull posts.

    1. Locate horizontally braces at midheight of fabric. Install so posts are plumb when diagonal rod is under proper tension.

F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120 inch diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric.

    1. Top Tension Wire: Install tension wire through post cap loops
    2. Bottom tension Wire: Install tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.

G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

H. Bottom Rails: Install, spanning between posts and ½” above concrete mowing strip

I. Chain-Link Fabric: apply all chain-link fabric to outside of enclosing framework. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull and gate posts with tension bands no spaced more than 15 inches o.c.

K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at 1 end to chain-link fabric, wrap wire around post a minimum of 180 degrees and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individual and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

L. Fasteners: Install nuts for tension banks and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

M. Barbed Wire: Install barbed wire uniformly spaced, angled toward security side of fence. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.

3.05 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.06 GROUNDING AND BONDING

A. Fence Grounding: Install at maximum intervals of 1500 feet excepts as follows:

1. Fences within 100 feet of buildings, structures, walkways and roadways: ground at maximum intervals of 750 feet

a. Gates and Other Fence Openings: ground fence on each side of opening

1) Bond metal gates to gate posts

2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least 18 inches below finished grade.

B. Protection at Crossings of Overhead Electric Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.

C. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum to steel connections with stainless steel separators and mechanical clamps.
4. Make aluminum to galvanized steel connections with tin planted copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

D. Bonding to Lightning Protection System: If fence terminated at lightning protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780

3.07 ADJUSTING

A. Gates: Contractor shall adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding. This gate adjusting work shall be performed at no direct pay.

B. Lubricate hardware and other moving parts.

3.08 MEASUREMENT AND PAYMENT

A. No Measurement will be paid. Payment for chain-link fencing and gates shall be included in the lump sum pay item for Earthwork and Site Improvements.

END OF SECTION

SECTION 33 05 19

DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and install ductile iron pipe, and ductile iron fittings for buried piping complete as shown on the drawings and as specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 33: Earth Excavation and Backfill in Trenches

B. Reserved.

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer, within ten days after signing of the contract, a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.

B. The Contractor shall submit for approval, as provided in the General Conditions, complete, detailed working drawings of all ductile iron pipe and fittings.

C. The Contractor shall submit and shall comply with the recommendations of the pipe manufacturer for handling, storing, and installing pipe and fittings.

D. The Contractor shall submit the pipe manufacturer's certification of compliance with the specifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ductile iron pipe shall conform to ANSI A21.51 and AWWA C151. Thickness of pipe shall be Class 51 for 8" diameter and smaller, class 52 for 10" diameter and larger.

B. Restrained joints shall be provided for buried locations. Restrained joint pipe and fittings for 12" and smaller diameter pipe shall be "Mechanical Joint with Retainer Gland" as manufactured by American Cast Iron Pipe Company, "Lok-Tyton" or "TR FLEX" as manufactured by U.S. Pipe Company, "Super-Lock" as manufactured by Clow Corporation, or equal. Restrained joint pipe and fittings for 14" and larger diameter pipe shall be "Lok-Fast" as manufactured by American Cast Iron Pipe Company, "Lok-Tyte" as manufactured by U.S. Pipe Company, "Super-Lock" as manufactured by Clow Corporation, or equal. Where bolts are required, they shall be stainless steel.

C. Ductile iron fittings shall meet the requirements of ANSI/AWWA C110. Rubber gaskets shall conform to ANSI A21.11 for mechanical joints. Fittings shall be rated for 250 psi working pressure.

D. Joints for pipe and fittings shall be push on or mechanical joints conforming to ANSI/AWWA C111-A21.11 except where flanged joints are shown on the Drawings.

E. Flanged joints shall be 125-pound threaded flanges conforming to ANSI B16.1 for pipe and AWWA C110 for fittings. The pipe flanges shall be flat faced and suitable for 250 psi working pressure. Gaskets shall be ethylene propylene (EPDM), 1/8 in thick, full face and meeting the material requirements of AWWA C115.

G. Flexible joint pipe shall be ball and socket type self-restraining without the use of bolts and designed for a maximum working pressure of 250 psi. Boltless restraint shall be achieved by external lugs interlocked into a retainer gland. Each joint shall be capable of a maximum deflection of 15 degrees Flexible joint pipe shall be USIFLEX by U.S. Pipe and Foundry Company; Flex Lok-Boltless Ball Joint Pipe by American Cast Iron Pipe Company or equal.

2.02 PROTECTIVE COATINGS

A. Interior Ceramic Epoxy Lining (Wastewater Applications Only)

Except as otherwise indicated, interior surfaces of ductile iron pipe, fittings, and specials shall be cleaned and lined in the shop or by certified coating manufacturer installer with an epoxy lining meeting all the performance characteristics of Protecto 401, Tnemec Series 431, Permox CTF or approved equal. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining equipment shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. Pipe shall only be handled from the exterior. No interior handling forks, rods, ropes, straps or other handling means shall be allowed within the pipe. If lining is damaged or found defective at the

Site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications as well as native to the shop applied coating at the expense of the Contractor.

1. Material: Novalec epoxy, polyamine ceramic epoxy or amine cured novolac epoxy containing a minimum of 20 percent by volume ceramic quartz pigment meeting all the performance characteristics of Protecto 401, Tnemec Series 431, Permox CTF or approved equal coating system. Certification of test results for coating system shall be provided.
2. Surface Preparation: The surface shall be prepared in strict accordance with the coating system manufacturer's procedures.
3. Application: Coating system shall be factory applied by the ductile iron pipe and fitting manufacturer or a firm certified by the coating system manufacturer in the application the lining system.
4. Lining Thickness: Pipe and fittings shall receive 40 mils, minimum dry film thickness of coating.
5. Inspection: Pipe and fitting lining shall be checked for thickness using a magnetic film thickness gauge using the method outlined SSPCPA-2 Film Thickness Rating. Interior lining of pipe and fittings shall be tested for pinholes with a non-destructive 2,500-volt test. Any defects found shall be repaired prior to shipment.

B. Interior Cement-Mortar Lining (Potable Water Applications)

Except as otherwise indicated, interior surfaces of ductile iron water pipe, fittings, and specials shall be coated with a cement mortar lining in accordance with ANSI/AWWA C104/A21.4. Interior coating of all potable water pipe shall be NSF 61 certified.

C. Exterior Coating of Pipe

1. Exterior Coating of Exposed Piping: The exterior surfaces of pipe which will be exposed to the weather or above ground and not subject to immersion or corrosive gases shall be thoroughly cleaned and then given a coating of:

    a. Two (2) coats of Epoxy Polyamide and a final coat of Cycloaliphaltic Amine Epoxy conforming to the requirements of Section 09800 - Protective Coating.
    b. All surface preparation and materials shall be applied in accordance with manufacturer's instructions.

2. Exterior Coating of Exposed Piping subject to Immersion or Corrosive Gases: The exterior surfaces of pipe which will be exposed inside structures. Immersed or subject to corrosive gases shall be thoroughly cleaned and then coated with:

a. Prime coat of Polyamidoamine Epoxy Primer and two (2) top coats of Cycloaliphatic Amine Epoxy conforming to the requirements of Section 09800 - Protective Coating.
b. All surface preparation and materials shall be applied in accordance with manufacturer's instructions.

3. Exterior Coating of Buried Piping**:** The exterior coating of buried piping shall be an asphaltic coating approximately 1-mil thick.
4. Buried Piping Polyethylene Sleeve: Sleeves shall conform to the requirements of AWWA C105, and shall be a tubular 8-mil thick linear low-density film. Color shall be black.

2.03 PIPE REJECTION

Should any Ductile or metal pipe arrive on site with a non-approved coating for its intended environment, the coating shall be completely removed and coated as per section 09800 and section 15062 or the pipe material shall be replaced at the expense of the contractor. NO EXCEPTIONS.

2.04 IDENTIFICATION

Each length of pipe and each fitting shall be marked with the name of manufacturer, size and class. All gaskets shall be marked with the name of manufacturer, size, and proper insertion direction.

2.05 MANHOLE AND WET WELL CONNECTIONS

Pipe stubs for all manhole and wet well connections shall not exceed two feet (2') in length. Caps shall be furnished where required.

PART 3 - EXECUTION

3.01 LAYING DUCTILE IRON PIPE AND FITTINGS

A. All buried piping shall be installed in accordance with recommendations of the pipe manufacturer and as specified herein.

B. Care shall be taken in handling, storage, and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before laying, and no piece shall be installed which is found to be defective. All damage to the pipe coatings shall be repaired according to the manufacturer's recommendations.

C. All pipe and fittings shall be kept clean and shall be thoroughly cleaned before lying.

D. Pipe shall be laid to lines and grades shown on the drawings with bedding and backfill as shown on the drawings and as specified in Section 02221. Blocking under the pipe will not be permitted.

E. When laying is not in progress, including lunch time, the open ends of the pipe shall be closed by watertight plug or other approved means.

F. Under no circumstances shall the pipe or accessories be dropped into the trench.

3.02 TESTING

A. All force mains shall be field tested. The Contractor shall supply all labor, equipment, material, gages, pumps, and incidentals required for testing.

B. The test pressure shall be 50 psig unless noted otherwise. The test pressure shall be measured at the highest point along the test section.

C. Testing shall be conducted after backfilling has been completed and before placement of permanent surface.

D. Testing procedure shall be as follows:

1. Fill line slowly with water. Maintain flow velocity less than two feet (2') per second.
2. Expel air completely from the line during filling and again before applying test pressure. Air shall be expelled by means of taps at points of highest elevation.
3. Apply test pressure. Measure the quantity of water that must be pumped into the line to maintain pressure within 5 psi of the test pressure for a period of two (2) hours. This quantity is defined as leakage.
4. Carefully examine any exposed pipe, fittings, and joints during the test.

E. Allowable leakage: No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{S\ D\ P^{1/2}}{133200}$$

L = Loss Gal/hr.
S = Length of pipe tested, in feet
D = Nominal diameter in inches
P = Average test pressure

Notes: The following shall be determined at the discretion of the Engineer.

1. Minimum Test pressure of 50 psig unless otherwise noted.
2. Test duration shall be a minimum of two hours.
3. All visible leaks are to be repaired regardless of the amount of leakage.

F. If any test of pipe laid discloses leakage greater than that allowed, the Contractor shall, at his own expense, locate and repair the cause of leakage and retest the line.

G. All visible leaks are to be repaired regardless of the amount of leakage.

3.03 CLEANING

A. At the conclusion of the work, the Contractor shall thoroughly clean all of the new pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed.

B. After the pipe lines are cleaned and if the ground water level is above the pipe, or following a heavy rain, the Engineer will examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired or replaced by the Contractor.

C. All water pipe and fittings shall be disinfected in accordance with AWWA Section C651, Disinfecting Water Mains.

END OF SECTION

SECTION 33 05 31.13

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1: GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and install in the locations as shown on the Drawings, the plastic piping, fittings and appurtenances as specified herein.

1.02 DESCRIPTION OF SYSTEM

Piping shall be installed in the locations as shown on the Drawings.

1.03 QUALIFICATIONS

All plastic pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The equipment shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

1.04 SUBMITTALS

A. Shop drawings shall be submitted to the Engineer for approval in accordance with the General Conditions and Section 01340 and shall include dimensioning and technical specification for all piping to be furnished.

B. Submit to the Engineer, for approval, samples of all materials specified herein.

1.05 TOOLS

Special tools, solvents, lubricants, and caulking compounds required for normal installation shall be furnished with the pipe.

PART 2: PRODUCTS

2.01 MATERIALS

A. Pressure-Rated Polyvinyl Chloride (PVC) Pipe:

1. All pressure-rated PVC pipe and accessories as specified on the Drawings, of two to twelve inches (2"-12") in diameter, shall be extruded from clean, virgin, unplasticized, National Sanitation Foundation (NSF) approved, Class 12453-B or Class 12454-A PVC compound conforming to Resin Specification ASTM D 1784. Pipe shall be suitable for use at a maximum hydrostatic working pressure of 200 psi at 32°C (73.4°F). Pipe shall conform to ASTM D 2241 for Standard Dimension Ratio (SDR) 21, and shall meet the requirements as set forth in Product Standards PS 22-70. All spigot (plain) ends shall be marked so as to indicate the distance the spigot end should be extended into the bell. The pipe shall be furnished in nominal lengths of approximately 20 feet, unless otherwise directed by the Engineer. Pipe and accessories shall bear the NSF mark indicating pipe size, manufacturer's name, AWWA and/or ASTM Specification number, working pressure, and production code.

2. All PVC pipe and accessories less than two inches (2") in diameter, where called for on the Drawings, shall be Schedule 80 and be of rigid normal impact polyvinyl chloride. The pipe and accessories shall conform to ASTM Specification D 1785 and Product Standard PS21-70. All materials to be furnished complete to perform the work, including solvent cement, etc. The pipe shall be furnished in nominal lengths of approximately 20 feet, unless otherwise directed by the Engineer.

B. Class-Rated Polyvinyl Chloride (PVC) Pipe:

1. PVC joints for pipe less than three inches (3") in diameter shall be threaded or solvent welded joints where called for on the Drawings, unless otherwise directed by the Engineer. Teflon thread tape or liquid teflon thread lubricant shall be used on all threaded joints to serve as both a sealer and lubricant. Threaded joints should be made hand tight (hard). When the joint is hand tight a strap wrench should be used to make up one to two (1-2) additional full turns past the hand tight point. Do not use pipe wrenches or pump pliers on plastic pipe or fittings.

D. Fittings:

1. Fittings for Schedule 80 PVC pipe two inches (2") in diameter and less shall be solvent welded or threaded thype and be PVC as shown on the Drawings, or as directed by the Engineer. Threaded PVC fittings shall conform to ASTM Specification D 2464-69.

2. The manufacturer of the pipe shall supply all polyvinyl chloride accessories as well as any adaptors and/or specials required to perform the work as shown on the drawings and specified herein. Standard double bell couplings will not be accepted where the pipe will slip completely through the coupling.

PART 3: EXECUTION

3.01 INSTALLATION

The installation of plastic pipe shall be strictly in accordance with the manufacturer's technical data and printed instructions.

3.02 FIELD PAINTING

(NOT USED)

3.03 INSPECTION AND TESTING

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure test for 4 hours at full working pressure but not less than 150 psi. All leaks shall be repaired and stress retested as approved by the Engineer. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during tests.

END OF SECTION

SECTION 33 05 31.16

POLYVINYL CHLORIDE PRESSURE PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

The Contractor shall furnish and install the polyvinyl chloride (PVC) pipe along with labor, materials and equipment necessary for installation in accordance with the Plans and Specifications.

1.02 REFERENCES

A. ASTM D1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

B. ASTM D1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

C. ASTM F441 Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80

D. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

E. ASTM F1674 Standard Test Method for Joint Restraint Products for Use with PVC Pipe

F. AWWA C-900 (PVC) Pressure Pipe and Fabricated Fittings

G. AWWA C-905 Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14” through 48” for Water Transmission and Distribution

H. Appendix A: J.P. Gravity Sanitary Sewer General Standard Notes

I. Appendix B: J.P. Sanitary Sewer Force Main Standard Notes

J. Appendix C: J.P. Water Distribution System Standard Notes

1.03 SUBMITTALS

Certified mill tests shall be furnished the Engineer by the manufacturer for all pipe and fittings at least 10 days prior to shipment of material to the job site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe:

1. All polyvinyl chloride (PVC) pipe shall be extruded from PVC meeting the requirements of cell classification 12454-B as defined in ASTM D1784.
2. All polyvinyl chloride (PVC) pressure pipe 4 inches through 12 inches in diameter shall meet AWWA specification C-900, DR18. PVC pipe 14 inches and larger in diameter shall meet AWWA specification C-905, DR25.
3. All polyvinyl chloride (PVC) pipe used to transport raw sewage, treated sewage, sludge, etc., by gravity shall be SDR 26 PVC pipe. Polyvinyl chloride (PVC) pipe in diameters of 4 inches through 12 inches shall meet all requirements of AWWA C-900 specifications. Polyvinyl chloride (PVC) pipe in diameters of 14 inches through 36 inches shall meet all requirements of ASTM F1674 latest revision or approved equal.
4. All polyvinyl chloride (PVC) pipe used to transport raw sewage, treated sewage, sludge, etc., under pressure shall have a SDR rating of 26 for diameters up to and including 16 inches. The pipe shall have a minimum pressure rating of 165 psi, and compatible for use with cast iron joints and fittings. Polyvinyl chloride (PVC) pipe used to transport raw sewage, treated sewage, sludge, etc., in diameters of 18 inches through 36 inches shall have a SDR rating of 26. Polyvinyl chloride (PVC) pipe in diameters of 4 inches through 12 inches shall meet all requirements of AWWA C-900 specifications. Polyvinyl chloride (PVC) pipe in diameters of 14 inches through 36 inches shall meet all requirements for AWWA C-905.

B. Fitting and Specials:

1. The polyvinyl chloride fitting used in conjunction with Schedule 80 and SDR 26 polyvinyl chloride (PVC) pipe shall be in accordance with all applicable sections of ASTM Specifications.
2. PVC fittings in chlorine solution service shall be Schedule 80, suitable for outdoor installation.
3. The strength class of the fitting shall be not less than the strength of any adjoining pipe.
4. No polyvinyl chloride (PVC) pipe fitting will be allowed on PVC pipe used to transport raw sewage, treated sewage, sludge, etc., under pressure. All bends shall be ductile iron fittings meeting the requirements of Section 02615.

C. Joints:

1. The pipe will have integral bell elastomeric, gasketed joints in accordance with ASTM F477. The gaskets shall be inserted into the pipe bell at the factory

prior to shipment.
2. All "O" rings furnished as part of any fitting, union, etc., conveying chloride solution shall be suitable for chlorine solution service.

D. Protective Coatings: No protective coating will be required on polyvinyl chloride (PVC) pipe.

E. Restrained Joints:

1. Polyvinyl chloride (PVC) pipe shall be restrained using the Series 1100 PV or 1100 HV MEGALUG mechanical joint thrust restraint as manufactured by EBAA Iron, Inc. or approved equal.
2. The EBAA Iron Series 1100 PV or 1100 HV MEGALUG assembly shall be cast completely of closely controlled ductile iron conforming to ASTM A536, latest revision, and furnished with silicone bronze IFI 140 Grade 655 bolts. All glands and bolts shall be coated with two (2) coats of coal tar epoxy, Koppers 300-M Bitumastic or approved equal, with a minimum dry film thickness of eight (8) mils per coat.
3. Both types of restraining glands shall be wrapped with an eight (8) mil thick polyethylene tube for additional protection. The polyethylene wrap shall extend a minimum of two (2') feet in either direction from the gland and secured on the end with circumferential turns of tape.
4. All restrained joints shall be inspected at the job site after installation. Field touch-up and repair if needed shall be made by the Contractor under the supervision and inspection of a representative of the coating supplier.

PART 3 - EXECUTION

3.01 TESTING AND INSPECTION

A. All pipe and fittings shall be subjected to a rigid inspection after delivery to the site and before being placed in the work. Any piece found defective by such field inspection will be rejected and shall be immediately removed from the premises.

B. Sewer Force Main lines shall be tested to 100 psi.

END OF SECTION

SECTION 33 05 39.41

REINFORCED CONCRETE CULVERTS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. This work consists of furnishing and installing storm drain pipe culverts, including excavation, bedding material, sheeting and bracing, geogrid, geotextile fabric, and backfill in conformity with the lines and grades shown on the plans or established in the field. Contractor shall be responsible for design of sheeting, bracing, and dewatering to maintain stability of excavations for culvert installations.

B. All work shall be performed in accordance with the provisions of Section 701 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition (Purple Book), and latest revisions, except as otherwise noted in these specifications.

1.2 SUBMITTALS

A. The following items shall be submitted to the Engineer for approval prior to construction:

1. Certificate of Concrete Pipe Classification

2. Technical data on Geotextile Fabric and Geogrid

3. Sheeting/Bracing/De-watering Design

PART 2 – PRODUCTS

2.1 MATERIAL

A. Reinforced Concrete Pipe: All pipe shall conform to ASTM Designation C-76, Class III or Class IV pipe, Type 3 joint, as per Section 1016.02 of the Purple Book.

B. Reinforced Concrete Arch Pipe: All arch drain pipe shall be reinforced concrete arch pipe in accordance with Section 1016.03 of the Purple Book, conforming to ASTM C-506, Class A-III, with Type 3 joints.

C. Plastic Pipe: All pipe shall be thermoplastic in accordance with Section 1006 of the Purple Book.

D. Bedding: Bedding Material for concrete pipe (30" diameter and smaller) shall be compacted modified 610 crushed limestone / recycled Portland cement concrete in accordance with ASTM D698 and conforming to the requirements of Section 726 and Subsection 1003.10.1 of the Purple Book. Bedding Material for concrete pipe (36" diameter and larger) shall be compacted #57 crushed limestone / recycled Portland cement concrete at 75% relative density in accordance with ASTM D 4253 and ASTM D 4254, and conforming to the requirements of Section 726 and Subsection 1003.10.1 of the Purple Book. Bedding Material for Plastic Pipe shall be river sand compacted to 97% of maximum dry density in accordance with ASTM D 698.

E. Backfill: Backfill shall be river sand compacted to 97% of maximum dry density in accordance with ASTM D 698.

F. Geotextile Fabric: The geotextile fabric shall be Mirafi 140N or Propex Geotext 401 or approved equal, non-woven.

G. Geogrid: The geogrid shall be Tensar BX1200, Tensar Type II, or Syntec SBX12, or approved equal.

2.2 SHEETING AND BRACING

A. At No Direct Payment, the Contractor shall be responsible for design of sheeting, bracing, and dewatering to maintain stability of excavations for required pipe and bedding material. Design shall be performed by a Professional Civil Engineer licensed in the State of Louisiana. Excavations of 4 feet or less depth may be stabilized by steel or timber sheeting, trench box, or open cut. Excavations deeper than 4 feet shall be stabilized by sheetpiles with bracing as required by design. The Contractor is responsible for the protection of all existing subsurface utilities and shall determine whether sheet piles may be removed without causing damage to existing subsurface utilities, to adjacent public and private facilities, and to adjacent property. Any sheeting left in-place shall be cut-off to an elevation

three (3) feet below finished ground. Any sheeting removed, including trench box, shall be removed vertically. Sheeting shall not be slid horizontally within the pipe trench. The cost of all labor, equipment, materials, engineering, etc., necessary to design, install, extract, and/or cut-off any sheeting and bracing system, including de-watering, shall be included in and paid for under the contract unit price per linear foot of corresponding pipe culvert.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Contractor shall install concrete pipe culverts as shown on the drawings.

3.2 MEASUREMENT AND PAYMENT

A. No measurement will be paid; payment shall be included in lump sum bid item for earthwork and site improvements.

END OF SECTION

SECTION 33 19 23

ELECTROMAGNETIC FLOW METERS

PART 1 - GENERAL

1.1 SCOPE

A. This section describes the requirements for a flow sensor.

B. Under this item, the contractor shall furnish and install the flow measurement equipment and accessories as indicated on the plans and as herein specified.

1.2 QUALITY ASSURANCE

A. Referenced Standards and Guidelines - Complies with applicable portions of ANSI/AWWA Standards and NSF/ANSI/CAN Standard 61, Annex G. There are currently no AWWA standards that specifically address electromagnetic metering.

1. Flow measurement function complies with Industry Standards

a. ANSI B16.5 Class 150 RF
b. AWWA Class B
c. NEMA 4X/6P (IP67/IP68)
d. CSA

1.3 SUBMITTALS

A. The following information shall be included in the submittal for this section:

1. Outline dimensions, conduit entry locations and weight

2. Customer connection and power wiring diagrams

3. Data sheets and catalog literature for microprocessor-based transmitter and sensor

4. Interconnection drawings

5. Installation and operations manual

6. List of spare parts

7. Complete technical product description including a complete list of options provided

8. Any portions of this specification not met must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification

1.4 SYSTEM DESCRIPTION

A. Electromagnetic flow meter is intended for fluid metering in industries including water, wastewater, food and beverage, pharmaceutical and chemical. Measures fluid flow of water or fluids which are highly corrosive, very viscous, contain a moderate amount of solids, or require special handling. No moving parts are in the flow stream. Transmitter can be integrally mounted to the sensor or can be remote-mounted. Unit is ideally suited for measuring dynamic, non-continuous flow. In applications where a minimum and/or maximum flow rate must be tracked and monitored, the unit provides pulse signals that can be fed to dedicated batch controllers, PLCs and other more specialized instrumentation.

1.5 DEFINITIONS

A. Transmitter – Device used for increasing the power of a signal. It does this by taking energy from a power supply and controlling the output to match the input signal shape but with larger amplitude.

B. ANSI – (American National Standards Institute) A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States. The organization also coordinates U.S. standards with international standards so that American products can be used worldwide.

C. AWWA – (American Water Works Association) An international non-profit professional organization founded to improve water quality and supply.

D. Sensor Coils – Also called an “induction loop”, an electromagnetic communication or detection system which generates a magnetic field to induce an electrical current in a nearby wire.

E. Electrode – An electrical conductor used to make contact with a nonmetallic part of a circuit (e.g. a semiconductor, an electrolyte or a vacuum).

F. Modbus RTU – a serial communications protocol published by Modicon (now Schneider Electric) in 1979 for use with its programmable logic controllers (PLCs). This is used in serial communication & makes use of a compact, binary representation of the data for protocol communication.

G. NEMA – (National Electrical Manufacturers Association) Is the 'Association of Electrical Equipment and Medical Imaging Manufacturers' in the United States. Its approximately 450 member companies manufacture products used in the generation, transmission, distribution, control, and end use of electricity. These products are used in utility, industrial, commercial, institutional, and residential applications.

H. NSF International – An independent, accredited organization that develops standards, and tests and certifies products and systems. They provide auditing, education and risk management solutions for public health and the environment.

I. PLCs – (Programmable Logic Controller) A digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. PLCs are used in many industries and machines.

J. PTFE – (Polytetrafluoroethylene) A synthetic flouropolymer of tetrafluoroethylene that finds numerous applications. The best known brand name of PTFE is Teflon by DuPont Co.

K. Serial Communications – In telecommunication and computer science, serial communication is the process of sending data one bit at a time, sequentially, over a communication channel or computer bus. This is in contrast to parallel communication, where several bits are sent as a whole, on a link with several parallel channels.

L. BACnet Communication - was and is being developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers

(ASHRAE). It is a uniform company-neutral standard for data communication in and with building automation systems. BACnet is standardized under ANSI/ASHRAE standard 135 and ISO standard 16484-5.

PART 2 – PRODUCTS

1.1 APPROVED MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with specifications, provide flow measurement equipment by one of the following:

1. Badger Meter, Model M2000 Electromagnetic Flow Meter, Liquid, Single-Channel
2. Approved Equal.

1.2 OPERATING CONDITIONS

A. System Components

1. Metering Tube (Sensor)

a. Consists of stainless steel tube lined with a non-conductive material. Energized sensor coils around tube create a magnetic field across the diameter of the pipe. As a conductive fluid flows through the magnetic field, a voltage is induced across two electrodes; this voltage is proportional to the average flow velocity of the fluid.

2. Transmitter

a. Consists of unit which receives, amplifies, and processes the sensor's analog signal. Signal is converted to both analog and digital signals that are used to display rate of flow and totalization. Processor controls zero-flow stability, analog and frequency outputs, serial communications and a variety of other parameters. Integrated LCD display indicates rate of flow, forward and reverse totalizers and diagnostic messages. Display guides user through programmable routines.

B. Operational Requirements

1. Electromagnetic Flow Meter

    a. The flow meter system shall operate with a pulsed DC excitation frequency, and shall produce a signal output that is directly proportional and linear with the volumetric flow rate of the liquid flowing through the metering tube. The metering system shall include a metering tube (sensor), a transmitter, and the necessary connecting wiring. The metering system shall have the ability to incorporate a meter mounted or remote mounted transmitter.

    b. Engineering Units:

        1) The transmitter shall be program selectable to display the following units of measure: U.S. gallons, imperial gallons, million gallons (U.S.), cubic feet, cubic meters, liters, hector-liters, oil barrels, pounds, ounces or acre feet.

    c. Operating Principle: Electromagnetic Induction

    d. Metering Tube (Sensor)

        1) The metering tube (sensor) shall be constructed of stainless steel, and rated for a maximum allowable non-shock pressure and temperature for steel pipe flanges, according to ANSI B16.5.

        2) The metering tube (sensor) shall be available in line size from ¼" [6 mm] to 78" [2000 mm].

        3) The metering tube (sensor) end connections shall be carbon steel, 304 or 316 stainless steel flanged, according to ANSI B16, Class 150 and AWWA Class B standards.

        4) The insulating liner material of the metering tube (sensor) shall be made of a hard rubber elastomer and NSF-listed for meter sizes 4” and above, in conformance with manufacturer’s recommendation for the intended service or an NSF-listed meter option with PTFE liner.

5) The metering tube (sensor) shall include two self-cleaning measuring electrodes. The electrode material shall be corrosion resistant and available in Alloy C or 316 stainless steel.

6) The metering tube (sensor) shall include a third “empty pipe detection” electrode located in the upper portion of the inside diameter of the flow tube in order to detect an empty pipe condition when the flow tube is running partially empty. Empty pipe detection that is not activated until the pipe is 50% empty is not acceptable.

7) The metering tube (sensor) housing shall be constructed of carbon steel, welded at all joints, and rated to meet NEMA 4X/6 (IP67) ratings.

8) For remote transmitter applications, the metering tube (sensor) junction box enclosure shall be constructed of cast aluminum (powder-coated paint) and shall meet NEMA 4X/6 (IP67) ratings.

9) For remote transmitter applications, where the sensor can be prolonged submerged, the metering tube (sensor) junction box enclosure shall be constructed of cast aluminum (powder-coated paint) and shall meet NEMA 6P (IP68) ratings.

10) When installed in non-metallic or internally lined piping, the metering tube (sensor) shall be provided with a pair of corrosion resistant grounding rings. The grounding ring material shall be 316 stainless steel.

11) Fluid Temperature Range

    i. For remote transmitter applications, the fluid temperature range shall be 32°F to 178°F [0°C to 80°C] at a maximum ambient temperature of 140°F [60°C] for the hard rubber liner material.

    ii. For remote transmitter applications, the fluid temperature range shall be -40°F to 302°F [-40°C to 150°C] at a maximum

ambient temperature of 140°F [60°C] for the PTFE liner material.

iii. For meter-mounted transmitter applications, the fluid temperature range shall be 32°F to 178°F [0°C to 80°C] at a maximum ambient temperature of 140°F [60°C] for the hard rubber liner material.

iv. For meter-mounted transmitter applications, the fluid temperature range shall be -4°F to 212°F [-20°C to 100°C] at a maximum ambient temperature of 140°F [60°C] for the PTFE liner material.

e. Transmitter

1) The transmitter shall be microprocessor based, and shall energize the sensor coils with a digitally controlled pulsed DC. The excitation frequency shall be program selectable for the following: 1Hz, 3.75Hz, 7.5Hz, or 15Hz. (factory optimized to pipe size and application)

2) The transmitter electrical power requirement shall be 85-265VAC, 45-65Hz. The power consumption shall not exceed 15W.

3) The transmitter shall have an ambient temperature rating of -4°F to 140°F [-20°C to 60°C].

4) The transmitter shall include non-volatile memory capable of storing all programmable data and accumulated totalizer values in the event of a power interruption.

5) Automatic zero stability, low flow cut-off, empty pipe detection and bi-directional flow measurement shall be inherent capabilities of the transmitter.

6) All transmitter outputs shall be galvanically isolated to 250 volts.

7) The transmitter and remote junction enclosures shall be constructed of cast aluminum (powder-coated paint) and shall meet NEMA 4X/6P (IP66/IP67) ratings.

8) Outputs:

The transmitter shall provide a total of four digital outputs, one analog output and one digital input.

i. Up to four open collector digital outputs, program selectable from the following: Forward pulse, reverse pulse, AMR pulse, flow set point, empty pipe alarm, flow direction, reset output, error alarm and 24V supply.

ii. Up to two active digital (24 Volt) outputs, program selectable from the following: Forward pulse, reverse pulse, AMR pulse, flow set point, empty pipe alarm, flow direction, preset output, error alarm and 24V supply.

iii. Up to two AC solid-state relay outputs, program selectable from the following: Frequency output, flow set point, empty pipe alarm, flow direction, preset amount and error alarm.

iv. One digital input, program selectable from the following: Remote reset, batch reset and positive return to zero.

v. Advanced protocol support using Modbus/RTU.

vi. One analog output programmable and scalable from the following: 0-10mA, 0-20mA, 2-10mA or 4-20mA. Voltage sourced and isolated. Max. loop resistance = 800 ohms.

vii. Advanced protocol support communication thru AquaCUE

viii. Advanced protocol support communication thru BACnet MS/TP

f. Control and Programming

1) The transmitter shall be programmed via three function buttons. The programming functions shall be available in a user-friendly, menu driven software through the four-line LCD interface. The transmitter shall accommodate the following languages: English, German, Czech, French or Spanish.

2) Programmable parameters of the transmitter include, but are not limited to: calibration factors, totalizer resets, unit of measure, analog and pulse output scaling, flow-alarm functions, language selection, low-flow cutoff, noise dampening factor and excitation frequency selection.

3) The transmitter shall have a programming option allowing entry of a selected numeric password value for tamper protection.

g. System Performance

1) The metering system shall operate over a flow range of 0.1 to 39.4 ft/s [0.03 to 12 m/s].

2) The metering system shall perform to an accuracy ±0.2 percent of rate ±0.0032 ft/s [±1 mm/s].
The accuracy for zero straight run with a single elbow up and/or a single elbow down stream shall be 1% or better in the flow range 0.5 ft/s (0.15 m/s) and up.

3) The metering system shall be capable of measuring the volumetric flow rate of liquids having an electrical conductivity as low as 5 µS/cm (demineralized water 20 µS/cm).

4) The system measuring repeatability shall be <0.1% of full scale.

h. Indication

1) The transmitter shall include a four-line, 20-character, backlit LCD interface to display the following values:

i. Flow rate in selectable rate units
ii. Forward totalizer in selectable volume units
iii. Reverse totalizer in selectable volume units
iv. Net totalizer in selectable volume units
v. Error or alarm messages
vi. Software revision level

PART 3 - EXECUTION

1.1 INSTALLATION

A. Follow manufacturer's recommendation for installation. Installation will conform to the guidelines provided by the Installation & Operation Manual.

B. Straight pipe requirement shall be an equivalent of three diameters on the inlet (upstream) side, and two diameters on the outlet (downstream) side.

C. For best performance, place meter vertically, with liquid flowing upward and meter electrodes in a closed, full pipe.

1.2 CALIBRATION

A. Each meter shall be hydraulically calibrated in an ISO 17025-certified testing facility, which utilizes a computerized gravimetric testing method with a measuring uncertainty of 0.1%.

B. Each meter shall be provided with a calibration certificate indicating the measured error (percent deviation) at three different flows, respectively equivalent to 25%, 50% and 75% of the nominal flow rate for each size.

1.3 MANUFACTURER'S WARRANTY

A. Terms

1. The manufacturer of the above specified equipment warrants the Product to be free from defects in materials and workmanship appearing within the earlier of either: One (1) year after installation; or one (1) year and six (6) months after shipment from manufacturer.

END OF SECTION

SECTION 33 32 16

PACKAGED WASTEWATER GRINDER PUMP STATIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

This section includes the material and installation requirements for the sewerage system lump sum item included in the base bid project.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 23 33: Earth Excavation and Backfill in Trenches

1.03 SUBMITTALS

A. Manufacturer Product Data.
    a. Provide manufacturer product data prior to actual field installation work.

B. Shop Drawings
    a. Provide drawings of the manufacturer recommended installation and foundation requirements prior to actual field installation work.

1.04 QUALITY ASSURANCE

A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.
B. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

1.05 PRODUCT DELIVERY AND STORAGE

A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above-ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.01 PACKAGED GRINDER LIFT STATION

A. The manufacturer shall furnish complete Grinder Pump Station, consisting of a basin package, control panel, alarm device, unitized level control system, grinder pump and all necessary appurtenances to form a complete package system. Grinder pump shall be listed to U.L. 778 and CSA 108. All equipment in the wet well shall be capable of constant submergence in sewage to a minimum depth of ten feet without electrical power being energized.

B. The manufacturer shall provide a warranty on any defective part(s) and labor to replace defective parts for a period of twelve (12) months after notice of owner's acceptance, but no greater than twenty-four (24) months after receipt of shipment. The owner will return any equipment found to be defective to the manufacturer for inspection and validation of the defect. Defective equipment will be repaired or replaced and shipped back to the customer at no charge. Consult factory for extended warranty information.

C. Each basin package shall include one (1) PVC flapper type check valve (supplied and installed by others) in the service lateral between the grinder pump station and the low pressure sewer main. Valves shall be 1.25 inch NPT for simplex and 1.5 inch NPT for duplex stations.

D. Lift station shall be pre-fabricated packaged grinder-pump station with 48 inch diameter x 72 inch deep fiberglass reinforced polyester (FRP) resin basin. Lift station shall include one (1) 2-HP submersible grinder pump, factory pre-wired with steel cover, float tree and 3 floats, complete with check valve and gate valve for the pump. Pump shall be wired to a control panel and shall operate on a float switch system as follows: Bottom float is pump off; Second float is pump on; Third float is high water alarm. Pump shall be 2 HP, 208-240V, single phase, 3450 RPM, with 1.25-inch discharge. Lift Station shall include cover, control panel, stainless steel lifting chain.

Provide 24” thick crushed stone subbase extending one (1) foot outside the perimeter
of the lift station wall. Crushed stone shall be accordance with Section 301 of the Louisiana Standard Specifications for Roads and Bridges 2016 edition.

The discharge system shall consist of a 1.25” PVC ball type check valve and flexible hose design. Hose shall be rated at a capacity greater than the pump is capable of producing. Non-flexible portions of the discharge assembly shall be Schedule 80 PVC. The manufacturer shall guarantee all bulkhead penetrations watertight. The grinder pump shall be mounted on a SS base. The discharge shall be 1.25” NPT SS discharge coupling.

Pump Removal System: Each pump shall be removable from ground level without the requirement of entering the basin. A polypropylene lifting rope with 756lb (343kg) working load and 3,780lb (1,715kg) breaking strength shall be supplied for pump removal.

Pump Design: A centrifugal submersible grinder pump designed to reduce all material found in normal domestic and light industrial sewage, including plastics, rubber, sanitary napkins, and disposable diapers into a finely ground slurry. The resultant slurry is then pumped through small diameter piping into a gravity interceptor or treatment facility. The temperature limitation of the liquid being pumped is 104° F continuous, 160°F intermittent and shall be capable of running dry for extended periods.

Pump Performance: In order to insure proper operation in all conditions, pump(s) must provide, without overheating in continuous operation, maximum head condition required by the system. Pump(s) must also be capable of operating at zero or negative heads without damage to the pump(s).

Pump Construction: The volute, seal plates and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. The pump (s) shall be powder coated with an epoxy primer and polyester top-coat. All exposed hardware shall be 300 series stainless steel. Discharge connection shall be a standard 1.25 inch NPT in the vertical position using a threaded bolt on discharge flange. A movable fitting with C-Channel connection is also acceptable.

The pump impeller shall be of the recessed vortex design. Pumps with standard centrifugal semi-open impeller designs shall not be acceptable. The impeller shall be of ASTM A-48 cast iron construction. The impeller shall be capable of being trimmed to meet specific performance characteristics.

The pump shall be a two bearing design consisting of an upper ball bearing carrying the thrust loads, and lower ball bearing for the purpose of carrying the thrust loads and radial loads. Sleeve bearings or ballbearings will not be considered equal. Bearings shall operate in an oil bath atmosphere for superior life. Permanently lubricated bearings are not acceptable.

Grinder: The grinder mechanism shall be specifically designed for use in a grinder pump. The mechanism shall consist of an axial cutter that is locked for rotation by a shaft key. The cutter is fixed axially by a socket head cap screw. The cutter plate is held in place by a press fit. The entire cutting mechanism shall be recessed, protecting the mechanism. All grinding mechanism components, including both the cutter plate and radial cutter shall be constructed of 440C stainless steel hardened to a minimum Rockwell C55 and shall be finish ground

for a fine cutting edge. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece, stainless steel motor shaft. The grinding assembly shall operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. In order to demonstrate adequate flow velocity and grinding capability, the grinder pump shall be capable of passing a series of stringy type solids (diapers, rags, feminine products, etc.) through the pump without roping or winding the material in or immediately below the pump suction.

Electric Motor: Single-phase motors shall be of the capacitor start, capacitor run design, 208-240 volt, and single phase, 2 HP. The motor shall meet the performance requirements of a NEMA L speed-torque curve. The motor shall be designed to be non-overloading throughout the entire pump curve. The motor shall be constructed with the open windings operating in a sealed housing, which contains clean dielectric oil for heat dissipation from the windings and for lubrication of the bearings, making it capable of operating in a totally, partially, or non-submerged condition for extended periods of time without damage due to heat being generated. Oil used must be able to be disposed of as nonhazardous waste. Air-filled motors shall not be acceptable. The motor shaft shall be of 416 stainless steel.

For single phase pumps, an automatically resetting, heat sensing thermal device that interrupts current flow if excessive temperature and/or current is detected shall provide protection against excessive temperature.

The pumps shall be equipped with 20 ft. of type SOW power cord. The power cord and motor shall be connected via quick disconnect pin terminals located within the motor housing. Pin receptacles shall be crimped and molded to the power cord in a PVC plug. The plug shall be secured with a stainless steel compression plate to prevent water from entering the motor housing and to provide strain relief at the point of cord entry. A polybutylene terephthalate terminal block with brass pin inserts shall connect the power cord leads with motor leads. The ground pin shall be longer than the other pins such that the ground connection is the first connection made and the last connection broken when the plug is inserted and removed, respectively. A Buna-N o-ring shall provide isolation sealing between terminal block and the motor housing. The plug assembly shall be guaranteed by the manufacturer to meet UL approval for submersion.

For three phase pumps, Protection against excessive temperature shall be provided by heat sensor thermostat attached to the stator windings and connected in series with the contactor coil in the control panel.

Mechanical Seal: The unit shall utilize a double mechanical shaft seal arrangement and shall operate in an oil atmosphere. The materials of

construction shall be silicon carbide for the rotating face and silicon carbide for the stationary face, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be Buna-N. The seal shall be commercially available and not a proprietary design of the manufacturer.

Testing:

The pump manufacturer shall perform the following inspections and tests:

1) A check of the motor voltage and frequency shall be made as shown on the nameplate.

2) A motor and cable insulation test for moisture content or insulation defects shall be
made per CSA criteria.

3) The pump shall be completely submerged and run to determine that the unit meets
three pre-determined hydraulic performance points. If certified testing is required, the manufacturer shall offer to perform tests in accordance with Grades B, E and U of Hydraulic Institute standards.

Control Panel: A wall-mounted control panel shall be supplied with each station. All control panels shall be UL Listed to meet Standard 508A. Each panel shall be constructed with a padlockable NEMA 4X non-metallic enclosure and utilize stainless steel hardware.

E. Acceptable Manufacturers: Acceptable grinder pump station manufacturer(s) are Crane Pumps & Systems Inc., Barnes, Gorman-Rupp, Grundfos, or pre-approved equal.

2.02 SEWER FORCE MAIN

A. Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784. PVC pipe shall be Schedule 80 and shall have a pressure rating of 400 psi at 73.4° F. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States.

B. Fittings: Injection molded PVC Schedule 80 fittings shall conform to ASTM D 2467 and shall have a pressure rating of 240 psi at 73.4° F. Pipe to fitting connections shall be slip-on socket and spigot connections with solvent welded joints. Solvent cement shall conform to ASTM D 2564 and shall be obtained from the PVC pipe manufacturer and installed per manufacturer's recommendations. PVC welding solvent shall be compounded to conform to the socket fit and the weather

conditions at the time of installation. Solvent welding shall be performed during weather conditions conforming to manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION OF SEWERLINE

A. Install PVC sewer line as indicated in the drawings.

3.02 INSTALLATION OF LIFT STATIONS

A. Install lift station per manufacturer's recommendations at the location shown in the drawings.

3.03 PRESSURE TESTING

Upon completion of sewer force main system, Contractor shall perform the following pressure testing:

a) Prior to testing, all air shall be expelled from the pipe. The force main shall be subjected to a
hydrostatic pressure of 150 psig for no less than 2 hours where joints are exposed and not less than 8 hours where joints are covered. Allowable leakage is 0.20 gallons per hour per 1,000 feet of pipe.

b) Pressure shall be measured at low points on section of pipelines. The Contractor shall furnish all gauges, meters, pumps, and other equipment and incidentals required for testing at no direct pay. Include costs in price bid for Sewerage System lump sum item.

c) Where leaks are visible at exposed joints and/or evident on the surface where joints are covered, the pipe shall be rejoined, and leakage repaired regardless of total leakage as shown by test.

d) Pipe and fittings which fail tests shall be repaired and re-tested as necessary until the test
requirements are met.

e) All pipe, fittings, and other materials found to be defective under the test shall be removed and replaced at the Contractor's expense.

3.04 MEASUREMENT AND PAYMENT

A. Lump sum item; no measurement will be paid. Payment will be the contract lump sum price for Sewage Lift Station & Force Main. Payment shall include lift station, control panel, accessories, PVC pressure sewer line, tie-in to existing lift station, valves, fittings, hardware, excavation, backfilling, limestone surface restoration, and all materials, labor, and incidentals required for a complete working system.

END OF SECTION

SECTION 40 05 07

PIPE HANGERS AND SUPPORTS

PART 1: GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals and install pipe hangers, supports, concrete inserts, and anchor bolts including all metallic hanging and supporting devices for supporting exposed piping.

1.02 QUALIFICATIONS

A. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for pipe supports shall be five (5) times the ultimate tensile strength of the material, assuming 10 feet of water filled pipe being supported.

B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification stating that such requirements have been complied with.

1.03 SUBMITTALS

A. Submit to the Engineer for approval, as provided in the General Conditions and Section 01 33 23, shop drawings of all items to be furnished under this section.

B. Submit to the Engineer, for approval, samples of all materials specified herein.

PART 2: PRODUCTS

2.01 GENERAL

A. All pipe and tubing shall be supported as required to prevent significant stresses in the pipe or tubing material, valves, and fittings and to support and secure the pipe in the intended position and alignment. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. All pipe supports shall be approved prior to installation.

B. All materials used in manufacturing hangers and supports shall be capable of meeting, the respective ASTM Standard Specifications with regard to tests and physical and chemical properties, and be in accordance with MSS SP-58.

C. The maximum unsupported span shall not exceed 5 feet unless otherwise specified herein.

D. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by Grinnell Co., Inc., Carpenter and Patterson, Inc., or equal. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance will be considered for approval.

2.02 PIPE HANGERS AND SUPPORTS FOR METAL PIPE

A. Suspended single pipes shall be supported by hangers suspended by steel rods from galvanized concrete inserts, beam clamps, or ceiling mounting bolts as follows:

1. Hangers:

Pipe Size, inches	Grinnell Fig. No.
Less than 1/2	138R
1/2 through 1	97C
1 through 4	104

2. Hanger rods shall be rolled steel machine threaded with load ratings conforming to ASTM Specifications and the strength of the rod shall be based on root diameter. Hanger rods shall have the following minimum diameters.

Pipe Size, inches	Min. Rod Diameter, in.
Less than 2-1/2	3/8

3. Concrete inserts for pipe hangers shall be, continuous metal inserts designed to be used in ceilings, walls or floors, spot insets for individual pipe hangers, or ceiling mounting bolts for individual pipe hangers and shall be as manufactured by Unistrut Corp., Wayne, Michigan; Carpenter and Patterson, Inc., Laconia, New Hampshire; Richmond or equal and shall be as follows:

a. Continuous concrete inserts shall be used where applicable and/or as shown on the Drawings and shall be used for hanger rod sizes up to and

including 3/4-inch diameter. Inserts to be used where supports are parallel to the main slab reinforcement shall be Series P3200 by Unistrut Corp., Fig 1480 Type 2 by Carpenter and Patterson, Inc. or equal. Inserts to be used where supports are perpendicular to the main slab reinforcement shall be Series P3300 by Unistrut Corp., Fig 1480 Type I by Carpenter and Patterson, Inc., or equal.

b. Spot concrete inserts shall be used where applicable and shall be used for hanger sizes up to and including 7/8-inch diameter.

4. All pipe hangers shall be capable of vertical adjustment under load and after erection. Turnbuckles, as required and where applied, shall be equal to Grinnel Fig. No. 230.

B. Wall or column supported pipes shall be supported by welded steel brackets equal to Grinnel Fig. 194, 195, and 199 as required, for pipe sizes up to and including 20-inch diameter. Additional wall bearing plates shall be provided where required.

1. Where the pipe is located above the bracket, the pipe shall be supported by an anchor chair and U-bolt assembly supported by the bracket for pipes 4-inches and larger or by a U-bolt for pipes smaller than 4-inches. Anchor chairs shall be equal to Carpenter & Patterson Fig. Fig. No. 127. U-bolts shall be equal to Grinnell Fig. 120 and 137.

2. Where the pipe is located below the bracket, the pipes shall be supported by pipe hangers suspended by steel rods from the bracket. Hangers and steel rods shall be as specified above.

3. Wall or column supported pipes 2-inches and smaller may be supported by hangers equal to Carpenter and Patterson Figures 74, 179, or 237 as required.

C. Floor supported pipes less than 3-inches shall be supported by fabricated steel supports as shown in the Drawings.

D. Vertical piping shall be supported as follows:

1. Where pipes change from horizontal to vertical, the pipes shall be supported on the horizontal runs within 2 feet of the change in direction by pipe supports as previously specified herein.

2. Where vertical piping passes through a steel floor sleeve, the pipe shall be supported by a friction type pipe clamp which is supported by the pipe sleeve. Pipe clamps shall be equal to Grinnell Fig. 262.

D. Anchor bolts and accessories shall be Type 316 stainless steel and shall be equal to Kwik-Bolt as manufactured by the McCullock Industries, Minneapolis, Minnesota or Wej-it manufactured by Wej-it Expansion Products, Inc., Bloomfield, Colorado.

E. All rods, hangers, inserts, brackets, and components shall be Type 316 stainless steel unless otherwise specified on the Drawings.

2.03 PIPE HANGERS AND SUPPORTS FOR PLASTIC PIPE

A. Single plastic pipes shall be supported by pipe supports as previously specified herein for metal pipe.

B. Multiple, suspended, horizontal plastic pipe runs, where possible, and rubber hose shall be supported by ladder type cable trays such as the Electray Ladder by Husky-Burndy, the Globetray by the Metal Products Division of United States Gypsum, or equal. Ladder shall be of Type 316 stainless steel construction. Rung spacing shall be approximately 18 inches for plastic pipe and 12 inches for rubber nose. Tray width shall be approximately 6-inch for single runs of rubber hose and 12 inches for double runs of rubber hose. Ladder type cable trays shall be furnished complete with all hanger rods, rod couplings, concrete inserts, hanger clips, etc. required for a complete support system. Individual plastic pipes shall be secured to the rungs of the cable tray by strap clamps or fasteners equal to Globe Model M-CAC, Husky-Burndy Model SCR or equal. Spacing between clamps shall not exceed 9 feet. The cable trays shall provide continuous support along the length of the pipe.

C. Individual clamps, hangers, and supports in contact plastic pipe shall provide firm support but not so firm as to prevent longitudinal movement due to thermal expansion and contraction.

2.04 SPECIAL SUPPORTS

A. The pipes shall be supported by means of a supporting framework suitably anchored into the floor or curbing. The vertical piping shall be suitably secured to horizontal support members connected at each end to vertical support members and spaced as required to provide a rigid installation.

1. The complete supporting system shall be as manufactured by the Unistrut Corporation, Globe-Strut as manufactured by the Metal Products Division of U.S. Gypsum, or equal.

2. Vertical and horizontal supporting members shall be U-shaped channels similar to Unistrut Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps equal to Unistrut Series P1100M and Series P2558. All components shall

be of Type 316 stainless steel.

3. The assemblies shall be furnished complete with all nuts, bolts, and fittings required for a complete assembly and shall be Type 316 stainless steel.

4. The design of each individual framing system shall be the responsibility of the Contractor. Shop Drawings shall be submitted and shall show all details of the installation including dimensions and types of supports.

PART 3: EXECUTION

3.01 INSTALLATION

A. All pipes, horizontal and vertical, shall be rigidly supported from the building structure by approved supports. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or specified herein. No piping shall be supported from other piping or from metal stairs, ladders, and walkways, unless it is so indicated on the Drawings, or specifically directed or authorized by the Engineer.

B. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement, and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces. Prior to installation, all pipe supports shall be approved by the Engineer.

C. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings, and sleeve type couplings and to minimize all pipe forces on pump housings. Pump housings shall not be utilized to support connecting pipes.

D. Pipe supports shall be provided as follows:

1. Supports for multiple PVC pipes shall be continuous wherever possible. Individually supported PVC pipes shall be supported as recommended by the manufacturer except that support spacing shall not exceed five (5) feet.

2. Support spacing for galvanized steel pipe and copper tubing shall not exceed five (5) feet.

3. All vertical pipes shall be supported at each floor or at intervals of at least 15 feet by approved pipe collars, clamps, brackets, or wall rests, and at all points necessary to insure rigid construction.

E. Pipe supports shall not result in point loadings but shall distribute pipe loads evenly along the pipe circumference.

F. Effects of thermal expansion and contraction of the pipe shall be accounted for in pipe support selection and installation.

G. Inserts for pipe hangers and supports shall be installed on forms before concrete is poured. Before setting these items, all Drawings and figures shall be checked which have a direct bearing on the pipe location. Responsibility for the proper location of pipe supports is included under this Section.

H. Continuous metal inserts shall be embedded flush with the concrete surface.

3.02 PRIME COATING

A. Prior to prime coating, all pipe hangers and supports shall be thoroughly clean, dry, and free from all mill-scale, rust, grease, dirt, paint, and other foreign substances to the satisfaction of the Engineer.

B. All submerged pipe supports shall be prime coated with Kop-Coat 654 Epoxy Primer or equal. All other pipe supports shall be prime coated with Rustinhibitive Primer No. 621 as manufactured by Koppers Company, Inc., Pittsburgh, Pa., or equal.

C. Finish coating shall be compatible with the prime coating.

END OF SECTION

SECTION 40 05 61

VALVES AND APPURTENANCES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to install, complete and ready for operation, all valves and appurtenances as shown on the drawings and as specified herein.

B. The equipment shall include, but not be limited to, the following:

1. Pressure Gauges
2. Quick Connect Couplings
3. Air Release Valves
4. Plug Valves
5. Gate Valves
6. Check Valves

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Excavation and backfill for pipe is included in Section 31 23 33.

B. Piping is included in Sections 33 05 19 and 33 05 31.16.

C. General Electrical is included in Division 26.

1.03 DESCRIPTION OF SYSTEMS

All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of wastewater.

1.04 QUALIFICATIONS

All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with standard practices and methods and shall comply with these specifications as applicable.

1.05 SUBMITTALS

A. Submit to the Engineer, within 30 days after execution of the contract, a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.

B. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer for approval in accordance with the requirements of Section 01340 and the General Conditions.

1.06 TOOLS

Special tools, if required for normal operation and maintenance, shall be supplied with the equipment.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Valves:

1. Gate Valves

a. Gate valves shall be double disc parallel seat, iron body, bronze mounted, side wedge type. They shall comply with AWWA C500 as latest revised.
b. Gate valves shall be rated at 200 psi water working pressure with 400 psi hydrostatic test for structural soundness for 2” through 12” and 150 psi water working pressure with 300 psi hydrostatic test for structural soundness in 20” size. Testing shall be conducted in accordance with AWWA C500.
c. End connections shall be in accordance with ANSI B 16.1 125# flange drilling and mechanical joints per AWWA C111 without accessories.
d. All ductile iron shall comply with ASTM A536 Gr. 65-45-12. Castings shall be clean and sound without defects. No plugging or welding of defects will be allowed.
e. Stems shall be manganese bronze having a minimum tensile strength of 60,000 psi and a minimum yield of 20,000 psi for 20” valve.
f. Bolts shall be electrozinc plated steel with ex heads and hex nuts in accordance with ASTM A307 and ASTM A563 respectively.
g. Gate valves shall be non-rising stem (NRS) meeting requirements of AWWA C500. Valves shall be furnished o-ring stem seals using 2 o-rings set in the seal plate.
h. Discs for valve sizes 2” through 4” shall be bronze; for sizes 6” and larger, they shall be cast iron bronze faced. Bronze facing shall be machine after insertion into disc face. Disc spreaders for valves 2” through 8” shall be bronze. Disc spreaders for valves 10” through 20”

shall be cast iron with bronze faced. Spreaders shall actuate from stem nut independent from valve body.

i. Direction to open shall be counter-clockwise unless otherwise specified.

j. The inside and outside of all valves, together with all working parts ecept bronze and machined faces, shall be coated in accordance with AWWA standards.

k. Marking shall be in accordance with AWWA C500 standards, to include name of manufacturer, year of manufacture, maximum working pressure and size of valve.

l. Valves must be of domestic United States of America.

2. Eccentric Plug Valves

a. Plug valves shall be solid one piece, cast of ASTM A536 ductile iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft. Plug shall not contact the seat prior to 90% closed. Plug facing shall be Chloroprene (CR), or other resilient facing suitable for the application.

b. Plugs shall be solid one piece, cast of ASTM A536 ductile iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft. Plug shall not contact the seat prior to 90% closed. Plug facing shall be Chloroprene (CR), or other resilient facing suitable for the application.

c. Seats shall be 1/8" thick welded overlay of not less than 95% pure nickel. Seat shall be at least 1/2” wide and raised. The raised surface shall be completely covered with nickel to insure that the resilient plug face contacts only the nickel seat.

d. Adjustable Packing shall be of the multiple V-ring type, with a packing gland follower. Shaft seals shall permit inspection, adjustment or complete replacement of packing without disturbing any part of the valve or actuator assembly except the packing gland follower.

e. Eccentric plug valves shall be 100% ported.

f. Eccentric plug valves and actuators shall meet or exceed the latest revisions of AWWA C517 and other applicable standards. Flanged ends shall be per ANSI B16.1 and mechanical joint ends per AWWA C111..

3. Check Valves

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.

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. Shop coat finish shall comply with Section 09900 of these specifications.
g. The valve shall be suitable for direct burial and shall have flanged or mechanical joint ends. Valves must be of domestic United States of America.

4. Actuators

a. Worm gear actuators shall be provided on all valves six inches and larger. Actuators shall be enclosed in a cast iron housing, with outboard seals to protect the bearings and other internal components. The actuator shaft and gear quadrant shall be supported on permanently lubricated bronze bearings.
b. Buried actuators shall be 90% grease filled. Input shaft and fasteners shall be stainless steel. Actuator mounting brackets shall be totally enclosed.

B. Pressure Gauges

Each pressure gauge shall be direct mounted, cast aluminum case, with a 4-1/2" diameter dial and furnished with a clear glass crystal window, 1/4" shut-off valve, and a bronze pressure snubber. Provide diaphragm seals between shut-off valve and pressure gauge on all lines. All gauges shall be weatherproofed. The face dial shall be white finished aluminum with jet black graduations and figures. The face dial shall indicate the units of pressure being measured (e.g., feet, inches, etc.) or be dual scale.

C. Quick Connect Couplings

Quick connect couplings shall consist of bronze female adapter with female threads complete with plug by same manufacturer. Coupling components shall be as manufactured by Ever-Tite Coupling Company, Inc., New York, New York, OPW Seal Fast Adapter as manufactured by OPW (Dover Corporation) or approved equal.

D. Air Release Valves

1. Sewage air and vacuum release valve to be a design with a conical shape body, and no contact between the fluid and sealing area. The valve body and spindle spring shall be a minimum 316 grade stainless steel, designed to facilitate disassembly for cleaning and maintenance. The float, valve seat and all working parts shall be of corrosion-resistant materials. Valves shall be equipped with the necessary attachments, including ball valve and cam-lock fitting to permit back flushing after installation without dismantling the valve.
2. The air release mechanism shall be a non-shock type by roll on seal that provides positive open and close operation with leak free sealing. The air and vacuum release valve working pressure range shall be 0 to 250 psi.
3. The air release shall be the following H- Tec or A.R.I. models or approved equal with size to be recommended by the manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.

B. After installation, all valves and appurtenances shall be tested at least one (1) hour at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.

3.02 SHOP PAINTING

Ferrous surfaces of valves and appurtenances shall be painted in accordance with Section 09900 unless specified elsewhere. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.03 INSPECTION AND TESTING

Completed pipe shall be subjected to hydrostatic pressure test for four (4) hours at full working pressure. All leaks shall be repaired and lines retested as approved by the Engineer.

END OF SECTION

SECTION 40 63 00

CONTROL SYSTEM EQUIPMENT (SCADA)

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section includes Supervisory Control and Data Acquisition (SCADA) systems required for the project.

B. Extent of SCADA work is indicated by drawings and schedules.

C. Included are the SCADA Panels, all associated controls and signal conduit and wiring, level sensors, interfacing with Peristaltic Pump Panels and controls, ammonia analyzers, chlorine analyzers, and related work and materials. The above list is not meant to be all-inclusive but rather to provide an overview of the project scope.

1.02 RELATED WORK

A. Section 26 29 15 Pump Control Panel
B. Section 40 70 00 Process Instrumentation and Controls

1.03 QUALITY ASSURANCE

A. Electric Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction, and the NEC.

1.03 NEMA COMPLIANCE

A. Standards Pub/No. LA1Surge Arresters

PART 2 – PRODUCTS

2.01 SCADA PANEL

A. Materials and Components:

Refer to Specification Section 40 70 00 and project drawings.

PART 3 – EXECUTION

3.01 INSTALLATION OF SCADA SYSTEMS

A. Install SCADA systems as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure compliance with requirements.

3.02 FIELD QUALITY CONTROL:

A. Upon completion of installation of SCADA systems, Contractor shall demonstrate the completed SCADA system and operation of all components.

END OF SECTION

SECTION 40 70 00

PROCESS INSTRUMENTATION AND CONTROLS

PART 1: GENERAL

1.01 SCOPE OF WORK

A. Furnish, install, and configure all instrumentation and controls hereinafter specified to perform the intended function. Work shall include all necessary materials, equipment, labor and services.

B. Auxiliary and accessory devices necessary for system operation or performance, such as transducers or relays to interface with existing equipment, or equipment provided under other sections of this specification, shall be included whether specified or not.

C. The Contractor's attention is directed to the fact that the Instrumentation and Control System shall be furnished by a single system supplier who shall provide all of the service, equipment and appurtenances required to achieve a fully integrated and operational system.

D. Substitution on functions or equipment specified will not be acceptable. In order to ensure the inter-changeability of parts, the maintenance of quality, the ease of interfacing between the various subsystems, and the establishment of minimums with regard to ranges and accuracy, strict compliance with the above requirements shall be maintained. In order to ensure compatibility between all equipment it shall be the responsibility of the system supplier hereunder to coordinate all interface requirements with mechanical and electrical system suppliers and furnish any signal isolation devices that might be required.

E. Equipment shall be fabricated, assembled, installed, and placed in proper operating condition in full conformity with detail drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer as approved by the Engineer.

1.02 RELATED WORK

A. Section 26 29 15 Pump Control Panel

B. Section 40 63 00 Control System Equipment (SCADA)

1.03 SUBMITTALS

A. Shop drawings shall be submitted in accordance with Section 01 33 23. They shall be complete; giving at least equipment specifications, details of connections, wiring, range and dimensions. Submittals consisting of only general sales literature will not be acceptable.

B. Submit detailed information for each instrument or control device, including manufacturer's descriptive literature and specific data sheet for each device and its configuration which shall include, as a minimum:

    1. Tag number per loop diagram.

    2. Product (item) name used herein and on the contract drawings.

    3. Manufacturer's complete model number.

    4. Location of the device.

    5. Input-output characteristics.

    6. Range, size and graduations.

    7. Physical size with dimensions, enclosure NEMA classification, and mounting details.

    8. Materials of construction for all components.

    9. Instrument of control device sizing calculations where applicable.

    10. Certified calibration data on metering pumps.

C. Submit a detailed loop diagram on a single 8 1/2 inch x 11 inch sheet for each monitoring point and control loop. The format shall be Instrument Society of America, standard for Instrument Loop Diagrams, ISA-S5.4. Each wire shall be shown with all terminations as part of the loop diagram. The loop diagrams shall use the same number as used herein.

D. The data sheet shall be provided with an index and proper identification and cross-referencing. There shall be separate volumes for field/panel and in-line equipment. The in-line equipment shall be coordinated with the piping work. The detailed loop diagrams shall accompany the field/panel instrument submittal. Each volume shall be submitted in its entirety. Partial submittals will be rejected.

E. Submit detailed drawings concerning control panels and/or enclosures, including:

    1. Cabinet assembly and layout drawings to scale.

    2. Fabrication and painting specification.

    3. Color selection samples for selection by the Engineer.

4. Point-to-point wiring diagrams depicting wiring within the panel as well as connections to external devices.

F. Exceptions to the specifications and drawings shall be clearly defined by the system supplier. Data shall contain sufficient details so a proper evaluation may be made by the Engineer.

G. Provide detailed elementary control diagrams for all control systems, Distributive Process Controllers (DPC), remote I/Os showing all control devices, interlocks, DPC inputs and outputs, in order to demonstrate compliance with the P&ID drawings.

H. Provide detailed interconnection diagrams between all control panels, instrument panels and field devices, DPC's and remote I/Os identifying all conduits, terminal blocks and wiring.

1.04 FINAL SYSTEM DOCUMENTATION

Prior to final acceptance of the system, operating and maintenance manuals covering instructions and maintenance of each type of equipment shall be furnished in accordance with the Specifications and as noted herein. The instructions shall be bound in three-ring binders, with drawings reduced or folded for inclusion and shall provide at least the following as a minimum:

1. A comprehensive index.

2. A complete "as constructed" set of approved shop drawings.

3. A complete list of the equipment supplied including serial numbers, ranges, and pertinent data.

4. Full specifications on each item.

5. System schematic drawings "as constructed" illustrating all components, piping and electrical connections of the system supplied under this section.

6. Detailed service maintenance and operation instructions for each item supplied.

7. Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.

8. The operating instructions shall also incorporate a functional description of the entire system, with references to the systems schematic drawings and instructions.

9. Complete parts lists with stock numbers and name, address and telephone number of the local supplier.

10. Service manuals and schematic diagrams to discrete component level.

11. Full annotated documentation on DCS Graphics and programming configuration hard copy and backup 3.5" diskette copy.

12. Full annotated documentation of DPC logic configuration including separate ladder logic diagram, hard copy.

1.05 QUALIFICATIONS

A. The system supplier shall be required to demonstrate a minimum of 5 years recent, past experience in the design, configuration, installation, and commissioning of instrumentation and control systems of comparable size, type and complexity to the proposed project. The system supplier shall be required to have its' own in-house capability to handle complete system engineering, fabrication and testing.

B. The system supplier shall have, in his employ, capable personnel for detail engineering, coordination, drafting, procurement and expediting, scheduling construction, testing, inspection, installation, start-up service for calibration and commissioning, and warranty compliance for the period specified.

C. If the system supplier is an authorized representative of one of the instrument and control system manufacturers listed above, rather than the manufacturer himself, the system supplier shall provide a certification from the manufacturer stating that the manufacturer shall assume full responsibilities for successful completion of the work specified under this section of the specification, including start-up, commissioning and full warranty, maintenance and services for one-year duration after system acceptance.

D. The SCADA system supplier shall be one of the following instrument and control system integrators or an approved alternate:
   • **Red Group**
   3850 N. Causeway Blvd, Ste. 1255
   Metairie, LA 70002
   (504) 729-5086
   https://www.red.group
   info@red.group

1.06 SOURCE QUALITY CONTROL

A. The manufacturers of the equipment and fabricators of panels and/or cabinets supplied under this section shall allow the Engineer and/or Owner to inspect and witness the testing of the equipment at the site of fabrication. Equipment shall include the cabinets, special control systems, flow measuring devices, and other pertinent systems and/or devices. A minimum of ten working days notification shall be provided to the Engineer prior to testing. No shipments shall be made without the Engineer's approval.

1.07 PRODUCT HANDLING

A. Shipping Precautions:

1. After completion of shop assembly, factory test and approval, all equipment, cabinets, panels and consoles shall be packed in protective crates and enclosed in heavy duty polyethylene envelopes of secured sheeting to provide complete protection from damage, dust and moisture. Dehumidifiers shall be placed inside the polyethylene coverings.

Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing, and handling at the job site.

2. Special instructions for proper field handling, storage and installation required by the manufacturer for proper protection, shall be securely attached to each piece of equipment prior to packaging and shipment.

B. Identification:

1. Each component shall be tagged to identify its location, tag number and function in the system. Identification shall be prominently displayed on the outside of the package.

2. A permanent stainless steel or other non-corrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number, shall be provided on each piece of equipment supplied under this section.

C. Storage:

1. Equipment shall not be stored outdoors. Equipment shall be stored in dry, permanent shelters, including in-line equipment and shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired by the Contractor at his own cost and expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the Contractor, or the apparatus shall be replaced by the Contractor at his own expense.

1.08 SPARE PARTS

A. Field and Panel Mounted Equipment:

1. One dozen indicating lights for each type of control and switch module.

2.One box of each different type and size of fuses.

B. Miscellaneous spare parts: One year's supply of items recommended by the

manufacturer of the equipment for each component.

C. The spares, listed above, shall be packed in a manner suitable for long-term storage and shall be adequately protected against corrosion, humidity and temperature.

PART 2 - PRODUCTS

2.01 INSTRUMENTATION - GENERAL

A. Type:

1. All instrumentation supplied shall be of the manufacturer's latest design and shall produce or be activated by signals which are established standards for the water and wastewater industries.

2. All electronic instrumentation shall be of the solid-state type and shall utilize linear transmission signals of 4-20mADC (milliampere direct current).

3. Outputs of equipment that are not of the standard signals as outlined shall have the output immediately raised and/or converted to compatible standard signals for remote transmission. No zero based signals will be allowed.

4. All instruments shall be provided with mounting hardware and floor stands, wall brackets, or instrument racks as shown on the drawings or as required.

5. All transmitters shall be provided with integral indicators in process units, accurate to 2%.

6. Electronic equipment shall be of the manufacturer's latest design, utilizing printed circuitry and suitably coated to prevent contamination by dust, moisture, and fungus. Solid-state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and 0, 10, 100% relative humidity. The field-mounted equipment and system components shall be designed for installation in dusty, humid and slightly corrosive service conditions.

7. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single manufacturer to the extent possible and shall consist of equipment models which are currently in production. All equipment provided shall be of modular construction and shall be capable of field expansion.

2.02 DISTRIBUTIVE CONTROL SYSTEM (DCS)

A. General:

1. The system shall utilize one (1) new SCADA/RTU unit, as supplied by RED Group (504) 729-5086. The RTU unit shall be capable of sending all information remotely to the Owner's office(s).

2. The system shall allow for future addition of DPCs/Remote Telemetry Unit (RTU) to the data communications network and has an interface from the data communications network for supervisory control in the general plant main control room.

B. Preferred System Characteristics - Distributive Process Controllers/RTU:

1. General

The DPC/RTU shall be a solid state, microprocessor based, digital device; using a real-time clock, programmable memory capable of performing continuous process control and monitoring and with the capability of handling analog input, output and discrete I/O.

The DPC shall interface to the existing Bristol BSAP redundant data communications network and shall be able to request and send data to any point in the entire plant system.

By design, the DPC shall be capable of operating in an industrial environment without special requirements for heating, cooling and electrical filtering. The PLC shall be designed to operate in an ambient temperature range of 0-60 degrees C and in an environment with humidity ranging from 0-95% (non-condensing).

Construction shall be modular to allow for each maintenance, serviceability and expansion; shall be designed for surface mounting within a cabinet or panel.

The DPCs' major components shall be: Processor (CPU), power supply, I/O sections, chassis and interfaces.

2. Processor:

The CPU shall be a solid state microprocessor based unit. It shall have a memory sized to perform all required functions with 50% spare. The CPU shall have self-diagnostic functions with appropriate built-in annunciation. It shall process data and instructions at a speed that shall allow for sufficient monitoring of the system. Necessary I/O capacity, timer functions, and PID instructions shall be included. The CPU shall also accommodate a time of day clock/ calendar and any other features necessary for control as specified elsewhere herein.

Internal memory shall consist of the RAM with battery back-up to provide no loss of memory without normal power for a period of six months.

The processor shall directly accept relay ladder logic diagram symbols and shall output memory and program contents to the supervisory device.

3. Power Supply

The power supplies shall be modular and shall not be integral with the processor. They shall supply sufficient power for all items on the main chassis plus spare power sufficient for support of devices in all spare slots. The supplies shall be fused and shall include power-on lights. They shall be designed for operation on 120 volts, 60 Hertz and shall have internal line filtering for removal of line noise and transient voltages.

4. I/O Sections

a. Discrete I/O:

The modules shall be inter- changeable without de-energizing power to section or field wiring. Modules shall be identified by voltage level, input or output and isolated or non-isolated contacts. All modules used with external control power shall be an isolated type module using external relay only when load of device is greater than allowed by the manufacturer's recommendation. All circuits shall be protected against field wiring transients by fuses. Indicators shall be provided on each module showing that status of I/O.

The amount of the I/O points shall be that required for a complete operating system as shown on the P&ID drawings, instrumentation drawings and specified herein. An additional minimum of 15% spare I/O points shall be included in the total. Sixteen (16) point modules shall be the maximum size module utilized, unless approved by the Engineer.

b. Analog I/O:

The modules shall be intelligent microprocessor based, with the capability of converting analog 4-20mADC signals into 12 bit binary words or vice versa, and shall update all signals a minimum of twice per second. All inputs shall be stored in a buffer memory integral with the module. All output shall be adjustable to provide calibration to full scale output for each channel. All channels shall be isolated.

The amount of channels shall be what is required for a complete operating system as shown on the P&ID drawings, instrumentation drawings and as specified herein. An additional minimum of 5% spare channels shall be included at each chassis location. An eight point module shall be the maximum size module utilized, unless approved by the Engineer.

c. Chassis:

The chassis shall accommodate all modules specified herein and shall have a minimum back-plane current rating sufficient for the associated power module used. Chassis shall be sized to allow for natural cooling and working space when installed in a cabinet or panel. The chassis shall have the appropriate hardware to be surface mounted.

d. Interfaces:

Each programmable controller shall have a modular interface capable of linking the DPC with the existing BSAP redundant data highway.

Each remote I/O location shall include an interface linking it with the other DPC locations.

The DPC shall provide interface with the data communications highway which enables the central computer to work on a supervisory level, monitoring, modifying, and logging the entire system.

These interfaces shall be designed to alleviate any mismanagement of data in the network. They shall include network diagnostics and allow communications to continue if one unit fails. The interfaces shall transmit and receive all data necessary for operation of the system.

C. Programming

Any changes or additions deemed necessary, to accommodate specific requirements of the equipment being furnished or deemed necessary to provide a functional system, which will meet the intent of these specifications and the contract drawings, shall be included in the programming of the DPC. Operating programming shall be as described on P&ID drawings, and as described in sub-section 2.04, paragraph G of this specification for turbidity sampling, residual chlorine, and organics spill monitoring.

2.03 FIELD INSTRUMENTS

Field instrumentation and parameters requiring SCADA communication signals include the following:

A. Monitoring of Water Well

1. Flow Rate

a. Flow rate measured by new electromagnetic flow meter downstream of Diversified well pump.

2. Well Pump – Electrical Parameters

a. Pump Power Failure
b. Power Return/Restoration
c. Voltage and Amperage of Pump Motor
d. Pump Motor Failure

3. Elevated Storage Tank Water Level Sensor

a. Water Level (feet above ground)

4. Elevated Storage Tank Pressure Sensor

a. Low Pressure (50 PSIG)
b. High Pressure (65 PSIG)
c. Air Compressor, hydro-pneumatic tanks (not used)

5. Water Quality Monitors (See Sections 40 75 21 and 40 75 53)
- Two (2) new chlorine analyzers.
- One (1) new turbidity analyzer.

a. At POE

1) pH
2) Free Chlorine
3) Total Chlorine
4) Turbidity
5) Water Temperature
6) Ammonia (not used)

b. Prior to Entering Tank

1) Free Chlorine
2) Total Chlorine
3) Turbidity
4) Ammonia (not used)

B. Monitoring of Chlorine and Chemical Storage

1. Chemical Metering Pumps

a. Power Failure
b. Power Return/Restoration
c. Pump Failure
d. Feed Rate (flow proportional vs. steady feed)

2. Chemical Storage Tanks

a. Monitoring of tanks

1) Bulk tanks (Qty. 1 – Chlorine)
2) Day tanks (Qty. 3 – Chlorine, Potassium Permanganate, Polymer)

b. Tank levels

1) Ultrasonic level meters for three (3) new chemical storage day tanks
2) Ultrasonic level meter for one (1) new chlorine bulk storage tank
3) Low level alerts for all tanks

c. Temperature and climate control in Chemical Storage Room

1) A/C controls
2) A/C failure
3) Chlorine Gas Leak Monitor (Armstrong AMC-1400)
4) Chemical Gas Leak Monitor (Armstrong AMC-1400)

C. Monitoring of Pressure Filters

1. New Pressure Filter System (4 filter tanks) including PLC controllers.

D. Monitoring of Stand-by Generator

1. Generator On/Off

2. Voltage and Amperage

a. Output to well pump(s) and chlorine storage
b. Battery for engine

3. Fuel monitoring

a. Pressure for natural gas power generators

4. Engine Parameters

a. Run-time
b. Life of engine fluids (i.e. oil, coolant, etc.)
c. Engine temperature

5. Generator failure

E. Monitoring of Distribution System (Not Used for this Project)

1. Water quality parameters required by the Nitrification Plan

2. Pressure

   a. High water pressure alerts
   b. Low water pressure alerts

3. Chlorine residual

   a. Free and total chlorine
   b. High chlorine residual levels
   c. Low chlorine residual levels

D. Flushing Stations

2.04 OPERATING PROGRAMMING - CHEMICAL FEED

A. General Scope of Chemical Feed Software

The general scope of the chemical feed software is provided in Section 46 33 44, 1.3. Specific software (graphics) functionality will be finalized by the Owner and the Contractor.

B. Chemical Dosage

All dosage sets points shall be entered by system operators in mg/L and displayed in both mg/L and lbs. /day on the screen along with the time and date that the current dosage set point was entered. Chemical feeder/pump set points shall be determined by the dosage set point and plant raw water flow.

C. Operation

The chemical feed systems shall be capable of and be programmed to perform the following functions:

1. Provide the home office the tank(s) liquid level(s), with a high and low level alarm being sent at preset liquid levels.
2. Provide the home office with flow meter data
3. Provide the home office with a decimal feed pump failure alarm
4. Provide the home office with free chlorine, total chlorine, and turbidity readings.
5. Base the chemical feed pumps discharge rates from the flow meter data
6. The system shall be capable of the home office adjusting dosage rates from the chemical feed pumps remotely

3.0 PART 3 – EXECUTION

3.01 GENERAL INSTALLATION

A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's instructions. The locations of equipment, transmitters, alarms and similar devices shown on the drawings are approximate only. Exact locations shall be as approved by the Engineer during construction.

Obtain in the field all information relevant to the placing of process control work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.

B. The instrumentation loop diagrams indicate the intent of the interconnections between the individual instruments. Any exceptions should be noted.

C. Where specific installation details are not specified or shown on the drawings, the "American Petroleum Institute (API) Recommended Practice 550" shall be followed, as applicable.

D. All work shall be executed in full accordance with codes and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, the Contractor shall bare full responsibility for such violations and assume all costs arising therefrom.

E. All equipment used in areas designated as hazardous shall be designed for the Class, Group, and Division as required on the electrical drawings for the locations. All installations shall be in strict accordance with codes.

F. Unless specifically shown in the Contract Documents, direct reading or electrical transmitting instrumentation shall not be mounted on process piping. Instrumentation shall be mounted on instrument racks or stands. For slurries, chemical or corrosive fluids, diaphragm seals with flushing connections shall be provided.

G. Brackets and hangers required for mounting of equipment shall be provided. They shall be installed in a workmanlike manner and not interfere with any other equipment.

H. The Contractor shall require the system supplier to investigate each space in the building through which equipment must pass to reach its final location. If necessary, the Contractor shall require the system supplier to also investigate and make any field modifications to the allocated space for each cabinet, enclosure and panel to assure proper space and access (front, rear, side).

I. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded at the instrument panel, in no case shall

more than one ground point be employed for each shield.

J. Lifting rings from cabinets/assemblies shall be removed. Hole plugs shall be provided for the holes of the same color as the cabinet.

K. The Contractor shall require the system supplier to coordinate the installation, the placing and location of the system components, their connections to the process equipment panels, cabinets and devices; subject to the Engineer's approval. He shall be responsible to ensure that all field wiring for power and signal circuits are correctly done in accordance with "best industry practice" and provide for all necessary system grounding to ensure a satisfactory functioning installation. The Contractor hereunder shall schedule and coordinate his work under this section with that of the electrical work specified under applicable sections of Division 16.

3.02 TESTING AND START-UP

A. After installation of equipment, Contractor's Chemical feed equipment installer and Utility Company Operators shall meet on site for equipment testing and start-up. Equipment testing and start-up shall include the following:

1. Run chemical feed pumps and verify proper operation.
2. Calibrate and adjust chemical feed rates to establish optimum concentration.
3. Test SCADA signals and verify controls.
4. Adjust SCADA signals and controls as required.

B. The Contractor shall furnish the services of the system supplier's servicemen, all special tools, calibrations equipment and labor to perform the tests. Certified copies of the tests shall be furnished in duplicate to the Engineer.

C. Following installation, check-out the final adjustment of all panels, instruments, meters, monitoring and control devices, a performance check shall be made on each. Meters shall be tested at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of scale as required. All status and alarm switches, as well as, all monitoring and control functions shall also be checked. Each device on the Loop Diagrams/Instrument Tabulation must be signed-off by the Engineer as being acceptable. Testing shall be done from the signal source to the final element or device including all field wiring.

D. If during running of the tests, one or more points appear to be out by more than the specified amount, the system supplier's servicemen shall make such adjustments or alterations as are necessary to bring equipment up to the specification performance. Following such adjustment, the tests shall be repeated for all specified points to ensure compliance.

3.03 INSTRUCTION

A. The Contractor shall furnish a system supplier's representative for a field training program to be run at the Owner's plant site and consist of up to one (1) week instruction for four (4) of the Owner's personnel.

The program shall cover: instrumentation and Distributive Process Controller (DPC) debugging, troubleshooting, calibration and maintenance procedures and system operation. This training program will be held at a time chosen by the Owner and will be exclusive to any instructions given at the time of system start-up.

3.04 WIRING PRACTICES

A. Cables or wires shall not be supported by their connections or terminations.

B. Cables or wires shall not be run across hinges of doors or panels at 90 degree angles to the hinge.

C. All cables and wires shall be protected from abrasion, multiple flexing at any one spot and accidental snagging during maintenance.

D. All cables and connectors shall be labeled. The connector on the cable end and the receptacle which the cable fits into shall be labeled in a way which clearly identifies the proper cable and receptacle connection.

E. All cable and wire terminations shall be through an industry standard interface which allows proper termination of ground shield wires to the equipment frame and ground. Shield wires shall be terminated at one end only to prevent ground loops.

END OF SECTION

SECTION 40 75 21

CHLORINE ANALYZERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

On-line Chlorine Analyzers shall be provided to continuously measure Total and Free Chlorine Residual and pH as directed by the Engineer or Owner at each site. Each Chlorine Monitor shall consist of a direct measuring chlorine sensor, a clear constant-head flowcell, a pH probe, 25 feet of sensor interconnect cable with quick disconnect plug, and an electronic monitor housed in a NEMA 4X enclosure or approved equal suitable for wall, pipe, or panel mounting.

1.02 RELATED WORK

A. Section 40 70 00 Instrumentation for Process Systems

B. Section 40 63 00 Control System Equipment

1.03 SUBMITTALS

A. The Contractor shall submit for approval, as provided in the General Conditions, product data and detailed shop drawings of the chlorine analyzer system.

PART 2 - PRODUCTS

2.01 CHLORINE ANALYZER

A. The chlorine sensor shall be a direct measuring polarographic sensor utilizing a special polymeric membrane to isolate the sensing electrode from the sample and eliminate the potential for electrode contamination. The membrane shall allow chlorine to diffuse into the sensor where it shall react with the sensing electrode, generating a signal that is linearly proportional to chlorine concentration. The sensor assembly shall also contain a precision RTD temperature sensor to continuously measure sample temperature to allow temperature compensation of the measured chlorine value. The chlorine sensor shall be constructed with a quick disconnect receptacle to allow easy sensor servicing or exchange. Chlorine sensors shall be supplied complete with at least 10 spare membranes, electrolyte, and a spare parts kit that

includes all o-rings and special hardware.

B. The flowcell assembly supplied with the monitor shall be constructed of clear material allowing the conditions of the sensor membrane to be inspected without removal of the sensor. The sensor shall slide easily into the side of the flowcell, with a double o-ring seal to prevent water leakage. Flow t the sensor shall be regulated automatically through a constant-head overflow arrangement. Hose barbs for sample inlet (1/4" I.D. tubing) and drain (1/2" I.D. tubing) shall be supplied as part of the flowcell.

C. The instrument shall be powered by either 90-260 VAC single-phase line power, or 12-24 VDC. Either version of the monitor shall provide two isolated 4-20 mA outputs configurable for chlorine, pH temperature, or PID control. Analog outputs shall be both ground isolated and isolated from each other. Both versions shall also contain three SPDT relays.

D. The chlorine monitor electronic assembly shall provide a variety of functions as follows:

1. Provide user selectable display of PPM chlorine, process temperature, or PID % output on the main display. Main display variable shall be indicated with a minimum character height of 0.75" to allow easy readability up to 20 feet away.

2. Allow selection of operating ranges of 0-200 PPB, 0-2 PPM, or 0-200 PPM. Display ranges shall be configurable by operators, or the monitor may be configured for Auto-Ranging. The auto-ranging function shall automatically switch to the display range that provides the best resolution for any given operating level.

3. Provide the ability to use the 4-20 mA output for PID control. Proportional, Integral, and Derivative functions shall be user adjustable, and also provide for output hold when needed.

4. Provide two isolated 4-20 mA outputs, with output spans programmable by the user for any segment of s display range.

5. Provide output hold and output simulate functions to allow for testing or remote receiving devices or to allow maintenance without disturbing control systems.

6. Provide three 6-amp SPDT relay outputs in standard unit. Software settings for relay control include setpoint, deadband, phase, delay, and failsafe. Provide an optional 3-relay card, for 0-30 V signals, to bring the total to 6 relays. Relays shall be programmable for either control or alarm function, or relays may be assigned to diagnostic functions for use in indicating trouble conditions at a remote location.

7. Provide option for digital communications. These options shall include Profibus-DP, Modbus, or Ethernet.

8. Diagnostic functions shall be incorporated into the transmitter. The 4-20 mA output shall be capable of being assigned to safely rise to 20 mA, fall to 4 mA, or be left alone, during diagnostic failures. Diagnostic error messages shall be displayed in clear language; no confusing error codes shall be displayed.

E. The complete chlorine monitor shall be supplied with spare parts and accessories for up to 2 years of operation. A minimum of 10 replacement membranes shall be supplied for the sensor.

F. The complete Chlorine Monitors shall be the following:

Free Chlorine Monitor: Series Q46H/62 (free chlorine) as manufactured by Analytical Technology, Inc. or approved equal.

Total Chlorine Monitor: Series Q46H/79PR as manufactured by Analytical Technology, Inc. or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF CHLORINE ANALYZER

A. Contractor is required to install chlorine analyzer, display panel, sampling lines, and all ancillary equipment necessary. The contractor shall wire the unit for electrical, control, and SCADA panels, as necessary to provide a complete operational system. The chlorine analyzer shall be installed such that the sample location is taken post-chlorination and prior to storage or distribution. The sampling lines shall be 1/4” I.D. from the sampling point to the analyzer unit.

B. The chlorine analyzer shall be installed at the location shown on the drawings.

C. The chlorine analyzer shall be installed and mounted in accordance with the manufacturer’s recommendations.

3.02 TESTING

A. After installation, Contractor is responsible for start-up and testing of the chlorine analyzer equipment.

END OF SECTION

SECTION 40 75 53

TURBIDITY ANALYZERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

One (1) Turbidity Monitor shall be supplied for continuous monitoring of turbidity in the filter building effluent line. The turbidity monitoring system shall consist of an electronic monitor, sensor and accessories listed below. The unit shall include a flow sensor with flow cell assembly since turbidity in the finished water is expected to be less than 2.0 NTU.

1.02 RELATED WORK

A. Section 40 70 00 Instrumentation for Process Systems

B. Section 40 63 00 Control System Equipment

1.03 SUBMITTALS

A. The Contractor shall submit for approval, as provided in the General Conditions, product data and detailed working drawings of the turbidity analyzer system.

PART 2 - PRODUCTS

2.01 TURBIDITY SENSOR

A. The turbidity sensor shall employ an incandescent light source producing a white light beam, and located behind an optical lens focused into the process at a 45° angle with a photo receiver also focused at 45°. The light is then scattered at a 90° angle by the particles. Sensors shall be available for direct immersion, in-line flow applications or self-cleaning. Sensor shall be made of Delrin and have clear Acrylic optical windows. Sensor light source shall comply with EPA Method 180.1.

B. The turbidity monitoring system shall be designed for the continuous measurement of turbidity in water. It is intended for continuous monitoring of potable water filter outlets, for raw water inlets, or for turbidity monitoring of

wastewater effluent.

C. The full-scale operating range of the system 0-400 NTU. Actual display range is user programmable for 0-2, 0-20, 0-200 or 0-400 NTU, and the system can also be programmed to display in units of PSL for applications where polystyrene latex spheres are the standard of measurement.

D. For alarm purposes, monitors shall contain three SPDT relays. Relay functions shall be programmable for control, alarm, or fail functions, and may be designed for either normal or failsafe operation. For monitors supplied with only 2 analog outputs, monitors shall have the option of an additional 3 low-power relays to allow for additional external alarm functions.

E. The turbidity monitor electronic assembly shall provide a variety of functions as follows:

1. Provide user selectable display turbidity in NTU's (Nephelometric Turbidity Units) in a range up to 400, process temperature, or PID % output on the main display. Main display variable shall be indicated with a minimum character height of 0.75" to allow easy readability up to 20 feet away.

2. Allow selection of operating ranges of 0-2.000, 0-20.00, 0-200.0 or 0-400.0 PPM. Display ranges shall be configurable by operators.

3. The monitor shall provide sensor diagnostic functions to warn of conditions that cause inaccurate or invalid readings and to continuously monitor for optical fouling of the sensor, displaying an alarm message when the sensor requires cleaning.

4. Provide the ability to use the 4-20 mA output for PID control. Proportional, Integral, and Derivative functions shall be user adjustable, and also provide for output hold when needed.

5. Provide two isolated 4-20 mA outputs, with output spans programmable by the user for any segment of a display range.

6. Provide output hold and output simulate functions to allow for testing or remote receiving devices or to allow maintenance without disturbing control systems.

7. Provide three 6-amp SPDT relay outputs in standard unit. Software settings for relay control include setpoint, deadband, phase, delay, and failsafe. Provide an optional 3-relay card, for 0-30 V signals, to bring the total to 6 relays. Relays shall be programmable for either control or alarm function, or relays may be assigned to diagnostic functions for use in indicating trouble conditions at a remote location.

8. Provide option for digital communications. These options shall include Profibus-DP, Modbus-RTU, or Ethernet-IP.

9. Diagnostic functions shall be incorporated into the transmitter. The 4-20 mA output shall be capable of being assigned to safely rise to 20 mA, fall to 4 mA, or be left alone, during diagnostic failures. Diagnostic error messages shall be displayed in clear language; no confusing error codes shall be displayed.

F. The complete Turbidity Monitor shall be Series Q46/76 as manufactured by Analytical Technology, Inc., TU5400 Series as manufactured by HACH, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF AMMONIA ANALYZER

A. Contractor is required to install turbidity analyzer, display panel, sampling lines, and all ancillary equipment necessary. Contractor shall wire the unit for electrical, control, and SCADA panels, as necessary to provide a complete operational system. The turbidity analyzer shall be installed such that the sample location is taken post-chlorination and prior to storage or distribution. The sampling lines from the sampling point to the analyzer unit shall be sized as recommended by the manufacturer.

B. The turbidity analyzer shall be installed at the location shown on the drawings.

C. The turbidity analyzer shall be installed and mounted in accordance with the manufacturer’s recommendations.

3.02 TESTING

A. After installation, Contractor is responsible for start-up and testing of the turbidity analyzer equipment.

END OF SECTION

SECTION 41 22 13

MONORAIL HOISTS

PART 1 - GENERAL

1.01 SUMMARY

A. The work required under this section shall include the designing, manufacturing, shipping, installing and field testing of a monorail hoist with one electric wire rope trolley hoist.

B. On-site training of operators will be provided by the manufacturer. This will include but not necessarily be limited to techniques of safe operation, daily and monthly inspections, minor troubleshooting.

C. Related Sections:
1. Structural Steel
2. Special Coatings
3. Electrical Requirements
4. Basic Electrical Materials and Methods

1.02 REFERENCES

A. Crane Manufacturers Association of America (CMAA)
1. Specification No. 74 for Top Running & Under Running Single Girder Electric Overhead Traveling Cranes.

B. American National Standard (ANSI)
1. ANSI B-30.16 Overhead Hoists

C. Occupational Safety and Health Administration (OSHA)
1. Par. 1910.179 Overhead & Gantry Cranes

D. Hoist Manufacturers Institute (HMI)

E. National Electric Code (NEC)
1. NEC (Latest Edition Article 610 Cranes and Hoists)

F. American Institute of Steel Construction (AISC)
1. Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings

G. American Society for Testing and Materials (ASTM)
1. A36/A36M - Specification for Carbon Structural Steel

H. American Welding Society (AWS)
1. D1.1 - Structural Welding Code - Steel
2. D14.1 - Overhead Cranes

1.03 OPERATING SPECIFICATIONS

Capacity:	(3) tons
Duty Class:	CMAA Class ( ) [A, B, C or D]
Span:	(60)'-(0)”
Steel:	AISC Hot Rolled Steel Beams, A-992.
Bridge Girder Deflection:	L/888
End Trucks:	Dual drive with fixed axles. Motors shall include AC magnetic disc brakes per CMAA requirements. Wheelbase-to-span ratio shall not exceed 7:1.
Hoist:	Electric wire rope hoist.
Lift:	(15)'-0 above the operating floor with two wraps remaining on drum at lowest hook position.
Trolley:	Motor driven with two drive wheels and brakes per CMAA requirements.
Speeds:	Bridge Not Used Hoist 20 fpm, two speed control Trolley Not Used
Voltage:	460 v 3 Ph 60 Hz, 115 volt control.
Bumpers:	Rubber bumpers on end trucks and trolley per CMAA requirements.
Enclosures:	NEMA 4, Minimum.

1.04 SUBMITTALS

A. Shop Drawings
1. Submit for approval, Shop Drawings showing complete details,

dimensions, field coordinates and bills of material for fabrication and erection. Drawings shall include a “Wet Stamp” by a Professional Engineer, duly licensed in the State of ( ).

2. Include member sizes, model numbers, specifications, reactions and complete shop and field notes such as welding symbols, paint requirements, bolt sizes, etc.
3. Submit complete calculations for member sizes, horsepowers, design criteria and seismic calculations stamped as per (1.) above.

B. Product Data
   1. Provide information on all components, sub-assemblies, control systems, mechanical features, etc. relating to the equipment supplied under this specification.
   2. Include brochures, catalog cuts, parts breakdowns, operation and maintenance manuals, clearance diagrams, dimensional data (not supplied in the shop drawings) and any other data necessary for the engineer to determine compliance with specifications.

C. Wiring Diagrams
   1. Provide complete, integrated wiring diagrams for all the equipment provided under this specification on crane supplier’s letterhead. Catalog cuts will not be acceptable.

1.05 QUALITY ASSURANCE

A. Crane suppliers shall have documented experience of ten (10) years, having successfully designed and built installations of similar scope.

B. Crane suppliers shall be responsible for providing equipment of highest quality and workmanship which will perform specific functions reliably and safely and allow required maintenance procedures with a minimum amount of interference to operation of the equipment.

C. A copy of the crane supplier’s Quality Assurance Plan shall be made available to customer for review prior to award.

D. Equipment not meeting all requirements of this specification will be replaced with compliant components at no additional cost to the owner.

1.06 DELIVERY, STORAGE AND HANDLING

A. Unloading and storage of crane shall be under the direct supervision of manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. All major components shall be manufactured in the USA and complete repair parts shall be stocked locally by the crane supplier. All controls shall be interchangeable as much possible.

B. Hoists, trolleys, bridge end trucks, drives and controls shall all be from only one suppler and shall meet the requirements of this specification.

2.02 RUNWAY ELECTRIFICATION

A. The runway conductors shall be Figure-8, rolled galvanized steel bar. The minimum capacity of the conductor bar shall be 110 amp or larger to carry the necessary ampere load without undue heating.

B. A four conductor configuration shall be provided with all brackets, hangers, splice covers, power feeds, expansion gap assemblies and collectors as required by manufacturer.

C. When Variable Frequency Drives are provided, tandem collector shoes shall be provided.

2.03 RUNWAY BEAMS and RAILS

A. Runway beams shall be designed to meet the requirements of AISC. Beams, bracing, end stops, and electrification brackets shall be supplied by the crane manufacturer.

B. Beam sizes, connection details, bracing, etc., shall be clearly shown on the stamped design drawings submitted by the crane supplier. The top flange of the runway beams will be braced to the building structure at each support point

C. Rails shall be ASCE rails, sized according to the crane wheel loads. Rails, splice bars and bolts shall be supplied by the crane supplier.

D. The runway rails shall be attached to the runway beams using hook bolts, rail clips or clamps, as determined by the crane supplier.

2.06 GE CRANE

A. Crane Girder
   1. Girders shall be designed to resist all vertical, horizontal and

torsional forces.

2. Bridge girders shall be new, ASTM A992 Hot Rolled structural steel shapes or welded box girders designed to meet the requirements of CMAA.

B. End trucks

1. End trucks shall be constructed of structural steel tubes, providing a rigid structure. Design shall allow easy wheel removal and exchange.
2. End trucks shall be fitted with shock absorbing bumpers.
3. Crane wheels shall be high strength ductile iron, machined with double flanges and straight treads, flame hardened to 300 Bn. Wheels shall be sized to meet the minimum allowable wheel loads per CMAA. The wheel axle assembly shall rotate on dual high quality anti-friction, lifetime lubricated bearings having a minimum life of 5,000 hours.
4. The end truck to girder connection shall be bolted for easy removal of end truck. Bridge girder shall be coped to provide the highest possible positioning of the runway beams.

C. Bridge and Trolley Drives

1. Bridge drives shall employ fixed rotating axles with totally enclosed motors. Trolleys shall employ two drive wheels.
2. Motors shall be TENV, Class F insulated with a temperature activated switch in the windings, 30 minute rated, 1800 RPM.
3. The gear reducers shall be fully enclosed with oil bath for gears.

2.07 ROPE HOIST

A. Motor and Braking System

1. Motor shall develop sufficient power to lift the rated load at the specified speed. Motors shall be TENV, Class F insulated with a temperature activated switch, 30 minute rated, 1800 RPM. Hoist motor shall not be placed inside of hoist drum.
2. Hoist shall have a DC rectified disc type motor brake. Brake material shall not contain asbestos.

B. Gearing

1. Gearing shall be helical, heat treated alloy steel and shall operate in an oil bath.

C. Drum and Rope

1. Rope drum shall be welded construction, deep grooved and precision machined to give maximum rope life. Drum shall be supported at each end by sealed anti-friction bearings.
2. Hoisting rope shall be of a proper design and construction for hoist service. The rated capacity load divided by the number of parts of rope shall not exceed 20% of the breaking strength of the rope.

3. uble wrapping of the rope shall not be permitted. A drum rope guide shall be provided. A minimum of two wraps shall remain on the drum with the hook in the lowest position.
4. ck shall have a totally enclosed housing fabricated of steel. The rope sheaves shall be supported on an anti-friction thrust bearing. Hook shall be a single barbed type hook and shall be equipped with a heavy spring safety latch.
5. shall be equipped with upper and lower limit switches as well as a redundant block operated upper limit switch. The switches shall be adjustable to set the extreme upper and lower limits of hook travel.
6. shall be equipped with an overload device to prevent lifting loads in excess of 125%.

2.08 GE ELECTRIFICATION AND CONTROLS

A. Certification
1. To supply the electrical power across the crane for bridge, trolley and hoist motions, a flat cable festoon system shall be utilized. The flat cable shall be extra flexible with color coded wires according to NEMA standards. Wire shall be stranded copper per CMAA.
2. The trolleys that carry the flat cable shall have steel wheels with sealed ball bearings. The c-track that the trolley operates in shall be a minimum of 14 gage galvanized metal.
3. Flat cable connectors shall be heat shrinkable, corrosion resistant and flame retardant

B.
1. Bridge, trolley and hoist controls shall be mounted in NEMA 4 enclosures.
2. Magnetic mainline contactor, controlled by momentary on/off switches on the pushbutton shall be included.
3. Control transformer shall be provided with separate and isolated primary and secondary winding, all copper wound. Control voltage shall not exceed 120 volts.
4. Functions shall be controlled by magnetic contactor.
5. bridge and trolley functions shall be controlled by separate variable frequency drives.
6. Controls shall be sized to meet ambient temperatures. A cooling system will be provided for each enclosure when the ambient temperature exceeds the maximum allowable operating temperature of the individual electrical components.

C. Pendant Station
1. NEMA 4, pendant station will be provided with a separate pushbutton for each direction. A red mushroom head “off “switch and a separate “on” switch shall be supplied. Operators shall be two-speed.
2. Enclosures shall have durable, clearly marked legend plates, guards to protect switches from damage or accidental actuation and shall allow

for right or left hand operation. Arrangement shall be as used on other existing cranes in the facility.

2.09 COATING

A. Structural steel shall be cleaned of rust and mill scale with a minimum SSPC-6 “commercial blast” cleaning.

B. Cranes shall be painted with 2.0 mil DFT Primer & 2.5-3.0 mil DFT Safety Yellow Industrial Enamel.

C. hoists shall be painted per the Hoist manufacturer’s standard coating. Hooks shall not be painted.

D. Structural components shall be painted with 2.0 mil DFT Primer & 2.5-3.0 mil DFT Gray Industrial Enamel.

2.10 MISCELLANEOUS

A. Quality and Spare Parts
   1. To properly serve the crane users needs of after sales service and spare parts, the manufacturer shall have local availability of service and spare parts.

B. Factory Testing
   1. Following complete assembly of the crane in the factory, all components shall be tested to insure correct operation.
   2. Push-buttons shall be tested for operation of each movement.
   3. All motors shall be phased correctly in the factory for proper operation.

2.11 INTERCHANGEABILITY

A. Provide like parts on components furnished which are interchangeable and give particular attention to items that may require replacement or adjustment during the life of the crane.

2.12 SAFETY DEVICES

A. Each crane will be provided with all safety devices required by federal, state or local law.

B. Each Crane will be provided with a capacity plate with 3 inch high letters on each side of the crane giving the capacity in tons.

C. Cranes shall be supplied with a readily accessible power disconnect on the bridge, adjacent to or part of the control panel.

2.13 MATERIALS

A. All materials shall be new and meet the requirements of CMAA, HMI, NEC and NSI. All load bearing parts shall have a 5:1 factor of safety.

B. Structural steel used in the fabrication of bridge girders and end trucks shall be new and meet the minimum ASTM standards.

2.14 SHIPPING

A. After factory tests are completed, disassemble the crane into major components for shipment with all major points of attachment match-marked to facilitate final assembly, and all exposed finished parts coated with compound before shipment. Properly pack all small parts in boxes with parts identification clearly marked on the outside of each box.

B. The crane manufacturer shall pay all costs of packing, loading, shipping and unloading of the crane at the job site.

C. Crane manufacturer shall replace all parts of the cranes that are damaged or lost in shipment without cost to the Owner.

PART 3 -EXECUTION

3.01 CRANE ERECTION

A. The crane supplier shall receive, unload, and erect the cranes in accordance with applicable codes and specifications as referenced in the beginning of this specification. Installers shall be employees of the supplier and have five years experience installing overhead cranes.

B. Holes shall not be drilled or flame cut in any part of trusses or other parts of the building structure without permission from the customer's Engineer of Record (EOR).

C. Welding to the building structure must also be approved by the EOR.

3.02 ELECTRICAL WORK

A. The crane installer shall provide all wiring and electrification in accordance with the National Electric Code.

3.03 FIELD QUALITY CONTROL

A. Acceptance Test

1. Conduct testing for final acceptance after the erection work has advanced to the point that inspection and testing can proceed without interruption.
2. Allow inspection of all parts of the crane containing electrical parts or moving mechanical parts by the Engineer.
3. Test the cranes for capacity, speed and deflections in the presence of the Engineer and owner with 125 percent of the hoist capacity load on the hook. The contractor is responsible for crane testing, including supplying test weights and equipment as required. Include costs in the Filter Building Lump Sum Bid Item.

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4. Crane supplier will transmit to the owner a certificate of load test and compliance with OSHA requirements.

3.04 TRAINING

A. Following the acceptance testing, the crane supplier will provide up to 8 hours of instruction and field training of operators to meet the requirements of ANSI B30.2 and OSHA 179.1 for Operator Training.

B. The instruction will include but not necessarily be limited to: techniques of safe operation, daily and monthly inspections, minor troubleshooting.

C. The field training will consist of having the operators actually operate the crane and perform a daily inspection.

D. A written exam will be conducted to insure the operator’s understanding and compliance with the required codes of conduct.

END OF SECTION

SECTION 43 23 21

HORIZONTAL SPLIT-CASE CENTRIFUGAL PUMPS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. This specification describes the equipment, materials, and incidentals required for the horizontal split-case pumps for the Diversified Water Well to be furnished by a single responsible Pump Manufacturer for installation by Others (Contractor). The Pump Manufacturer will be required to provide pumps, drivers, motors and drive arrangements with seals, couplings, base plates, guards, supports, anchor bolts and appurtenances as shown on the Drawings and specified in this Section, including vibration switches, and RTDs as shown on the P&IDs.

1. Provide two (2) horizontally mounted, axial split-case, single stage, double suction, centrifugal pumps for the Diversified Water Well.

    a. Equipment Tags: 50-PMP-01, 50-PMP-02

B. The unit shall be furnished with all necessary accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not, and as required for an installation incorporating the highest standards for the type of service, including field testing and instructing the regular operating personnel in the care, operation, and maintenance of all equipment.

C. The Pump Manufacturer shall be responsible for coordination with the construction schedule of the Contractor to ensure that equipment is delivered to the site in accordance with the Contractor's schedule. The Pump Manufacturer shall also coordinate with the Contractor to ensure that all related systems furnished under the Contractor's scope of work will form a complete integrated operating system. The Pump Manufacturer for this project shall coordinate the pumps with the equipment as described herein and on the drawings supplied by the Contractor, and their manufacturers.

D. The Pump Manufacturer shall confirm the pump rotation from the plans prior to manufacture.

1.2 RELATED WORK

A. Section 01300 Submittals

B. Section 01600 Material and Equipment

C. Section 01640 Manufacturer’s Field Services

D. Section 01730 Operation and Maintenance Data

E. Section 01752 Facility Startup Commissioning Requirements

1.3 DEFINITIONS

A. Relevant terminology shall be defined according to the American National Standard for Centrifugal Pumps for Nomenclature, Definitions, Application and Operation; and the Hydraulic Institute Standards (HI) ANSI/HI 1.1-1.5.

1.4 SUBMITTALS

A. All submittals shall use English units and shall be written in English.

B. Submittals shall be made in accordance with the requirements in Section 01300 and as specified herein.

C. The Pump Manufacturer shall submit the following with the bid:

1. Certified dimensional drawings and weights of each item of equipment and auxiliary apparatus to be furnished, including pump, motor and base plate.

2. Submit Manufacturer's certified rating curves for each pump, showing pump characteristics for discharge head, Allowed Operating Range (AOR), Preferred Operating Range (POR), capacity, brake horsepower, pump efficiency at the "rated" point, pump efficiency curve for pump, and guaranteed net positive suction head required (NPSHR) over the entire range of pumping requirements. This information shall be prepared specifically for each pump provided. Catalog sheets showing a family of curves will not be acceptable.

3. Submit motor data sheets.

D. The Pump Manufacturer shall submit the following:

1. Submit pump/motor coupling manufacturer, model number, clearances and tolerances.
2. Cross-sectional drawings with detailed construction of each component in the pump along with the ASTM material designations.
3. Bill of materials.
4. Shaft seal drawing and shaft coupling.
5. Certified pump support and anchor bolt plans and details.
6. Materials certifications for castings, impellers, shafts, and shaft sleeves.
7. Submit hydraulic thrust and radial load calculations along with L10 bearing life calculations of each bearing. L10 bearing life is 100,000 hours.
8. Shaft design calculations along with worst case shaft deflections at the wear rings and at the mechanical seals.
9. Data sheets applicable to proposals, purchase, and as-built drawings.
10. Certified drawings of auxiliary systems.
11. Forces and moments analysis, along with thrust calculations at the pump feet and at the anchor bolts. Also provide certified pump support and anchor bolt plans and details.
12. Manufacturer’s installation instructions.
13. Factory test procedure.
14. Schedules for factory witness testing.
15. Factory test book per Paragraph 2.24.D.
16. Motor data per Section.
17. Preservation; packing, and shipping-procedures per Section 01730.
18. QA/QC program as described herein.
19. Spare parts recommendations and price lists.
20. Material safety data sheets.
21. Electrical and instrumentation schematics, wiring diagrams, and bills of materials.
22. Electrical and instrumentation arrangement drawings and lists of connections.
23. Drawings of bearing temperature sensors (RTDs), location and mounting details.
24. Drawings of oil level alarm switches.

25. Certified test data for-factory acceptance testing.
26. Certified hydrostatic test data.
27. Vibration analysis data for pump and motor.
28. Natural frequency analysis calculations.
29. Torsional analysis calculations.
30. Noise test results of factory test.
31. Manufacturing progress reports.
32. Certified motor test data.
33. Installation operations and maintenance manuals per Section 01730. Manuals shall include data for each pumping unit, including pump and motor.
34. Report of installation, inspection, testing, and observations for each pumping unit.
35. Letter of Certification.

1.5 REFERENCE STANDARDS

A. Design, manufacture, and assembly of elements of the equipment herein specified shall be in accordance with, but not limited to, current published standards of the following, as applicable:
    1. American Bearing Manufacturer's Association (ABMA).
    2. American Gear Manufacturer's Association (AGMA).
    3. American Institute of Steel Construction (AISC).
    4. American Iron and Steel Institute (AISI).
    5. American Society of Mechanical Engineers (ASME).
    6. American National Standards Institute (ANSI).
    7. American Society for Testing Materials (ASTM).
    8. American Welding Society (AWS).
    9. Anti-Friction Bearing Manufacturer's Association (AFBMA).
    10. American Water Works Association (AWWA).
    11. Hydraulic Institute Standards (HI).

12. Institute of Electrical and Electronics Engineers (IEEE).

13. Instrumentation, Systems, and Automation Society (ISA).

14. International Standards Organization (ISO).

15. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS).

16. National Electrical Code (NEC).

17. National Electrical Manufacturer's Association (NEMA).

18. NSF International Strategic Registrations, Ltd. (NSF).

19. NSF Standard 61 - Drinking Water System Components.

20. Occupational Safety and Health Administration (OSHA).

21. Society of Automotive Engineers (SAE).

22. Steel Structures Painting Council (SSPC).

23. Underwriters' Laboratories, Inc. (UL).

1.6 QUALITY ASSURANCE

A. The equipment covered by these Specifications is intended to be standard pumping equipment of proven ability as manufactured by reputable companies having extensive experience in the production of such equipment. The equipment furnished shall be designed and constructed in accordance with the best practice and methods, and shall operate satisfactorily when installed as shown on the Drawings. The manufacturer of the pump units shall have a quality management system in place and shall be ISO 9001 and 14001 certified.

B. The Pump Manufacturer shall be fully responsible for the design, arrangement, and operation of all connected rotating components, including soleplates, if any, of the assembled pumping unit mounted on a fabricated steel base plate to ensure that neither harmful nor damaging vibrations occur at any speed within the specified operating range.

C. The new high service water pumping units shall be complete, including pump, motor, RTDs, and terminal boxes. The high service water Pump Manufacturer shall be responsible for the furnishing and performance of the complete pumping units.

D. The Pump Manufacturer shall have furnished pumping units in the United States which are similar in design, type, and service, and comparable in size, head, and capacity to those specified to be furnished. Such comparable pumping units shall have been in satisfactory operation for a period of not less than five years.

E. The Pump and Motor Manufacturers shall currently have maintenance and repair facilities established and in operation in the United States for a period of not less than three years. Such facilities shall be fully equipped and staffed with qualified personnel for making repairs to damaged pumps and motors shall stock or have direct access to a full line of maintenance spare parts.

F. Vibration:

1. The Pump Manufacturer shall review the Specifications and Drawings, including piping, pipe supports, harnessing arrangements, and foundations to fully evaluate the field installation conditions prior to bidding.

2. Acceptable field vibration and factory vibration limits shall be in accordance with the latest version of the HI Standards. Vibrations in excess of specified limits shall not be acceptable.

3. The Pump Manufacturer’s field representative shall measure and record unfiltered vibration amplitudes in velocity units in/sec rms at each of the pump and driver bearing housings in two planes in a radial orientation and in one plane axially. The amplitude measured shall not exceed the limit specified above at any point within the pump’s Preferred Operating Range (POR), and it shall not exceed 130% of the limit at any point outside the POR but within the Allowable Operating Range (AOR).

G. Services of Manufacturer's Representative:

1. Provide services of Pump Manufacturer's factory service Engineer specifically trained in the installation, operation, and maintenance of pumping units as specified herein. The services of the

Manufacturer's Representative shall be made available during the installation period for assistance to the Contractor for adjusting and checking equipment.

2. The factory representative(s) shall be provided for trips and durations as shown below:

	Services to be Provided by Factory Representative	*Minimum Number of Trips [(a), (b)]*	*Minimum Time at Site Per Trip (hours)*
1	Supervise Setting of Pump Bases, Installation of Pumps, and Check Pump Leveling and Pre-Alignment[(c)]	1	8
2	Inspect Final Pump Alignment[(d)], Supervise Startup and Initial Run to Demonstrate Successful Operation, Instruct Engineer and Owner's Reps in Proper Startup and O&M	1	8
3	Additional Trips for Troubleshooting Following Installation[(e)]	---	---

[(a)] Representative(s) shall be present at frequent enough intervals to ensure proper installation, testing, and initial operation of the equipment.
[(b)] This assumes all pumps are shipped together. Additional trips shall be included for additional shipments.
[(c)] Before piping connection.
[(d)] After piping connection. The Manufacturer's representative shall provide to the Design Engineer a written certification that each pump has been installed in accordance with the Manufacturer's recommendations.
[(e)] Representative(s) shall be present as necessary to operate successfully following start-up. Additional trips/duration address issues associated with equipment defects will be at the cost of the manufacturer.

H. Casting Quality Assurance/Control: The Pump Manufacturer shall submit an internal quality control - quality assurance program for the review by the Design Engineer. As a minimum the QA/QC program shall include the following:

1. Before manufacture:

a. A list of all subcontractors/suppliers outside of the contiguous United States that will be supplying parts and materials for the pumps, and their experience on similar projects for the past

10 years. The list of subcontractors is to be provided within 45 days of the Pump Manufacturer's Purchase receipt of Purchase Order.

b. Copies of a dimensional control protocol to establish the manner in which the machining of the castings will be performed, and the control for dimensions for the upper and lower casing castings and the impeller casting.

c. Copies of the quality control protocols and reports to confirm that the patterns have been correctly produced.

2. After manufacture:

a. Three-dimensional checks to confirm that castings are within Pump Manufacturer's standards. Copies of all reports are to be provided to the Design Engineer for review.

b. For each heat number, the mechanical properties of the pour.

c. For each heat number, the chemical composition of the pour.

d. Documentation of all heat numbers and pours for the project, to include those castings that were scrapped by the foundry.

e. Photographic documentation that the castings comply with the requirements of MSS SP-55.

f. Copies of magnetic particles test reports or Hydro and visual reports for the volute and impeller.

g. Copies to the protocols for hydrostatic testing and copies of the hydrostatic testing reports.

1.7 DELIVERY, STORAGE, AND HANDLING

A. The Pump Manufacturer shall provide unloading, storage, and handling instructions prior to shipment.

B. Pumping units shall be shipped with the motor space heaters connected to a terminal board and ready to be energized.

C. All equipment shall be delivered in good, sound condition, and free from damage. Equipment which has been damaged will be rejected. Pump Representative shall be on the site to witness the arrival, inspection, and unloading process as specified.

D. The Contractor shall be responsible for proper unloading, handling, and storage of equipment in accordance with the Manufacturer's instructions.

1.8 MAINTENANCE

A. Pump Spare Parts: Furnish the Manufacturer's standard set of spare parts for each size pump, including at least the following:

1. One set of pump bearings.

2. One complete mechanical seal.

B. Motor/Coupling Spare Parts: Furnish the Manufacturer's standard set of spare parts for each size pump, including at least the following:

1. One spare gasket to fit between coupling hub flanges.

2. One complete flexible couplings.

C. Spare Parts Delivery/Storage: Crate and deliver spare parts in substantial wood boxes with hinged covers. Clearly and indelibly identify the contents of each box on its exterior. Each part shall be sealed, wrapped, or otherwise protected from corrosion during storage.

1.9 PERFORMANCE GUARANTEE

A. The Manufacturer shall guarantee the performance of each pumping unit to meet or exceed the specified performance. The guarantee shall include the complete pumping unit assembly, and shall cover speed, capacity, head, efficiency, brake horsepower, motor horsepower, and the performance curves for the pump. The capacity, head, and efficiency guarantee shall apply to the Rated Point (Primary Condition) on the pump's head capacity curve at the specified head and capacity specified herein. If the pumping units fail to meet the efficiency at Rated Point, corrective measures shall be taken as indicated in Part 2.

1.10 WARRANTY

A. The Pump Manufacturer's warranty period shall be concurrent with the Contractor's for two (2) years, commencing at the time of final acceptance by the Owner. Guarantee shall cover all necessary labor, equipment, materials, and replacement parts resulting from faulty or inadequate equipment design, improper assembly, defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer.

PART 2 – PRODUCTS

2.1 GENERAL

A. Manufacturer List:

1. Fairbanks Nijhuis / Aurora Pump / Pentair
2. Weinman / Crane Pumps
3. Grundfos
4. Flowserve, Inc.
5. Goulds
6. Patterson
7. Sulzer
8. Approved Equal

B. Coordinate pump requirements with drive manufacturer and be responsible for pump and drive requirements.

2.2 PERFORMANCE AND DESIGN CRITERIA

A. Pumping units shall be designed for the operating conditions as follows:

Pump Tag	*50-PMP-01, 50-PMP-02*
Number of Units	2
Type of Drive	Constant Speed
Design Points:	
Primary Condition (2 pumps)[(a)]:	
Capacity per pump:	800 GPM
Total Design Head (TDH):	195 FT
Minimum NPSHA:	70 FT
Minimum Pump Efficiency:	82%

Secondary Condition[(a)]:	
Capacity per pump:	750 GPM
Total Design Head (TDH): 257 ft	197 FT
Maximum NPSHA:	70 FT
Minimum Pump Efficiency:	80%
Low flow condition[(a)]:	
Capacity per pump:	700 GPM
Total Design Head (TDH):	200 FT
Maximum NPSHA:	70 FT
Minimum Pump Efficiency:	70%
Operating head range for full speed continuous operation	140-210 FT
Minimum shutoff head	220 FT
Maximum nominal pump speed	1,800 RPM
Maximum power required at pump input shaft at any point from minimum operating head to shutoff head.	60 bhp
Pump rotation as viewed from driven end	See drawings
Minimum pump suction nozzle size	6 IN
Minimum pump discharge nozzle size	4 IN

[(a)] The conditions listed shall operate within the pump's preferred operating range (POR), as described per HI Standard 9.6.3.

B. All specified conditions shall be at rated speed, unless otherwise indicated.

C. The minimum hydrostatic test pressure shall be 1.5 times shutoff head.

D. The pump manufacturer shall account for up to 2 minutes of ball valve travel time to account for the duration of run time at shutoff head conditions.

2.3 CASINGS

A. Materials:

1. Pump casings shall be cast iron conforming to ASTM A48.

2. 125 lb flange rating – ANSI/ASME B16.1, Class 125 raised-face dimensions and drilling.

B. Design/Fabrication:
    1. Casings shall be of sufficient thickness and suitably ribbed, if necessary, to withstand all stresses and strains to which it may be subjected during erection, testing, and operation.
    2. Casings shall be of sufficient strength, weight and thickness to provide accurate alignments and prevent excessive deflection.
    3. Free of blowholes, sand holes, and other detrimental defects, with smooth water passages.

C. Split-Case Provisions: Casings shall be split on the horizontal centerline with suction and discharge nozzles cast integrally with the lower half. Removal of the upper half of the casing shall allow the rotating element to be removed without disconnecting the suction and discharge flanges or without disturbing pipe connections or pump alignment. Lifting eyes or lugs shall be cast into the upper casing. Provide tapped holes in flange of upper casing with jack bolts that allow the casing halves to be separated during disassembly.

D. Taps and plugs: Casings shall be tapped for drains, vents, priming, water seal, and pressure gages. All taps shall be shipped with brass plugs. Plugs will be removed in the field, as necessary, to make connections for the miscellaneous piping and appurtenances. Provide a ¾” tap in the top of the volute for an air release valve.

E. Finishes: Apply special interior coating as specified under Paragraph 2.22, Interior Finish for Casings.

2.4 IMPELLERS

A. Materials: Entirely made of nickel aluminum bronze ASTM B148 UNS C958 or AISI Stainless Steel Type 316.

B. Type: Double suction, enclosed type.

C. Design/Fabrication:
    1. Designed with ample strength and stiffness for maintaining the maximum capacity of the unit.

    2. The impeller shall be a one-piece casting completely machined on all exterior surfaces and dynamically balanced. The interior water passage shall have uniform sections and smooth surfaces and shall be free from cracks and porosity.

3. Statically and dynamically balanced to prevent whipping and vibration throughout the operating range, from shutoff head to run out. Perform a precision balance of the entire rotating assembly to ANSI S2.9, G6.3 and provide the balance certificate in the quality control section of the O&M Manual.

4. Pump impeller assemblies shall be statically and dynamically balanced to within 0.5% or W times R squared, where W equals weight and R equals impeller radius.

5. No fillers of any type will be allowed.

D. Mounting: The impeller shall be mounted on the shaft with a single key which extends beyond the impeller hub, locking the impeller and shaft sleeves against rotation on the shaft.

2.5 WEAR RINGS (CASING AND IMPELLER)

A. Each pump casing and impeller shall be fitted with removable wearing rings.

B. Materials:
1. Casing Wear Rings: AISI Type 316 Stainless Steel

2. Impeller Wear Rings: Match impeller material as specified above.

3. Casing Wear Rings and Impeller Wear Rings shall have a Brinell hardness difference of 50.

C. Type: Full labyrinth double-ring type, single labyrinth double-ring type, or "L" double-ring type.

D. Design/Fabrication:

1. The casing wear rings shall be positioned in the casing and locked against rotation by the upper half of the case.

2. Wear rings shall be designed and machined to close tolerances to minimize leakage. The diametrical clearance shall not exceed 0.030-inch and be not less than 0.001-inch per inch of ring diameter.

2.6 SHAFT

A. Materials: High Grade Alloy 416 Stainless Steel.

B. Design/Fabrication:

1. Stress relieved, machined to true dimension, accurately ground and polished over the entire length.

2. The shaft shall be provided with oil throwers or Inpro seal to prevent oil creeping from the bearings. All parts shall have polished surfaces.

3. The pump shaft shall be fitted with threads, lock nut, and keyway to fasten the pump half-coupling hub securely.

4. Shaft diameter shall be sized to prevent torsional and flexural deflection which would cause whipping and vibrating under any condition.

5. Maximum allowable flexural shaft deflection shall be not more than 75 percent of the radial wearing ring clearance.

2.7 SHAFT SLEEVES

A. Shafts, where exposed to water or passing through glands and stuffing boxes, shall be protected by renewable (removable) sleeves. Stuffing boxes shall have hardware constructed of corrosion-resistant metals.

B. Materials:

1. AISI Type 316 Stainless Steel

C. Design/Fabrication:

1. The sleeves shall be secured in place, for both directions of pump rotation, with shaft nuts incorporating set screws for locking purposes.

2. The sleeves shall be provided with O-rings to prevent leakage between the shaft and sleeves.

3. Shaft sleeve nuts shall be threaded.

2.8 SHAFT MECHANICAL SEALS

A. Pumps shall be supplied initially with mechanical type split seals which are interchangeable with conventional packing.

B. Materials:
    1. Stationary Seal Face: Carbon.

    2. Rotary Holder: Stainless Steel, Grade 316.

    3. Rotary Seal Face: Ceramic or Silicon Carbide.

    4. Seal Glands: Stainless Steel, Grade 316.

    5. Springs: Stainless Steel, Grade 316.

    6. Elastomers: Viton or Ethylene Propylene

C. Type:
    1. John Crane Type I

D. Design/Fabrication:
    1. Seal glands shall have a flush connection at the top and along the vertical centerline or at 30 to 45 degrees from the horizontal centerline.

    2. Seal must consist of assemblies which fit together over a shaft to form a self-setting and aligning cartridge seal design.

    3. The seal must eliminate the need for shims or dimensions to be taken for proper installation.

    4. Provide water flushing per API Plan 11 with stainless steel seal water tubing, with stainless steel hand valve, from the pump casing to the gland flush connection. The hand valve shall be tagged with a stainless steel warning tag indicating the valve is to be open at all times during operation.

    5. Any additional equipment required, such as pressure relief valve, flow switch, or flow indicator shall be provided by Manufacturer at no additional cost to the Owner. Any instrumentation required for these devices shall be provided by the Manufacturer.

2.9 MISCELLANEOUS FITTINGS

A. Small fittings and accessories inside the pump and around the shaft sleeves, such as set screws, bolts, and nuts that are exposed to water or water spray, shall be made of noncorrosive materials such as bronze or stainless steel.

B. Materials: Bronze, stainless steel, or other approved non-corrosive materials.

2.10 PUMP BEARINGS

A. Pump bearings shall be antifriction, double row, deep-groove type ball bearings. They shall be designed and sized for 100,000 hours calculated minimum L10 rated bearing life at 25% BEP per ANSI/HI 1.3-2013. Each bearing shall be capable of carrying both line and thrust type loads. All bearings shall be manufactured in the United States.

B. Provide Inpro bearing isolators.

C. Pump bearings shall be ring oil lubricated or oil bath lubricated. A constant oil level oiler shall be provided. Pump design shall allow for the bearing to be removed without disturbing the upper casing for inspection and replacement of the bearings, seals and shafts.

D. Bearing housing shall be designed to maintain shaft alignment and ensure long bearing and lubricate life.

2.11 BEARING BRACKETS

A. The bearing brackets shall be accurately machined and doweled to the casing or with 360 degrees attachment to the upper and lower casing for a perfect shaft alignment by full register fit to the casing. The manufacturer shall have the option of constructing the bearing brackets integral to or separate from the pump casing.

2.12 PUMP BASE PLATE

A. A support base for pump and motor shall be provided.

B. The support base shall be structurally capable of supporting the weight of the pump and motor and resisting torsional movement.

C. The support base shall have adequate drainage.

D. Submittal of support base design to the Design Engineer prior to fabrication is required.

E. The pump and motor shall be mounted on a steel base plate or a steel drip rim base plate with integral drip channels incorporated on each side. Pump and motor mounting surfaces shall be machined for ease of realignment after motor replacement.

2.13 ACCESSORIES

A. Lifting Lugs: Shall be provided and positioned to provide balance during lifting.

B. Equipment base shall be manufactured and provided by the pump manufacturer and assembled together with the pump.

C. Jacking Bolt kit or a horizontal alignment tool set shall be provided. Jack bolts should be present at HSP motors to allow alignment in both directions (8 bolts – 2 each).

D. Oil lubricated units shall be provided with constant level oilers or will sight glasses arranged to indicate operating and static oil levels as described in Section 2.14 herein.

E. Pump impeller shall be balanced as described in Section 2.04.C.4. to ensure that all rotating parts shall operate smoothly without excessive vibration as defined by manufacturer.

2.14 LUBRICATION

A. Bearings shall be ring oil lubricated reservoir type. Lubrication oil for bearings shall be food grade.

B. Oil reservoirs shall include an opening for filling, an overflow opening, a drain at the lowest point, an oil level site glass, and an oil level indicator. Under each oil-bearing housing install ESCO oil site conditioning glass. Oil site glass shall be external to the bearing house with proper oil level marks on bearing housing or site glass.

2.15 ANCHOR BOLTS

A. Design/Manufacturing:

1. Pump Manufacturer shall provide the anchor bolts requirements to the Contractor prior to construction of the structural equipment pad as described below. The Contractor shall provide anchor bolts based on Pump Manufacturer's requirements.

2. Anchoring system shall be appropriately sized and provided by the Pump Manufacturer to adequately handle all loads applied for the piping configuration shown on the drawings in accordance with the Hydraulic Institute Standards. Minimum size: 1/2" diameter anchor bolts.

3. Bolts shall be of adequate length and design to transfer loads into the structural equipment pad.

4. Structural and seismic calculations for pumps: Include calculations for reactions at anchor bolts and selection of the size depth and number of bolts required for use with Simpson Set Epoxy anchor system. Manufacturer can assume Grade 60 Rebar and 4,000 psi concrete. Seismic design parameters are as follows:

Seismic Design Parameters				
Site Classification	F_a	F_v	S_s	S_1
B	1.0	1.0	0.074 g	0.030 g

Where: F_a = Site coefficient
F_v = Site coefficient
S_s = Mapped spectral response acceleration for short periods
S_1 = Mapped spectral response acceleration for a 1-second period

2.16 SUCTION AND DISCHARGE CONNECTIONS

A. Flange Type: Flanges: Suction and discharge nozzles shall be Class 125 lb, flanged, drilled, and machined to match AWWA C207 flanges of connecting pipe. Flanges shall be flat- faced.

B. Design/Fabrication:

1. Designed for through bolting and straddling vertical and horizontal centerline.

2. Gaskets shall conform to AWWA C207.

2.17 PUMP/MOTOR COUPLINGS

A. Flexible couplings shall be the heavy-duty type, designed so that each pump shaft may be removed without disturbing the positing or adjustment of the driving unit. Coupling shall be Falk Lifelign Gear Coupling, as manufactured by the Rexnord Corporation. Minimum factor of safety of 1.5 times shaft strength shall be used. Horizontal surface of the couplings shall be machined parallel to the axis of the shaft, and faces shall be machined perpendicular to the axis of the shaft. Provide appropriate coupling gaurgs, acceptable to OSHA< securely attached to the pump base with stainless steel bolts and nuts. Supply couplings with a precision balance certificate from the Pump Manufacturer.

B. The drive shaft coupling gear shall be gear type and all metal.

C. Lubrication: Oil or grease.

D. Baseplate: Cast iron or fabricated steel.

2.18 EQUIPMENT APPURTENANCES

A. Pumping equipment shall be provided with all necessary equipment appurtenances to make the pumping units functional.

1. Bolts and nuts shall conform to the requirements of ASTM A307.

2. Threads shall be clean-cut and shall conform to ASME B1.1.

3. Stainless steel bolts, nuts, and washers shall be Type 316.

4. Unspecified bolts, nuts, washers shall be zinc coated after being threaded by the hot-dip process conforming to ASTM A123 as appropriate.

B. Metal equipment guards shall be provided on all equipment driven by open shafts.

1. Guards shall be designed to enclose the drive mechanism completely and be easily removable.

2.19 INFORMATION PLATES / MARKINGS

A. Materials:

1. Nameplate: 16-gauge stainless steel with ¼-inch die-stamped equipment tag number securely mounted in a readily visible location.

B. Pump Nameplate: The nameplate shall clearly show pump information and complete performance data, including:

1. Manufacturer's name.

2. Pump size, type, and model number.

3. Serial number

4. Speed.

5. Impeller diameter.

6. Primary Duty Point- Capacity and head rating.

7. Bearing identification, name, and number.

8. Pump weight, motor weight.

9. Date of manufacture.

10. Other pertinent data.

2.20 ASSEMBLY, MOUNTING, & ALIGNMENT

A. Factory Pre-mounting and Alignment. Pumps with their job motors shall be pre-mounted and pre-aligned. Mounting holes shall be drilled and tapped at Pump Manufacturer's factory. Factory alignment data shall be furnished to the Contractor. Pump Manufacturer shall drill pump and motor feet only for dowels. Do not drill base plate or install dowels at factory; ship loose.

B. The Pump Manufacturer shall approve and sign off on proper installation.

C. A qualified factory-trained manufacturer’s representative shall personally inspect the equipment at the jobsite and shall certify in writing that the equipment has been installed, adjusted, and tested, in accordance with the manufacturer’s recommendations.

2.21 INTERIOR FINISH FOR CASINGS

A. Coat interior of pump casings with ceramic epoxy coating to enhance pump efficiency. Prepare and shop-prime, as stated in this Section.

B. Materials: Prime and Finish Coating: Belzona 1341N efficiency enhancement coating for potable water (ceramic epoxy coating) or fusion bonded epoxy.

C. Procedure:

1. Surface Preparation: As recommended by coatings Manufacturer, minimum blast clean to near white SSPC-SP-10.

2. Application (prime and finish coating): Apply 25 mils DFT of Belzona coating or fusion bonded epoxy.

3. Testing: Perform Holiday Test.

4. Touchup: After testing is complete and prior to shipment, touch up surfaces. Provide touch up kit for contractors use during installation. If holiday test is required, perform at shop prior to shipment and provide certification.

2.22 EXTERIOR FINISH

A. Exterior of pumps, motors, frames, base plates, and appurtenances shall be painted prior to shipment from factory. Pump units shall be prepared and shop-primed as follows:

1. Surface Preparation:

    a. All bare metals or areas that were shop primed that have been damaged shall be abrasive blast cleaned to SSPC-SP6, commercial blast cleaning standards.

    b. Shop primed items, stored on site for a prolonged period prior to coating, shall be prepared for coating following the coating manufacturer's recommendations prior to applying touch-up and subsequent coats. Surface preparation may include brush-off abrasive blasting or spot blasting to SSPC-SP6, commercial blast cleaning standards, for areas where the primer has been damaged and bare metal is showing.

    c. Non-ferrous metals shall be degreased and cleaned by washing with a water based dispersant such as Carboline Surface Cleaner #3. Rinse thoroughly with clean water after cleaning.

2. Coating System:

    a. Prime coat for ferrous and non-ferrous metal: Two part epoxy primer. Tnemec's Series 140, must be white, at 4.0 mils DFT.

    b. Intermediate coat for ferrous metal: Two part epoxy. Tnemec Series 140 with beige color at 3.0 mils DFT.

B. Contractor to apply finish coating in the field: Two coats of epoxy primer and polyurethane finish coat at 4-6 mils nominal DFT per coat.

2.23 DRIVE UNITS

A. Electric Motors.

1. The electric motors shall be not less than 60 hp 1150 RPM, NEMA design B squirrel cage type, (drip proof)(TEFC) EISA efficiency motor with 1.15 service factor and suitable for operation on 230 volt, 1 phase, 60 Hertz power supply OR 460 volt, 3 phase, 60 hertz power supply. Motor size shall be sufficient to prevent overloading at operating conditions or at the lowest listed head conditions whichever point requires greater horsepower. Following installation, grouting and connection of all piping, pump and motor

must be checked for alignment in accordance with standards of the Hydraulic Institute.

2.24 SHOP TESTING

A. Each pumping unit, including pump and motor, shall be witness tested at the Pump Manufacturer's factory as specified herein. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards. Acceptance testing shall be per HI Standards Table 14.6-3.4, Grade 1B.

B. FACTORY WITNESS TESTING

1. One representative from the Owner and one representative from the Engineer will witness the High Service Pump factory pumping unit test.

2. Witness Test Trip

a. The Contractor shall reimburse the Engineer for Engineer's time at a rate of $1,200 per day times the number of days required for the factory test visit, travel days included.

b. The Contractor shall arrange to provide an interpreter/guide for the entire time that the Owner's representatives are in the country for trips outside North America.

c. Provide a testing schedule before the trip agenda is set. Tests may not start any sooner than 12 hours after arrival at hotel for trips outside North America. Owner and Engineer will review agenda to ensure adequate time is allowed for shorter flights.

d. For trips outside North America, the Contractor shall provide and pay for at least one cellphone to be used by the Owner's representatives, purchased in the United States with a United States phone number that works at all times and locations as required by the witness testing.

e. The Contractor shall obtain any letters of invitation to enter the country in question on business and be responsible for paying for and making all arrangements to obtain the visa for each person.

f. Each of the Owner’s Representatives shall be responsible for obtaining their own passport. This is not the responsibility of the Contractor.

g. The Contractor shall designate a local firm that does Visas to collect each passport, send it overnight to their representative. The Contractor’s local firm shall be responsible for all Visa processing requirements and then overnight each passport directly back to each person. Each Owner’s and Engineer’s Representative shall have the Visas in hand at least two weeks before the flight.

h. Provide Economy Class (Coach) Flight arrangements. Provide confirmed reservations at least two weeks before the trip.

i. Owner's and Engineer’s Representatives shall be allowed to return at any time. Contractor shall be responsible for any penalties, if applicable. Owner and the Engineer will stay no more than two weeks for factory testing. For factory test requiring more than two weeks, Contractor shall make travel arrangements for additional personnel from Owner and Engineer.

j. For each additional trip after the first that is required due to witnessed testing partial/complete failure or incomplete occurrence because the Contractor or Manufacturer is not ready, any component of the motors/pumps are not ready for testing, or any other reason caused by the Manufacturers, Contractor, or his Subcontractors/Suppliers, the Contractor shall pay all costs described in 2.24.B.2. In addition, Contractor shall reimburse Engineer for Engineer’s labor at $1,200 per day.

C. FACTORY TESTING

1. Each constant speed pumping unit shall be tested with its job motor by the Pump Manufacturer at their plant prior to shipment. Each pumping unit shall be tested with water in accordance with the Standards of the Hydraulic Institute, Centrifugal Pump Section Test Code and Rotodynamic Pumps for Hydraulic Performance Acceptance Tests to determine compliance with Pump Manufacturer’s head-capacity curve and confirm guaranteed wire-

to-water efficiency. A hydrostatic test of the pump casing shall also be performed. Model tests will not be accepted. Factory testing shall be the final criteria for acceptance by the Owner for the tests specified in Paragraph 2.24.E. of this Section. Acceptance criteria for vibration as specified in this section shall include both factory and field tests. Field testing will be the final criteria for acceptance by the Owner for the tests specified in Paragraph 2.24.E. Factory test data and results shall be submitted for review prior to the equipment being shipped to the jobsite.

2. All factory pumping unit tests shall be performed with actual motors to be supplied to ensure that the same motor/pump units that are factory tested together are installed together in the field.

3. Perform NPSH testing on the first unit ready for testing. Determine the Net Positive Suction Head required under both “1% head drop” and at “3% head drop” conditions and provide a composite curve for each.

4. The factory test report shall be certified by a licensed Professional Engineer. Certified copies of the test data for each pump shall be furnished to the Owner as part of the Test Book referenced in Paragraph D. Test curves and data sheets shall include head-capacity curve, brake horsepower curves, overall (wire to water) efficiency curves, motor Manufacturer’s efficiency curves, pump efficiency curves, NPSH requirements, and a sketch of the test installation. Data for the entire pump range (from minimum head to shut-off) shall be included.

5. Shop tests shall be made at the speeds and horsepower required by the pump. Suction conditions for the test shall duplicate the Net Positive Suction Head available for continuous operation under which the pump will operate. Pumps shall have a minimum NPSH margin of 25%.

6. All tests for pumps shall be run at specified speeds indicated in the respective specification over the full range of the curve.

7. Pump Manufacturer shall provide one digital copy of video recordings with sound for each size pumping unit showing disassembly and reassembly of the pumps. Written copies of the sound script shall also be bound and provided to the Owner for their use in operation and maintenance.

8. Only after receipt, review, and approval of all factory test data, and preliminary O&M Manuals for pumps and motors, the Owner will give permission to Pump Manufacturer for shipment of pumping units.

D. FACTORY TEST BOOK

1. The Pump Manufacturer shall prepare and submit a Test Book for the Owner's review at least 60 days before any testing is scheduled. The Test Book shall be the test report minus test data and shall contain the following information:

    a. Description of tests to be conducted.

    b. Description of test procedures.

    c. Copy of test standards.

    d. Calibration of Instruments. All instruments shall be calibrated in accordance with Hydraulic Institute Standards just prior to and after all performance testing. Manufacturers performing the shop tests shall furnish the Owner approved certifications of calibrations. Bourdon or bellows gages shall be calibrated at the time of each test.

    e. A certified curve showing the calibration of the flowmeter used in the pump capacity test shall be furnished as part of the data and permanently bound with all other data. The data shall include coefficient of discharge and flow versus differential pressure if an orifice plate or venturi is used.

    f. Dimensional layout of test assembly and reservoir.

    g. Photos of test facility.

E. FACTORY TESTS TO BE PERFORMED

1. Hydrostatic Test: Each new pump casing shall be hydrostatically tested to one and one half times its maximum working pressure or 150 psi, whichever is greater. Maximum working pressure is defined here as the shutoff head pressure. Test duration shall be

30 minutes. Submit certified hydrostatic test results and test procedures.

2. Performance Test: Record data at a minimum of ten flows vs. head conditions with three of the points being those indicated below. Enough points shall be tested so that a smooth curve may be drawn through the points.

    a. Allowable tolerances for the desired points shall be as defined in the Hydraulic Institute Standards, Section 14.6, acceptance grade 1B.

    b. The manufacturer shall make continuous measurements and record the maximum down-thrust and maximum up-thrust for all conditions of its operation, including momentary loads from start-up and shut-down.

    c. The pump test results shall specify the pump performance curve to be performed to at least minimum head within the allowable operating range to shut-off head and define minimum head.

    d. The performance test for all pumping units shall be conducted with the pump and job motor.

        1) Shut-off head.

        2) Rated point.

        3) Minimum head point for continuous operation without cavitation.

3. Vibration Tests: Demonstrate the pumping unit runs smoothly during the tests. Vibration readings shall be taken and recorded at points specified in Paragraph 2.24.E. Factory acceptance criteria shall be as specified by the Hydraulic Institute Criteria.

4. Noise Tests. Noise readings shall be taken and recorded at points specified below:

    a. Maximum Noise Level: The maximum noise level of each assembled pumping unit located within or outside a structure shall not exceed 85 dBA at a distance of one meter (3.281

feet) from the nearest surface of the machine. Measurements shall be made on each complete unit, which includes the pump, motor, and coupling.

b. Sound tests shall be recorded at a minimum of five flow versus head conditions, including shut-off head, rated point, and minimum head point for continuous operation without cavitation. Sound level measurements shall be made on the pumping unit under single unit operation. All sound level testing in the factory may be witnessed by the Owner, Pump Manufacturer and Motor Manufacturer.

5. Test Log: Record the following:

   a. Total Head.

   b. Flow capacity measured by factory instrumentation and storage volumes.

   c. Power requirements.

   d. Average difference in elevation of water surface in suction well to pump discharge centerline for duration of test.

   e. Pump suction and discharge pressure converted to feet of liquid pumped and corrected to pump discharge centerline.

   f. Pump speed.

   g. Water temperature.

   h. Elevation of test stand.

   i. F.F.T. vibration plots of amplitude versus time out to 150,000 cycles/min at twelve points (three points per bearing, x, y, z). Vibration levels on test stand shall meet the specified vibration limits at the factory. Field vibration analysis will be performed by an independent testing laboratory on installed pump unit.

   j. Perform noise test in accordance with Section 2.24.E.6.

6. Adjust, realign, or modify units and retest in accordance with Hydraulic Institute Standards, if necessary.

PART 3 – EXECUTION

3.1 LEVELING

A. Pumps The base plate will be set to true level using machinist's level. The tolerance for leveling will not exceed 2/1000 inch per foot length along any side of the base plate. The Representative for the Pump Manufacturer shall be present during the leveling. The Pump Manufacturer shall certify that the leveling is in accordance with the limits specified herein and is acceptable to the Manufacturer.

3.2 STORAGE & EXERCISE

A. The Contractor shall provide any required maintenance, exercise, and storage for all pumping units included in this Specification, in accordance with Manufacturer recommendations.

3.3 INSTALLATION

A. The Contractor shall install pumping units as shown on the Drawings and in accordance with the Manufacturer's instructions and approved shop drawings. The Manufacturer shall provide Special Services as specified.

B. Installation of the pump and motor shall be in accordance with American National Standard for Centrifugal Pumps for Nomenclature, Definitions, Application, and Operation Hydraulic Institute ANSI/HI 1.1-1.5 and Manufacturer's printed instructions.

3.4 FIELD QUALITY CONTROL

A. Conduct field test as specified below:

1. Each pump system shall be field tested after installation to demonstrate satisfactory operation without excessive noise, vibration, cavitation, or overheating of bearings.

2. The following field testing shall be conducted:

a. Startup, check, and operate the pump system over its entire speed range. Unless otherwise specified, vibration shall be within the amplitude limits recommended by the Hydraulic

Institute Standards at a minimum of three pumping conditions defined by the engineer.

b. Obtain concurrent readings of motor voltage, amperage, pump suction head, and pump discharge head for at least four pumping conditions at each pump rotational speed. Check each power lead to the motor for proper current balance.

c. Determine bearing temperatures by contact type thermometer. A run time of at least 20 minutes, or until temperature is stabilized, shall precede this test, unless insufficient liquid volume is available.

d. Electrical and instrumentation tests shall conform to the requirements of the Section under which that equipment is specified.

3. Field testing will be witnessed by the Engineer. The Contractor shall furnish three weeks advance notice of field-testing.

4. In the event any pumping system fails to meet the test requirements, it shall be modified and retested as above until it satisfies the requirements.

5. After each pump system has satisfied the requirements, the Contractor shall certify in writing that it has been satisfactorily tested and that all final adjustments have been made. Certification shall include the date of the field tests, a listing of all persons present during the test, and the test data.

6. The Contractor shall bear all 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.

B. Functional Tests: Conduct on each pump.

1. Alignment: Test complete assemblies for correct rotation, proper alignment and connection, and quiet operation. Pump and motor shall be aligned using a laser alignment instrument at final site.

2. Vibration Test:

a. Test with units installed and in normal operation, and discharging to connected piping systems at rates between the low discharge head and high discharge head conditions specified, and with the actual building structures and foundations provided shall not develop at any frequency or in any plane, peak-to-peak vibration amplitudes exceeding the limits specified.

b. If units exhibit vibration in excess of the limits specified, adjust or modify as necessary.

3. Operating Temperatures: Monitor bearing areas on pump and motor for abnormally high temperatures.

4. Noise Test: Test pumping for noise in accordance with Paragraph 2.24.E.4. Equipment installed that exceeds allowable noise level limits must be re-worked, reinstalled, balanced or adjusted to reduce noise. Methods to reduce noise, including equipment insulation, must be approved by the Engineer.

C. Owner's Acceptance Basis

1. The Owner will accept the pumps after demonstration of proper functioning of all components and upon successful completion of the factory and field acceptance tests.

2. Penalty for Efficiency: If, as a result of the factory test, the efficiency of any pumping unit (pump and motor) is less than the specified minimum wire-to-water efficiency at Rated Point, the Owner, at his discretion, may reject the equipment, and require the Pump Manufacturer to provide a pump and motor as specified

3. There is no credit for efficiency values obtained during factory testing that are greater than the guaranteed wire-to-water efficiency.

4. If, as a result of the factory and field testing of the pumping units for vibration failed to meet the acceptance criteria, the Owner may reject the pumping units or required pumping unit supplier to modify the units to comply with specified vibration limits. All expense of retesting the units by Independent Testing Laboratory shall be borne by the Pump Manufacturer.

3.5 TRAINING

A. The Pump Manufacturer shall provide instructional training on the operation and maintenance of the equipment, including pump and motor, as specified in this section.

1. Provide manufacturer's services for training of plant personnel in operation and maintenance of the equipment furnished under this section.

2. The training shall be for a period of not less than one eight-hour day.

3. The cost of training program to be conducted with Owner's personnel shall be included in the Contract Price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.

4. Provide detailed O&M manuals to supplement the training course. The manuals shall include specific details of equipment supplied and operations specific to the project.

5. The training session shall be conducted by a manufacturer's qualified representative.

END OF SECTION

SECTION 43 41 43

POLYETHYLENE TANKS

PART 1. GENERAL

1.1 THE SUMMARY

A. This Section includes liquid chemical storage tanks and day tanks for potable water treatment.

B. The CONTRACTOR shall provide vertical, high density cross-linked polyethylene tanks and accessories in accordance with these specifications, complete and in place, in accordance with the Contract Documents.

C. Unit Responsibility: The CONTRACTOR shall assign responsibility for furnishing the tank system as indicated except for level indication to the tank manufacturer.

D. The tanks shall be of double wall construction or be provided with secondary containment tanks sufficient to prevent spillage in the event of a leak in the primary tank.

E. The tanks shall be as those constructed by ProTANK liquid handling products, or equal.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards

ASTM D 638	Tensile Properties of Plastics
ASTM D 883	Standard Terminology Relating to Plastics
ASTM D 1505	Standard Test Methods for Density of Plastics by the Density-Gradient Technique
ASTM D 1525	Standard Test Method for Vicat Softening Temperature of Plastics
ASTM D 1693	Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics
ASTM F 412	Standard Terminology Relating to Plastic Piping Systems
ANSI B 16.5	Pipe Flanges and Flanged Fittings

BUILDING CODE	International Building Code, IBC 2009
ARM	Low Temperature Impact Resistance (Falling Dart Test Procedure)
NSF/ANSI	Standard 61, AWWA – Drinking Water System Components
ASTM D-1998	Standard Specification for Polyethylene Upright Storage TanksNEMA ICS 6 Enclosures for Industrial Control and Systems

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

B. Shop Drawing information

1. Tank Material

   a. Resin Manufacturer Data sheet

   Information showing compatibility with chemical to be stored under the concentration and temperature conditions expected

   b. Fitting Material

   c. Color sample

   d. Gasket style and material

   e. Bolting material

2. Dimensioned tank drawings

   a. Location and orientation of openings, fittings, accessories, instrumentation, and anchors and supports

   b. Details of inlet and outlet fittings, manways, flexible connectors, and vents

3. Tank pad requirements such as blockouts where a full drain fitting is required.

4. Calculations stamped and signed by a registered engineer and certified by the tank manufacturer.

   a. Wall thickness. Hoop stress shall be indicated.

   b. Tank restraint system. Design for seismic and wind criteria in accordance with Section 01 33 17 – Structural Design, Support and Anchorage.

5. Electrical heat tracing installation details, sizing calculations, voltage, wattage and amperage, and thermostat details.

6. Insulation data and name of insulation Subcontractor.

C. Five year Full Replacement (minimum).

D. Manufacturer's unloading procedure

E. Manufacturer's installation instructions

F. Manufacturer’s written certification signed by a senior company officer stating that the tank design, type, and material is compatible with the indicated chemical to be stored in the tank.

G. Manufacturer’s Qualifications: List of at least five (5) tank installations in the same service installations documenting manufacturer's qualifications. Include names and telephone numbers for tank installations available for the ENGINEER to contact/visit.

H. Technical Manual: Include the following in Part 2 - Operational Procedures:

1. Manufacturer's recommendations for installation.

2. Installation and adjustment procedures to include foundation bolt and piping connections to the tank.

3. Repair procedures for typical situations, including small holes, pinholes, and minor cracks in the tank.

I. Factory Test Report

1. Tank nominal capacity and diameter, material, hoop stress design

2. Review audit for wall thickness

3. Fitting placement

4. Visual inspection

5. Impact Test

6. Gel Test

7. Hydrostatic Test

J. Certification: After inspecting the installed tank, a representative of the manufacturer shall certify in writing that the tank has been installed in accordance with the manufacturer's recommendations. Certification shall be submitted to the ENGINEER.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications

1. The tank manufacturer shall have a record of at least 10 installations during the previous 5 years for the tank sizes and for the chemicals indicated in this Contract.

2. All tanks shall be NSF 61 certified for applicable chemical being stored without the use of tank liner. Tank Manufacturer shall submit supporting documentation of Manufacturer's certification to NSF/ANSI Standard 61 – Drinking Water System Components.

3. Tanks shall be ISO9001-2015 certified.

1.5 SPECIAL WARRANTY REQUIREMENT

A. The tank shall be warranted for five (5) years to be free of defects in material and workmanship.

PART 2. PRODUCTS

2.1 GENERAL

A. Tanks shall be rotationally-molded high density crosslinked (HDXLPE), one piece seamless construction, cylindrical in cross-section, vertical in axis; complete with piping inlets and outlets, drains, and overflows installed by manufacturer; and anchoring system. Tanks shall be in accordance with ASTM D 1998 unless otherwise indicated. Lined or laminated tanks will not be accepted. Full drain bottom outlets for high density cross link tanks shall be molded into the bottom of the tank with the same material to include metal inserts and gaskets compatible with the chemicals to be stored. Dome and other fittings may be bolted onto the tank. Covered tanks shall be vented, and where indicated, tanks shall be provided with entrance manways and level indicators Tanks shall be marked to identify the manufacturer, date of manufacture, serial number, capacity, and chemical to be stored. Tank identification markings shall be permanently embossed into the tank.

B. Dimensions and tolerances shall be in accordance with ASTM D 1998. Measurements shall be taken with the tank empty, in the vertical position.

2.2 TANKS

A. Service: Chemical storage tanks shall be suitable for the operating conditions as specified in the tank equipment data sheets. The storage tanks shall be designed suitable for compressed air pneumatic filling from a tanker truck.

B. Required Tanks

Type	Chemical Stored	Size (Gallons)	Color
Bulk Storage	12.5% Sodium Hypochlorite Liquid Solution	1,000	Black
Day Tank	12.5% Sodium Hypochlorite Liquid Solution	65	White
Day Tank	Liquid Potassium Permanganate ($KMnO_4$)	65	White
Day Tank	Liquid Polymer (Coagulant)	65	White

C. Materials shall be virgin polyethylene as compounded and certified by the manufacturer, be the type indicated in the tank schedule, and shall meet or exceed the following:

1. Mechanical Properties of HDXLPE Tank Material

Parameter	ASTM Test Method	Value
Density of resin, gm/cc	D 1505	0.938 to 0.944
Tensile strength, psi (2-inches per min)	D 638	2600
Elongation at break, percent (2-inches per min)	D 638	400
ESCR (100 percent Igepal, Condition A, F50), hours	D 1693	1000
ESCR (10 percent Igepal, Condition A, F50), hours	D 1693	Greater than 1000
Vicat softening temperature, deg. F	D 1525	248
Flexural modulus, psi	D 790	100,000

2. High density croos link resin used in the tank shall be verifiable virgin and shall contain ultraviolet stabilizer as recommended by the manufacturer. Recycled

resins will not be allowed. Where black or white tanks are indicated, the resin shall be compounded black or white.

D. Construction

1. The minimum wall thickness of the cylindrical portion at any chemical depth shall be determined by ASTM D 1998 as modified by the following equation. Wall thickness shall be tapered, and no wall shall be less than 0.187 inch thick at the top.

   $T = (0.433 \times ASG \times OD \times H) / (2 \times SD)$

   Where:
   - T = wall thickness at any depth, in.
   - ASG = adjusted specific gravity of chemical (See Note A)
   - H = depth of chemical in tank ft
   - OD = outside diameter of tank, in.
   - SD = hydrostatic design stress, 600 psi (See Note B)

   Note A: The specific gravity of the fluid shall be multiplied by a service factor of 1.5 to 2.2, depending on the characteristics of the material stored within the tank. The service factor shall allow a design margin for a possible temperature excursion above 100 degrees F.

   Note B: The hydrostatic design stress shall be derated for temperatures above 100 deg F in accordance with ASTM D 1998.

   a. The minimum wall thickness shall be sufficient to support its own weight in an upright position without external support. Flat areas shall be provided for attachment of large fittings on the cylindrical portion.

2. The top head shall be integrally molded with the cylindrical wall. Its minimum thickness shall equal the thickness of the top of the wall. The top head of tanks 2000 gal and larger shall provide a minimum of 1300 square inches of flat surface for pipe nozzle locations.

3. The bottom head shall be integrally molded with the cylindrical wall. Knuckle radius shall be in accordance with ASTM D 1998.

4. Tanks with 2000 gal capacity or larger shall have at least 3 lifting lugs molded into the top head. Lugs shall be designed for lifting an empty tank.

5. Tie-down lugs may be molded into the top head.

6. Manway and Non-sealed Fill Cap

   a. Unless otherwise indicated by Contract drawings, for indoor pneumatic fill, manways shall be 24-in diameter or greater and equipped with an emergency pressure relief device with pressure relief at 6” water column to prevent over-pressurization. The manway shall be chemically compatible with the chemical being stored. Gaskets shall be closed cell, cross-linked polyethylene foam, Viton, or EPDM materials.

b. Unless otherwise indicated by Contract drawings, for outdoor pneumatic fill, manways shall be 24-in diameter or greater and equipped with combined manway and vent to prevent over pressurization of tank. Manway must be capable of relieving a volume flow rate of up to 2650 ACFM. Gaskets shall be closed cell, cross-linked polyethylene foam, Viton, or EPDM materials.

c. Unless otherwise indicated, tanks less than 2000 gallons in non-pneumatic applications shall have a manway cover 17-in or smaller of Polyethylene material with a coarse thread. Gaskets shall be closed cell, cross-linked polyethylene foam, viton or EPDM materials.

NOTE: Tanks must be vented to allow for performance at atmospheric pressure, in accordance with the following matrix:

Venting Requirements For Polyethylene Tanks

Mechanical Pump Fill	**Pneumatic Fill**								
IF ≤ 1000 gallons	**IF** - Vent length ≤ 3 feet			**IF -** Vent length > 3' and ≤ 30'			**IF** - Scrubber Application		
Vent size should equal size of largest fill or discharge fitting	**AND - Vent** screen mesh size ≥ 1/4" or no screen used			**AND -** 3 or less 90° elbows with no other restrictions or reduction in pipe size			**Vent pipe size throughout scrubber system CANNOT be reduced!** Centerline of dispersion pipe not to be submersed > 6 inches		
IF > 1000 gallons	**Emergency Pressure Relief Cover Required**			**Emergency Pressure Relief Cover Required**			Perforated dispersion pipe must be same diameter or larger, as vent. Sum of perforations ≥ cross sectional area of pipe		
Vent size should exceed the largest fill or discharge fitting by 1 inch	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size	Tanker Discharge	Inlet/Fitting Size	Minimum Vent Size
	2"	2"	4"	2"	2"	6"	2"	2"	6"
	3"	2"	6"	3"	2"	6"	3"	2"	8"
	3"	3"	6"	3"	3"	8"	3"	3"	10"

(2) 2 inch vents **DO NOT EQUAL** 4 inch venting capacity rev. Nov 2006

For detailed venting guidelines, please visit our Technical Resources at www.polyprocessing.com

E. Fittings

1. Tank fittings shall be according to the fitting schedule as shown on the drawings. Gasket material shall be suitable for the chemical. Fittings shall be compatible with the chemical stored, and shall be bolted double flanged fittings, Schedule 80, or threaded bulkhead type. Threaded fittings shall use American Standard Pipe Threads. No metals shall be exposed to tank contents.

2. Bolted flange fittings shall be constructed with two 150 psi flanges, two 150 psi flange gaskets, and the correct number and size of all-thread bolts recommended by the flange manufacturer. Flanges shall be constructed of PVC type 1, grade 1. Gaskets shall be min 1/4-in thick, constructed of 40 to 50 durometer EPDM, 60 to 70 durometer Viton, or material compatible with the chemical in the tank. There shall be minimum 4 full-thread bolts. Bolt heads may be gasket-flanged or may be encapsulated in a type of polyethylene compatible with the chemical stored. If encapsulated, the bolt head shall not contact the fluid in the tank and shall cover the head plus 1/4-in of threads away from the head. Polyethylene shall be color coded to identify the bolt metal underneath. Encapsulated heads shall have a gasket to provide

a sealing surface against the inner flange. Bolt holes shall straddle the principal centerline of the tank in accordance with ASME B16.5

3. Integrally Molded Fittings (IMF). Full drain bottom outlets for high density cross link tanks shall be molded into the bottom of the tank with the same material to include metal inserts and gaskets compatible with the chemicals to be stored.

4. Down Pipes and Fill Pipes: Down pipes and fill pipes shall be supported at 5-ft max intervals with support from standard bulkhead fitting tank attachments or welded PE supports. Down pipes and fill pipes shall be PVC or material compatible with the chemical stored.

5. U-Vents: Each tank must be vented for the material and flow and withdrawal rates expected. Vents should comply with OSHA 1910.106(F)(iii)(2)(IV)(9) or shall be as large as the filling or withdrawal connection, whichever is larger, but in no case less than 1-in nominal inside diameter. U-vents shall be sized by the tank manufacturer and be furnished complete with insect screen. U-vents shall be constructed of PVC or material compatible with the chemical stored.

6. Flange Adapters: Adapters may be used to adapt threaded or socket fitting components to 150 psi flange connections. Adapters shall be of material compatible with the chemical stored.

7. Ladders: Ladders shall be constructed of FRP. Ladders must be designed to OSHA standard 2206; 1910.27. Ladders shall be mounted to the tank in such a way that tank expansion and contraction are not restricted. Top ladder mounts shall be connected to the tank as appropriate.

8. Cone Bottom Supports: Cone bottom supports shall be for 15, 30, 45, or 60 degree style as indicated and have rated gross weight capacity. Design for safety factor of 2.4 on wind and seismic forces. Materials shall be painted steel stainless steel.

9. Attachments: Pipe attachments at fittings shall be equipped with flexible couplers or other provisions for movement. Piping attachments shall allow for 3 to 4 percent movement.

2.3 LEVEL INDICATON

A. Level indication shall be provided and installed with bulkhead fitting on top of tank. Provide and install reverse float sight gauge assembly with schedule 40 PVC tubing, Part No. 14987 as manufactured by Den Hartog Industries, Inc., or approved equivalent.

2.4 TANK STANDS, SEISMIC, AND WIND RESTRAINT SYSTEM

A. The tank shall be provided on a stand or support as indicated and shall be bolted to the floor or concrete foundation system.

B. Wind restraint for outdoor tanks shall be designed to resist a wind velocity of as specified in Structural General Sheet GS-1 with the tank empty.

C. Hardware and brackets for tie-down shall be 316 SS and top mounted polyethylene clips. No metal clips are allowed.

2.5 SAFETY SIGNS

A. Each tank shall be clearly marked with hazardous material warning signs, 10-inches by 14-inches in size. Each sign shall have the word "DANGER" and the name of the chemical stored, printed in large block letters and mounted directly adjacent to the tank outlet and tank inlet. Each entry manway shall be provided with a sign reading "DANGER--CONFINED SPACE--HAZARDOUS ATMOSPHERE".

2.6 FACTORY TESTING

A. Material Testing

1. Low temperature impact test: Condition samples taken from fitting cutouts frozen for 2 hours at minus 40 degrees F. Perform impact tests in accordance with ASTM D 1998. Specimens less than 1/2-in thick shall be tested at 100 ft.-lb. and specimens equal to or thicker than 1/2 -in shall be tested at 200 ft.-lb.

2. Degree of cross-linking (applicable to cross link material only): Use Method C of ASTM D 2765 to determine the ortho-xylene insoluble fraction of cross-linked polyethylene. Samples from the inside of the tank 1/8-in deep shall test at no less than 65 percent.

B. Tank Testing

1. Dimensions: Take exterior dimensions with the tank empty, in the vertical position. Outside diameter tolerance, including out-of-roundness, shall be per ASTM D 1998. Fitting placement tolerance shall be 1/2-in vertical and 2 degrees radial.

2. Visual: Inspect for foreign inclusions, air bubbles, pimples, crazing, cracking, and delamination.

3. Wall Thickness

a. Tanks 2000 gal or larger shall be measured for wall thickness by ultrasonic methods at 6-in, 1-ft, 2-ft, and 3-ft up the sidewall at zero and 180 degrees around the circumference from the outlet.

b. Tanks smaller than 2000 gal may be tested during a production run and the results reported as representative of each tank in the run.

4. Hydrostatic test: Following fabrication, the tanks, including inlet and outlet fittings, shall be hydraulically tested with water by filling to the brim for a minimum of 4 hours and inspecting for leaks. Following successful testing, the tank shall be emptied and dried prior to shipment.

C. An affidavit signed by the tank manufacturer shall be furnished indicating that the factory tests have been performed and the indicated requirements have been met.

PART 3. EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the manufacturer's recommendations.

3.2 FIELD TESTING

A. After installation of tank and connections, the tank shall be water tested by filling the entire tank with water and monitoring the tank and connections for at least 24 hours. Leaks shall be corrected prior to acceptance. Following successful field testing, the tank shall be completely emptied and dried.

END OF SECTION

SECTION 46 33 44

LIQUID CHEMICAL FEED SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. A Skid mounted chemical feed system as specified herein shall be furnished and installed at the following locations:

Location	Chemical	No. of Feed Pumps
Chemical Feed Room	Sodium Hypochlorite	2 (Duplex)
Chemical Feed Room	$KMnO_4$	2 (Duplex)
Chemical Feed Room	Polymer	2 (Duplex)

All materials of construction shall be appropriate for the chemical intended to be pumped.

1.02 MANUFACTURER

A. General: Provide the chemical feed equipment as manufactured by the following:
   a. Chemical Feed Skid
      i. Lutz-JESCO America Corporation.
      ii. Blue-White Industries.
      iii. Approved equal.

1.03 DESIGN

A. Each chemical feed system shall be capable of and perform the following:
   a. Receive a signal from the well pump system initiating a pump start and stop; and receive a signal from the flow meter and base the flow rate on the meter reading. The spare pump supports two different wells and therefore shall be capable of automatically replacing either of the two pumps.
   b. Each system shall be supplied with a SCADA/RTU unit as supplied by Red Group, and capable of sending all information via the Red Group SCADA/RTU unit.
   c. For the chemical storage tank, send a liquid level and alarm via the Red Group SCADA/RTU unit.

d. Send an alarm via the Red Group SCADA/RTU unit in the event of any pump failure.
e. Read and send via the Red Group SCADA/RTU unit, chlorine and turbidity residual readings, and send an alarm if outside of a programmable set range.
f. Send via the Red Group SCADA/RTU unit, pump operation (start, stop, on, off)
g. Be capable of remote operation.

1.04 CONSTRUCTION

A. General: The multiple pump chemical metering skid shall be completely self contained and designed to safely feed metered amounts of Sodium Hypochlorite or ammonium sulfate as shown on the Drawings. The chemical metering skid shall include identical chemical metering pumps for each system and accessories to offer complete redundancy. A local control panel shall also be supplied prewired to all skid mounted connections. This will be connected to skid via flexible conduit for wall or “unistrut” frame mount. The metering pumps shall be capable of both manual and automatic modes of operation utilizing a 4-20mA signal via VFD. The chemical metering skid will be completely assembled and tested prior to delivery to the jobsite.

All material and equipment that may come in control with the treated water shall be NSF certified; and proof of said certification shall be submitted to Engineer prior to supplying the material and equipment. All materials and equipment shall comply with the appropriate AWWA standard.

1. Multiple Pump Chemical Metering Skid

a. The chemical metering skid shall be constructed from solid black High Density Polyethylene having a minimum thickness of 1/2”. The skid shall be assembled using thermal welding technology. Skid Manufacturer shall be DVS 2212-1 Certified. Bolted construction is not acceptable.
b. The design of the skid shall include a solid base, back panel and side panels with clear acrylic/polycarbonate sliding door front and solid HDPE top. A minimum 2” lip shall be provided at the front to offer level of containment and a drain plug will be provided for wash down purposes. Pedestals shall be provided to elevate the metering pumps above the containment level.

c. Each chemical feed metering pump must include (1) Back Pressure Valve, (1) Pressure Relief Valve, (1) Pulsation Dampener, (1) Diaphragm Protected Pressure Gauge, (1) Calibration Column (per skid) and all required piping, ball valves and supports. Piping shall include isolation valves and unions for all serviceable components. Pulsation dampener shall be self supported as to not submit strain or load to the system piping. Accessories shall be constructed of materials suitable for use with the intended chemical.

d. All piping shall be schedule 80 PVC. The skid manufacturer shall perform assembly in a controlled shop environment. All pipes shall be squarely cut with precision equipment. All socket-welded connections shall follow the guidelines set by the pipe\fitting manufacturer for proper cleaning, priming and gluing procedures. A medium bodied solvent (weld on 724) suitable for use with the intended chemical shall be used. All threaded connections will utilize Teflon tape, a suitable thread sealant or a combination of both.

e. The piping will attached to the chemical feed skid with non-metallic corrosion resistant support systems. All supports shall be welded to the chemical feed skid. Bolted or screwed supports are not acceptable. The straps shall be removable and reusable for servicing. All inlet\outlet connections shall be marked clearly for installation. The skid system shall be tested at the factory or by a factory certified representative on a computerized calibrated test stand to ensure rated flow, pressure, and hydrostatic conditions are met.

B. Pumps shall be a peristaltic-type chemical feed pump and shall be a heavy duty modular design suitable for 24 hr/day operation for the intended chemicals. Pumps shall be Lutz-Jesco America - Peridos Series, Blue-White Model A2v24, or approved equal.

1. Provide three (3) duplex metering pump systems meeting the following Process Conditions:

Pump Model	Lutz-JESCO America Peridos
Quantity	2
Tag Number	To be determined
Fluid Being Metered	Sodium Hypochlorite, Potassium Permanganate, Polymer
Viscosity (cps)	Chemical specific
Specific Gravity	1

Tubing Material	Designed for the intended chemical
Pump RPM Range	To be determined by manufacturer
Min Flow Rate (GPH)	0
Max Flow Rate (GPH)	0.4
Fittings	Peristaltic Tube, PVC 1/4X7/16
Discharge Pressure (PSI)	100
Power Input	110V

2. Process Conditions
   a. The stainless steel pump head shall have a spring loaded roller assembly utilizing high performance 3/32" (2.4mm) thick wall extruded tubing specifically formulated for use in peristaltic pumps.
   b. The pump head shall be capable of accepting a minimum of 6 different tubing diameters.
   c. Pump head roller assembly shall have adjustable occlusion to optimize pump performance. Rigid roller assembly designs shall not be acceptable.
   d. Pump head design shall be capable of pressures up to 100 psi (depending on tubing sizes) with a suction lift to 30 ft. vertical water column and run dry without damage.
   e. One of the two spring loaded roller shall be fully engaged at all times to prevent backflow or siphoning.
   f. The tubing shall be in contact with the inside diameter of the pump head through an angle of 180 degrees and be held securely on the suction and discharge with a Viton tube seal.
   g. The pump head shall be a completely sealed design to prevent fluid leakage.
   h. Any fluid leakage due to a tubing rupture shall be completely contained within the pump head.

3. Speed Reducer / Adapter Flange
   a. Speed reducer shall be a right angle type for vertical motor mounting.
   b. The speed reducer output shaft shall be stainless steel.
   c. Maximum speed shall not exceed 220 RPM for 2.4mm wall tubing. The speed reducer shall use standard NEMA 56C face flanged motors. Metric or special flange motors are not acceptable.
   d. Gear reducer mounting feet shall be stainless steel. Mounting feet design shall be flared for additional stability.
   e. All mounting hardware shall be stainless steel.
   f. Gearbox finish shall be corrosion resistant two part epoxy.
   g. The speed reducer adapter flange shall have a Viton lip seal to prevent fluid leakage between pump head/adaptor/speed reducer.

h. Motor mounting shall be close coupled and self-aligning. No flexible coupling will be permitted.

4. Motor
   a. The motor shall be inverter duty TEFC type with standard NEMA 56C face mounting flange.
   b. Motor shall be capable of operation in a space saving vertical orientation.
   c. Motor shall have corrosion resistant two part epoxy coating identical to the speed reducer.
   d. Motor shall have integral junction box for internal wiring.
   e. Motor shall be capable of operating over a 150:1 turndown range with the minimum being 0.6 HZ.
   f. Motor shall be 1/3 HP, 230 Volt, 3 phase, 50/60 hz

5. Tubing and connectors
   a. The pump tubing shall be extruded from Floprene or other suitable material based on chemical compatibility. All tubing sizes will have a uniform wall thickness of 2.4mm.
   b. The pump head must accept tubing sizes from 1.6mm to 9.6mm ID.
   c. Leak-proof 4 piece machined PVC tubing connectors specifically designed for peristaltic pump tubing shall be provided. Inserts to be color coded for specific tubing sizes. The use of metal hose clamps will not be permitted.

6. Speed Controller
   a. The controller shall be remote wall mounted and housed in a NEMA 4 enclosure. Open frame controller enclosures will not be acceptable.
   b. Controller shall have an 6-position membrane keypad and integral LED display.
   c. Controller can be operated in manual or automatic mode via 4-20mA input. In automatic mode the speed range shall have the capability of being optimized to the input signal.
   d. Entering the controller's programming mode for operation change is not required.
   e. Controller shall have the capability to accept a contact closure from an optional tubing rupture detector. The capability of starting a back-up pump shall also be provided.
   f. The controller display shall be capable of being programmed in the following engineering units:
      .1. GPH
      .2. Percentage Full Scale
      .3. Percentage Hz

g. The controller shall have an integral run timer to monitor tubing life.

h. The controller shall have the following additional input and output functions:
   .1. 4-20mA or 2-10VDC speed reference – output
   .2. Fault – output
   .3. Loss of input signal – output
   .4. Run/Stop – output
   .5. RS-485 serial communications (optional)
   .6. Remote start/stop – input

i. Controller shall have password protection to prevent unauthorized programming changes.

7. Tubing Rupture Detection

a. Tubing Rupture Detector shall be provided to automatically shut down the pump and signal an alarm in the event of a tubing rupture within the pump head. The system shall consist of a sensor directly installed on the pump head and a wall mount controller/indicator. The detector shall have the following features:

- Sensor shall have no moving parts
- LED signals alarm condition
- 5 amp @ 250VAV DPDT latching relay
- Single reset pushbutton
- 115 VAC input

1.05 ACCESSORIES

A. The following accessories are to be included on the chemical feed skid system:

1. (1) Calibration Column shall be provided and installed in the chemical supply piping as close to the metering pumps as possible. The top of the calibration column shall be vented back to the supply container for overflow protection.

2. (2) Back Pressure Valve shall be provided to regulate the back pressure in the system. The back pressure valves shall be constructed of PVC/Polypropylene with a Teflon diaphragm. Back pressure valves shall be model J2601XX-BPV as manufactured by Lutz-JESCO America Corp or Griffco.

3. (2) Pressure Relief Valve shall be provided to provide protection against excess line pressure. The pressure relief valves shall be constructed of PVC/Polypropylene with a Teflon diaphragm. Pressure relief valves shall be model J2601XX-PRV as manufactured by Lutz-JESCO America Corp or Griffco.

4. (2) Pulsation Dampeners shall be provided and sized for a minimum of 90%

dampening. Pulsation dampeners must be of the inline design with PVC/Polypropylene housings and Viton/Hypalon Diaphragms. The dampener must include a 2 ½" pressure gauge and gas charging valve. Pulsation dampeners shall be model PDS as manufactured by Lutz-JESCO America Corp.

5. Piping and Valves shall be solvent welded schedule 80 PVC with Viton/Hypalon o-rings and diaphragms. Diaphragm valves must be true union style.

6. (2) Diaphragm Protected Pressure Gauges shall be provided for indication of system pressure. PVC gauges shall be utilized and the isolators shall have a PVC body with Teflon sealing diaphragm and suitable liquid filling.

7. Y-strainers are to be installed in the suction line of each metering pump.

8. A Local Control Panel shall be mounted on Skid system. Panel should include a manual A/B pump selector switch as well as provide local indication of pump failure.

9. Spare Parts kit shall be provided with the Chemical Feed Skid and delivered to the OWNER and must contain:

    a. (1) Maintenance kit for each installed chemical feed pump. The kits shall include diaphragm, check valve seats, o-rings, and seals.
    b. Spare diaphragms for the pulsation dampeners, PRV, and BPV. Qty one for each CFS skid system.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Provide a chemical feed system consisting of a chemical supply storage tank from which the chemical solution is pumped through piping or tubing, as appropriate, to the point of application. Include with each chemical feed system controlled-volume pumps, tanks, mixers, gauges, back pressure regulators, strainers, pressure relief valves, sight glasses and flow metering devices, check valves, and hand valves.

2.02 PERFORMANCE REQUIREMENTS

A. Capacity and features of the chemical feed systems and accessories must be suitable for 24-hour full load service in ambient, non-freezing conditions.

2.03 SUBMITTAL DATA

A. Submit manufacturer's performance charts, and pump curves. List of materials, list of equipment, including a complete list of parts and supplies with current unit prices and source of supply. List of special tools for each type of equipment furnished including special tools necessary for adjustment, operation, maintenance, and disassembly.

2.04 EXTENDED WARRANTY

A. Provide Manufacturer’s extended warranty to cover system components for two (2) years.

2.05 NAMEPLATES

A. Secure a plate to each major item of equipment containing the manufacturer's name, address, type or style, model or serial number, and catalog number.

PART 3 – EXECUTION

A. Install the multiple pump chemical metering skid as indicated on the drawings and specified and in compliance with the manufacturer’s instructions.

B. Upon completion of the installation, a full operating test shall be performed in the presence of the Owner, Engineer and a qualified manufacturer’s representative. The contractor shall furnish all the labor, materials and equipment required for such a test and shall correct any installation related deficiencies noted.

C. The manufacturer shall provide a 24-month warranty for the metering pumps. The warranty shall cover all material and moving parts of the metering pump.

END OF SECTION

SECTION 46 41 17

INLINE STATIC MIXERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

The Contractor shall provide and install an in-line static mixer at the location as shown on the drawings. The in-line static mixer shall be used to blend chlorine and ammonia in the finished water prior to storage or distribution.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Reserved

B. Reserved

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer, within ten days after signing of the contract, a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.

B. The Contractor shall submit for approval, as provided in the General Conditions, complete, detailed working drawings of all ductile iron pipe and fittings.

D. The Contractor shall submit the manufacturer's certification of compliance with the specifications.

PART 2 - PRODUCTS

2.01 IN-LINE STATIC MIXER

A. The static mixer shall incorporate tabular mixing arrays, which shall induce high efficiency mixing vortices. The mixer shall be a Kenics HEV-FRP-2, Stratiflo Series 650 or approved equal.

B. The static mixer shall incorporate the required number of tabular arrays to provide mixing at the following design conditions. The coefficient of variation three diameters downstream from the mixer shall not be greater than 0.05 (95% Efficient) at all design flow rates.

	Main Stream Flow Rate
Min. Flow Condition	750 GPM
Avg. Flow Condition	800 GPM
Peak Flow Condition	850 GPM

C. The static mixer shall maximize energy efficiency by providing complete mixing with minimum pressure loss across the mixer. Pressure drop through the mixer shall not exceed 0.20 psi at a flow rate of 15 MGD. Mixers with a pressure drop higher than 0.20 psi at a flow rate of 15 MGD will not be considered or approved.

D. The static mixer shall incorporate mixing arrays of sufficient thickness and flexural rigidity to withstand the hydrodynamic forces of the process flow, the static head of the process flow and the supported process fluid when installed horizontally.

E. The static mixer shall be rated for 250 psi at 180F with a minimum safety factor of 10:1.

F. The static mixer shall be constructed using an integral design with fiberglass reinforced vinyl ester resin or epoxy coated steel with stainless steel mixing elements. Each mixing element must be attached directly to the housing wall and cannot rely on adjacent elements, rods, retaining grates, fasteners or any other device for retention within the mixer.

G. The static mixer shall incorporate materials, construction, and workmanship equal to or in excess of that required by NBS Voluntary Standard PS-1569.

H. The projected area of the mixing elements, in the plane perpendicular to the mainstream flow, cannot exceed 17% of the total cross-sectional area.

I. At no point may any components of an individual element or adjacent elements intersect or come in direct contact with one another.

J. The static mixer's exterior surface shall be finished with a pigmented protective gel coating to inhibit resin breakdown by UV radiation.

K. The inner surface of the mixer housing and all exposed mixing tab edges shall have a minimum of 100-mil corrosion barrier. In addition, the exposed mixing array edges shall be coated with paraffinated resin.

L. Vendor must establish compliance with mixer performance criteria by providing independent test data confirming uniformity and pressure drop predictability in a similar flow regime.

PART 3 - EXECUTION

3.01 INSTALLATION OF INLINE STATIC MIXER

A. Storage and handling shall be in accordance with recommendations of the manufacturer.

B. In-line static mixer shall be installed at the location as shown on the drawings and in accordance with recommendations of the manufacturer.

3.02 TESTING

A. Pressure and leakage testing shall be performed in accordance with Section 33 05 19 Ductile Iron Pipe and Fittings.

3.03 CLEANING AND DISINFECTION

A. Cleaning and disinfection shall be performed in accordance with Section 33 05 19 Ductile Iron Pipe and Fittings.

END OF SECTION

SECTION 46 61 21

VERTICAL PRESSURE FILTERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section of the specifications provides for an automatic pressure type filtration system complete and operable as indicated on the drawings and as specified herein.

B. The following items shall be included in this section and are to be furnished by the water treatment equipment manufacturer:

1. Treatment Vessels
2. Inlet Distributor/Waste Collectors
3. Underdrain Distributors
4. Support Gravel
5. Filtration Media
6. Control and Isolating Valves
7. Filter Face Piping
8. System Interconnecting Piping
9. Control Panel
10. Equipment Installation

C. All interconnecting wiring and conduit, motor starters, and appurtenant electrical work running up to the filtration system shall be furnished and installed by the general contractor in accordance with Division 26 – ELECTRICAL.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 23: Shop Drawings, Working Drawings, and Samples
B. Section 33 05 19: Ductile Iron Pipe
C. Section 09 91 00: Painting
D. Section 40 63 00: Control System Equipment (SCADA)
E. Section 33 05 31.13: PVC Pipe and Fittings
F. Section 40 05 61: Valves and Appurtenances

1.03 REQUIREMENTS

A. The base bid shall be for a filter system as manufactured by one of the following suppliers, all in accordance with the following detailed specification and as shown in the drawings.

- Hungerford & Terry, Inc., Clayton, New Jersey, (856-881-3200)
  (Local Rep: Environmental Technical Sales, Inc., 7731 Office Park Blvd.
  Baton Rouge, LA 70809, 225-295-1200).

- AdEdge Water Technologies, LLC, Duluth, Georgia, (678-835-0052)
  (Local Rep: QSM, 2250 Richland St. Kenner, LA 70062, (985-859-9681)

- DeNora Water Technologies, LLC, Sugar Land, Texas, (281-240-6770)
  (Local Rep: Fluid Process & Pumps, 405 Commerce Point, Harahan, LA 70123, (504-733-1330)

- WesTech, Salt Lake City, Utah, (801-265-1000)
  (Local Rep: Gulf States Engineering Co., Inc., 17961 Painters Row, Covington, LA 70435, (985-893-3631)

- Roberts Filter Group, Coatesville, Pennsylvania, (610-583-3131)
  (Local Rep: Coastal Process, LLC, 28750 James Chapel Road, Holden, LA 70744, (225-567-3120)

- Culligan Water, Rosemont, Illinois, (877-540-9072)
  (Local Office: Culligan of Baton Rouge, 7102 Greenwell Springs Rd. Baton Rouge, LA 70805, (225-925-2260)

B. All equipment shall be provided by the same vendor and manufacturer.

C. The Contractor shall base his/her bid using the equipment specified within this specification or on the Drawings. Substitute equipment or equipment not meeting the dimensions, materials or performance standards will not be considered in the base bid.

1. Manufacturers of filtration equipment must be an American owned and operated company and furnish proof of successful operating experience during the last ten (10) years on ten (10) municipal installations comparable in size and flow rate to that specified herein. References shall be required and contain the following

    a. End user contact information (contact, email, phone number, company name and address)

b. Engineer contact information (contact, email, phone number, company name and address)

c. Contractor contact information (contact, email, phone number, company name and address)

2. Manufacturers must accept responsibility for the satisfactory operation of the entire filtration system and equipment specified below

3. A Guarantee for a period of one (1) year from the date of acceptance that all equipment is free from defects in design, materials, and workmanship shall be supplied by the system manufacturer. Furnish replacement parts for any defective component at no cost to the owner.

4. A Guarantee for a period of nine (9) months for the date of acceptance for any damages associated with filter underdrain failure, media failure or internal inlet and backwash water piping shall be repaired and/or replaced by the filter manufacturer (inclusive of labor) at no cost to the Owner.

5. Local representative of the filter manufacturer shall be authorized to make repairs to the filter equipment and sell spare parts from the manufacturer.

1.04 SUBMITTALS

A. The filtration equipment supplier shall submit to the Engineer a .pdf document with complete sets of shop drawings, details, data sheets, and other descriptive drawings and material as may be required to fully describe the equipment proposed and to verify compliance with the contract documents.

B. All submittals shall be complete, neat, and orderly. The submittals shall include the following, as applicable:

1. Custom, CAD generated shop drawings pertinent to this specific application showing interconnections of the components in the system, including scaled double line piping drawings (schematics will not be acceptable), control logic schematic/wiring diagrams, control panel drawings to include front panel view, internal wiring detail, and panel internal arrangements, control panel equipment charts, equipment arrangements, installation and erection details, anchor bolts, equipment pads, etc.

2. Detailed descriptions of each piece of equipment specified.

3. Description of the operation and control of the equipment along with an annotated copy of the as built control logic program.

4. Three (3) copies of an Operation & Maintenance Manual operation and maintenance requirements for the system as well as a digital .pdf version.

1.05 PERFORMANCE AND DESIGN REQUIREMENTS

A. The pressure filter system shall be specifically designed to provide filtration and treatment for iron and manganese removal from groundwater. The filter media shall consist of GreensandPlus and anthracite. A sodium hypochlorite chemical feed system shall serve to catalytically regenerate the GreensandPlus.

B. Design requirements are as follows:

1. The pressure filter units shall be designed based on the following requirements:

a. System design flow rate	800 GPM
b. No. of Filter Units:	4 UNITS
c. Diameter of units:	9'-0"
d. Filter loading rate with all 4 units in operation:	3.14 gpm/ft^2
e. Filter loading rate with 3 units in operation:	4.19 gpm/ft^2
f. Filter backwash rate (maximum)	15 gpm/ft^2
g. Normal maximum operating pressure	100 PSI

2. The external filter piping shall utilize ductile iron flanged pipe with pipes designed to yield conservative pipe velocities and to minimize floc shearing on influent pipes and potential underdrain displacement. It is also assumed that at least 3 filters will be in use at any time and that filters will be backwashed one filter at a time. Maximum velocities for pipes shall be as listed below:

a. Filter influent manifold pipes. Maximum velocity = 3.40 ft/sec
b. Filter influent flow to a single filter. Maximum velocity = 1.8 ft/sec
c. Filter effluent manifold pipes. Maximum velocity = 3.40 ft/sec
d. Backwash water inlet pipes (single filter). Maximum velocity = 6.1 ft/sec
e. Backwash water discharge pipes. Maximum velocity = 6.1 ft/sec
f. Rinse (Filter-to-Waste) pipes. Maximum velocity = 6.9 ft/sec

3. Sample ports shall be installed at the following locations:

a. Filter influent manifold

b. Filter effluent discharge (each filter)
c. Filter effluent manifold (most downstream point)
d. Filter backwash discharge (each filter)

C. Performance Testing and Remedies:

1. Contractor shall install a temporary filter influent line from the on-site well head to the influent filter manifold for initial filter performance testing and startup. The temporary influent water supply shall be adequate for 200 gpm. The chemical feeds (sodium hypochlorite, polymer and permanganate) associated with this project can be used to provide the required chemical feed. The contractor shall also provide an in-line static mixer for the temporary line (to be located near the well head) and any temporary valves and fittings needed to supply water to the filters.
2. The Contractor/Filter Supplier shall conduct a continuous 24-hour testing of each filter that will simulate a filtration rate of 3.14 gpm/ft^2. All filtered water (effluent) shall be discharged through the rinse (or filter-to-waste) line and disposed to the backwash water system.
3. Data to be collected during the performance testing of each filter include:
    a. Date and time
    b. Flow rate (gpm)
    c. Influent and effluent pressure gauge readings
    d. Turbidity readings of influent and effluent
    e. Free chlorine residual of the influent (collected at filter) and effluent (collected at filter).
    f. pH (using field calibrated pH probe)
    g. Iron and Manganese concentrations using field testing equipment.
    h. Iron and Manganese concentrations using an EPA Certified Lab
    i. Total Coliform testing of filter effluent (at end of filter run)
4. Data collection and frequency for each filter shall include the following:
    a. Date, time, flow rate, influent and effluent pressure readings, turbidity, pH,and free chlorine:
        i. Every 15 minutes for the first 2 hours of operation
        ii. Every hour for the remaining 22 hours of operation.
    b. Iron and Manganese (using EPA Certified Lab) at the beginning, midpoint and end of each filter run (3 samples total for each filter). Samples to be collected at well head and filter effluent.
    c. Total Coliform at the end of filter run. Coliform testing shall be performed by an EPA Certified Lab.
5. A testing report (3 copies) shall be prepared and submitted to the Engineer/Owner. Report shall include:
    a. Brief narrative about purpose of filter performance testing.
    b. Schematic of the testing program.

c. P&ID Diagram showing sampling locations
d. Pictures of temporary and permanent facilities used during testing.
e. Graphical results for water quality data
f. Data sheets showing collected data
g. Lab results from Certified Labs

PART 2 - PRODUCTS

2.01 EQUIPMENT DESIGN

A. Filter Tanks:

1. System will consist of four (4) vertical pressure filters, 108 inch O.D. by 66 inch straight shell.

2. The filter tanks shall be of welded steel construction using SA-516 Grade 70 steel, and shall be tested to withstand a hydrostatic pressure 30% in excess of the designed working pressure of 100 psi. The tanks shall be designed in accordance with the requirements of the latest ASME code section VIII construction and include the code stamp.

3. Tanks are to include the following features:

    a. One (1) 18 inch x 24 inch elliptical manhole at the top of the tank with a spare gasket.
    b. One (1) 18 inch x 24 inch elliptical manhole on the side of the tank, located 60 inches above the bottom of the tank, with a spare gasket.
    c. Flange nozzle type connections as shown on the drawings.
    d. Four (4) lifting lugs.
    e. Four (4) structural steel I-beam type support legs placed under the tank head.
    g. Tank interiors are to be cleaned and free of any debris or contaminates
        i. Tank exteriors to be primed per painting specification
        ii. Finish painting of the tank exteriors shall be furnished and field applied by others in accordance with the painting section of the specification.

B. Filter Inlet Distributors:

1. Each filter shall be furnished with an H-type inlet distributor/backwash collector system designed with schedule 80 PVC pipe or stainless steel pipe. The hub will be will extend down from the tank top head via

flanged connection. Laterals will include two (2) lateral arms, each ending with two (2) upturned elbows. Interior inlet piping shall utilize flanged Schedule 80 PVC pipe and fittings or stainless steel piping and fittings. The distributing system shall be designed for uniform distribution of inlet water over the entire filter bed and for the uniform collection of the backwash water during the backwash operation. A trough or splash plate type distributor will not be accepted.

2. The inlet distributors are to be installed by the filter manufacturer prior to shipment.

C. Underdrain System:

1. Each filter shall be furnished with a non-ferrous underdrain system designed to uniformly distribute backwash water and for collection of filtered water. The distributor shall be of the hub-curved radial lateral type design. The hub shall be of polypropylene construction. The laterals shall be constructed of schedule 80 PVC, and are to be curved to follow the contour of the tank bottom head. The filter tank bottom head is to include #304 stainless steel threaded studs and clips to securely clamp the laterals in place.

2. To prevent hideout, the space under the underdrain laterals must be less than one inch.

3. The underdrain systems are to be installed by the filter manufacturer prior to shipment.

4. To ensure uniform quality underdrain equipment shall be custom made in the shop of the system manufacturer. Premanufactured underdrain nozzles will not be accepted.

D. Gravel Supporting Bed:

1. A gravel support bed shall be incorporated in the bottom of each vessel, consisting of five (5) layers of graded gravel, with the largest size gravel loaded into the filter first and the succeeding smaller sizes placed on top. The gravel graduations shall be as follows. A three or four layer gravel bed will not be accepted. Gravel sizes deviating from those provided below will not be accepted

1/8" x 1/16"	3.0 inches
1/4" x 1/8"	3.0 inches
1/2" x 1/4"	1.5 inches
3/4" x 1/2"	1.5 inches
1.5" x 3/4"	3.0 inches

2. The gravel shall be washed and shipped in clearly marked fifty(50#) pound bags. The gravel must meet the requirements of the American Water Works Association (AWWA) Specification number B-100-89.

3. All gravel is to be field installed by the general contractor.

E. Filtration media**:**

1. Each filter is to be provided with a 24 inch deep bed of GreensandPlus. The GreensandPlus is to meet the following criteria:

b.	Specific gravity:	approx. 2.4
c.	Effective size:	0.30 - 0.35 mm
d.	Uniformity coefficient:	less than 1.6
e.	Screen grading:	18 x 60 mesh

6. In addition to the GreensandPlus filter media, the equipment supplier shall provide a 12" depth of specially graded anthracite cap. The anthracite is to meet the following criteria:

a.	Specific gravity:	approx. 1.6
b.	Effective size:	0.8 - 1.2 mm
c.	Uniformity coefficient:	less than 1.6

7. The total GreensandPlus and anthracite bed depth shall total 36 inches.

8. The anthracite shall be shipped in one (1) cu.ft. bags. Gravel shall be shipped in one half ½ cubic foot bags on pallets, and the GreensandPlus shall be shipped in ½ cubic foot bags on pallets.

9. All media shall be accepted under ANSI/NSF Standard 61.

10. GreensandPlus shall be loaded into the filters and conditioned in accordance with the manufacturer's recommendations.

11. All filter media is to be field installed by others.

12. The general contractor shall furnish 40 pounds of HTH (65% available chlorine by weight) for every 100 cubic feet of GreensandPlus filter media as required for the initial conditioning of the media.

F. Filter exterior valving and piping:

1. Each filter shall be furnished with an automatic and manual valve nest exterior consisting of the following. Filter valve nest must contain a minimum of five automated control valves per filter.

    a. Automatic valving:

    Bray Series 3W butterfly control valves with wafer style cast iron bodies, nylon coated discs, metal reinforced EPDM seats, with Bray Series 70 electric motor operators with auxiliary limit switches, and anti-condensation heaters.

    Valves are to be furnished for the following filter sequences:

        1. Inlet
        2. Outlet
        3. Backwash inlet
        4. Backwash outlet
        5. Rinse outlet

    b. Manual isolating valves:

    Bray Series 3W butterfly valves with wafer style cast iron bodies, nylon coated discs, field replaceable EPDM seats, and manual gear operators.

    Valves are to be furnished for the following:

        1. Inlet isolating
        2. Outlet isolating

    c. Manual ball valves:

    Apollo model 70 or equal stainless-steel ball valves with manual lever operators.

    Valves are to be furnished for the following:

        1. Backwash tell-tale
        2. Air vent

    d. Air/pressure release valve

G. Filter System Piping

1. Water piping:

a. All exterior filter piping and fittings larger than 4” shall be ductile iron flanged piping. Pipes shall be painted in accordance with paint requirements.

b. All exterior piping smaller than 4” shall be copper or stainless steel. These pipes are typically associated with sampling taps or pressure gauges.

c. Exterior vent pipes may be mild steel and painted in accordance with paint specifications.

2. General notes:

a. All pipe supports shall be provided by the contractor.

b. All system face, filter interconnecting piping and air piping shall be furnished with the required bolts, studs, nuts, and gaskets as follows:

Bolts:	ASTM A307 grade B plated carbon steel
Studs:	ASTM A307 grade B plated carbon steel
Nuts:	ASTM A563 or A194 2H plated steel heavy hex
Gaskets:	Neoprene (shore A) 70 or equal, 1/8" thick

c. Filter system piping shall be commercial sandblasted (SSPC-SP6) and lined with one (1) prime coat of Tnemec 69F.

d. Finish painting of the filter system piping is to be field applied by the general contractor as specified by the painting requirements.

H. System accessories:

1. Filter Pressure Equipment

a. One (1) Ashcroft Model D-400 snap acting differential pressure switch with a NEMA 4 enclosure complete with three (3) manually operated ball valves. The differential pressure switch shall detect the d/p across the filter common inlet and common outlet headers.

b. Ashcroft Model 1279SS pressure gauges with 4.5 inch diameter dials, and stainless steel bourdon tubes shall be furnished for each filter unit inlet and outlet.

c. Each pressure switch and gauge shall be furnished with stainless steel supply tubing, manual isolating valves, and sampling valves.

2. Filter Flow Equipment:

a. Each filter inlet header shall be equipped with a Rosemount 8750WA magnetic flowmeter, complete with 150 lb. flanged carbon steel process connections, polyurethane liner, #316 stainless steel electrodes, integral mounted aluminum NEMA 4X housing with local display and 4-20 mA output, and grounding rings.

I. Filter Controls

1. Filter manufacturer shall provide One (1) NEMA 4X electrical control panel of type 304 Stainless Steel construction complete with the following components:

   a. Allen Bradley CompactLogix L33ER Ethernet PLC and 1769 series I/O modules.

   b. Automation Direct #EA9-TW10CL 10” widescreen color/touch OIT

   c. C3 Controls door mounted power disconnect switch

   d. Phoenix Contact UNO series 24VDC power supply

   e. Phoenix Contact 120VAC and Ethernet surge suppressors

   f. Finder #46 series interposing relays

   g. Red Lion #104TX unmanaged Ethernet switch

   h. Phoenix Contact #UT-6 terminal blocks

   i. Panduit type “G” gray wire duct

   j. Allen Bradley #1492-REC15G GFCI duplex

   k. Internal type “THHN” stranded copper wire

   l. Ul-508 label

2. Control panel shall be completely shop wired and tested prior to shipment.
3. Control panel shall have a HMI to allow operators to see process control data such as filter flow rates, and run time for each filter. Headloss across the filter is from a pressure switch that will show alarm conditions.
4. The control panel shall include an operator programable PLC that will allow the backwash cycle to be automatic. Operators will be able to establish backwash times, rinse times and open and closing of electric valves.

5. Panel shall be powered via 120VAC-1PH-60Hz (20A) from the treatment plants power panel.

6. Panel shall be supplied with one (1) spare Ethernet port for Ethernet/IP communication to the SCADA System supplied by others.

7. Panel shall provide controls for all of the filter vessel valves, filter flow meters and differential pressure switch listed in this specification section. All other balance of plant controls, such as: Well Pumps, Chemical Feed Pumps, Plant Instrumentation & etc. shall be controlled by the SCADA Panel supplied by others.

J. Shop Assembly:

1. Filter tanks shall be mounted on individual structural steel I-beams and channel skid and be complete with the inlet and underdrain distributors, exterior face piping and valves, and the NEMA 4X type 304 stainless steel junction box with wiring and rigid galvanized conduit run to each skid mounted electrical device.

2. The media, interconnecting piping, and system auxiliary equipment shall be shipped loose to the jobsite for installation by others.

3. Filter skids are to be cleaned by power wire brushing and painted with one (1) shop coat (3.0 – 5.0 mils DFT) of Tnemec 69F primer by the filter manufacturer prior to assembly.

4. Finish painting Tank exteriors will be commercial sandblasted (SSPC-SP6) and painted with one (1) primer coat (3.0-4.0 mils DFT) of Tnemec series 90-97, one (1) intermediate cost (3.0-5.0 mils DFT) of Tnemec 161-EN15, and one (1) finish coat (2.5-5.0 mils DFT) of Tnemec 73-112GN Endura Shield ANSI #61. Tanks and piping will be color specific to function of tank/pipe.

5. Filters must be assembled by the filter system provider.

6. Control Panels to be remote mounted.

PART 3 - EXECUTION

3.01 SHOP DRAWING SUBMITTAL

A. Contractor shall coordinate with the Filter Supplier and verify all foundation connections, pipe penetrations and electrical/instrumentation foundation penetrations.

B. Shop Drawing shall include a dimensional layout of all pipe penetrations (diameter and location), foundation anchor locations and in-slab electrical facilities. This shop drawing must be approved prior to any concrete pouring of the foundation.

C. Shop Drawing shall include detailed schematics and product information to verify all materials identified in Part 2 of this specification.

3.02 EXAMINATION OF DELIVERED FILTER EQUIPMENT

A. The contractor shall carefully inventory all delivered filter equipment and document any defects in the delivered equipment. Contractor shall provide the Engineer and Filter Equipment Supplier with a detailed list of any missing, defective or damaged equipment/materials.

B. The contractor shall be responsible for storing all equipment in accordance with the filter manufacturer’s recommendations.

C. The Contractor shall provide the Engineer with a listing of all special storage and requirements.

D. Verify that dimensions are as shown on Drawings and Shop Drawings.

3.03 INSTALLATION

A. Manufacturer's Service Representative: The filters shall be furnished complete by the manufacturer and shall be assembled, erected and installed by the contractor as directed by the manufacturer in his working drawings and written instructions. The installation, alignment, testing and grouting shall be checked and approved by a factory representative before acceptance.

3.04 MANUFACTURER'S SERVICES

A. The manufacturer shall furnish the services of trained technical representatives as needed to provide a satisfactory operating system. Services to be included are as follows:

1. Prior to equipment delivery, the manufacturer shall furnish jointly to the ENGINEER and CONTRACTOR a minimum of three sets of complete installation, operation and maintenance manuals which shall include erection drawings, as built drawings of electrical equipment, assembly details, parts lists, and detailed written instructions for the installation, operation and maintenance of the equipment furnished. Pdf submittals are acceptable.

2. Deviations from the manufacturer's written or verbal instructions shall be subject to approval by the ENGINEER and discrepancies or unsatisfactory work shall be reported in writing by the equipment manufacturer's representative jointly to the ENGINEER and CONTRACTOR.

B. The supervisory service of a factory trained field service technician who is specifically trained in this type of equipment shall be provided for a period of (8) 8-hour man days over 2 trips, during construction. The service technician shall provide the equipment installer or subcontractor with technical advice on the installation of the major components of the treatment equipment. The service technician/ filter supplier shall provide the Contractor, Owner and Engineer a written certification that each component of the following components of the filter were installed in accordance with the filter manufacturers recommendations and procedures along with digital pictures of the installation process. Items requiring service technician/filter supplier certifications include:

   1. Proper setting of the interior piping
   2. Placement of the gravel support material.
   3. Placement of GS+, Backwash and Undercutting of GS+
   4. Placement of Anthracite

C. Upon completion of the installation, the services of the factory trained field service technician shall be provided for a period of (4) consecutive 8-hour man days to check the completed installation, make any required adjustments, and place the system in satisfactory operation.

D. The Filter Manufacturer shall coordinate with the Contractor any filter media conditioning and disinfection prior to performance and startup testing.

E. After all exterior piping is installed and the associated exterior painting, the Contractor may proceed to filter performance and startup testing as specified in Paragraph 1.05 of this specification.

F. After completion of each filter performance testing, the Manufacturer shall assist the Contractor in calibrating and set up of all electric actuators to provide proper backwash rates and rinse (filter-to-waste) flows.

G. In addition to the above, the manufacturer shall provide the services of the factory trained field service technician for a period of (2) 8-hour man days for classroom/field instructing the plant operating personnel in the proper care and operation of the equipment. Instruction should include but not be limited to:

   1) Overview of Operation and Maintenance Manual
   2) Overview of process design components such as filtration rates, backwash rates, and how to calculate headloss across each filter.
   3) What factors are used to determine when a filter needs backwashing/cleaning.
   4) Training to show operators/Owner how to calibrate and set limit switches on flow control valves (filter influent, backwash, rinse and filter effluent).

5) Training on how to set differential pressure switch set points.
6) Training on how to calculate filtration rates, backwash rates, rinse rates.
7) Training on how to collect water samples at the filter influent, filter effluent, backwash water and rinse water (filter-to-waste).
8) How to calculate filter removal efficiency for iron, manganese and turbidity.
9) How to utilize the master control panel to monitor process control. measure influent turbidity.
10) How to initiate a filter backwash cycle using the Master Control Panel.
11) How to program the backwash cycle logic

END OF SECTION

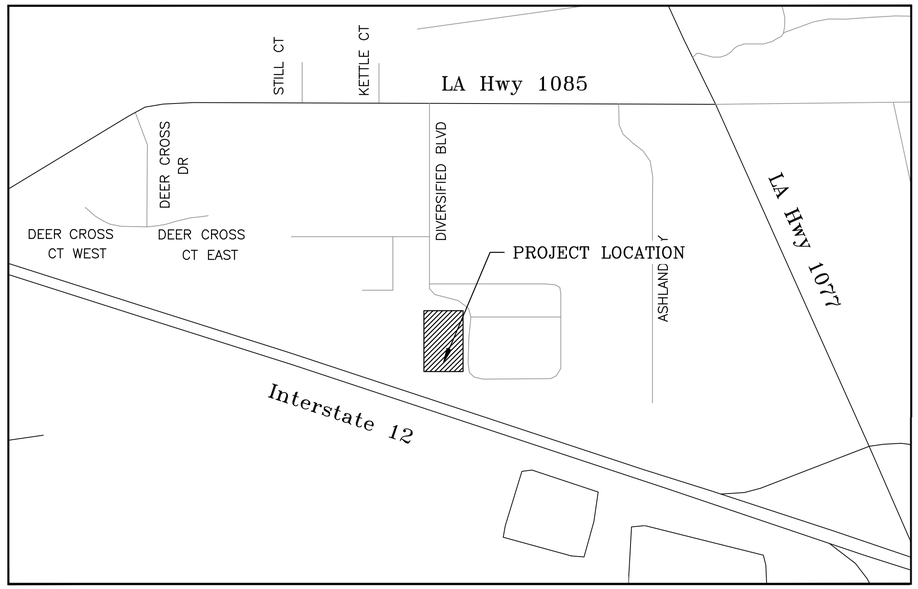
ST. TAMMANY PARISH
DEPARTMENT OF UTILITIES
DIVERSIFIED WATER WELL PRETREATMENT SYSTEM

POTABLE WATER FILTRATION AND CHLORINATION IMPROVEMENTS
DIVERSIFIED FOODS WATER WELL SITE
329 DIVERSIFIED BOULEVARD
MADISONVILLE, ST. TAMMANY PARISH, LOUISIANA
PROJECT No.: TU23000181
P.W.S. NUMBER 1103149
BID No.: 24-35-2

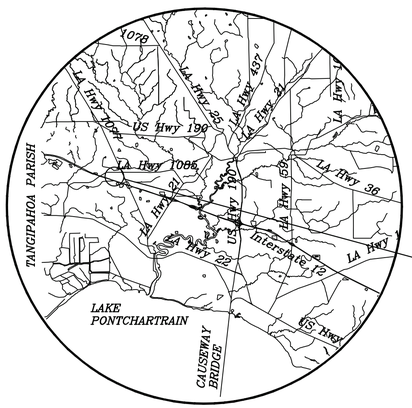
INDEX TO SHEETS

CONSTRUCTION TYPE:

POTABLE WATER TREATMENT BUILDING INCLUDING NEW FILTRATION SYSTEM, CHLORINE FEED SYSTEM, AND INSTALL NEW GENERATOR SET.



LOCATION MAP
(NOT TO SCALE)



PROJECT LOCATION

VICINITY MAP
(NOT TO SCALE)

Barowka and Bonura
Engineers and Consultants, L.L.C.
209 Canal Street
Metairie, Louisiana 70005

PARISH PRESIDENT

MICHAEL B. COOPER

PARISH COUNCIL

ARTHUR LAUGHLIN
COUNCIL CHAIRMAN
DISTRICT 11

CHERYL TANNER
COUNCIL VICE-CHAIRMAN
DISTRICT 6

COUNCIL MEMBERS

RICK SMITH	DISTRICT 1
LARRY ROLLING	DISTRICT 2
MARTHA J. CAZAUBON	DISTRICT 3
KATHY SEIDEN	DISTRICT 4
PAT PHILLIPS	DISTRICT 5
CHERYL TANNER	DISTRICT 6
JOE IMPASTATO	DISTRICT 7
PAT BURKE	DISTRICT 8
DAVID COUGLE	DISTRICT 9
MAUREEN "MO" O'BRIEN	DISTRICT 10
ARTHUR LAUGHLIN	DISTRICT 11
JERRY BINDER	DISTRICT 12
JEFF CORBIN	DISTRICT 13
JIMMY STRICKLAND	DISTRICT 14

PLANS PREPARED BY AND RECOMMEND FOR APPROVAL:

Matthew Hahn 7/15/24

BAROWKA AND BONURA ENGINEERS AND CONSULTANTS, L.L.C.
MATTHEW HAHN, P.E. — DATE

APPROVED BY:

Christopher Tissue 07/15/2024

ST. TAMMANY PARISH GOVERNMENT
DEPARTMENT OF UTILITIES
CHRISTOPHER P. TISSUE, P.E., DIRECTOR — DATE

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MH
DRAWN BY: PW
CHECKED BY: JAB
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE: ---

MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING
STATE OF LOUISIANA

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

TITLE SHEET

SHEET NO.
G-001
SHEET 1 OF 92

Plot Date: Mon Jul-15-2024 - 03:23PM
User: Phil
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GENERAL NOTES:

1. THE WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
2. SUBMIT SHOP DRAWINGS OF ALL PIPING, VALVES, ETC. TO THE ENGINEER FOR APPROVAL PRIOR TO COMMENCING WORK.
3. THE WORK SHALL BE CONFINED TO LIMITS OF CONSTRUCTIONS AS SHOWN ON THE PLANS. THE CONTRACTOR'S STAGING AND STORAGE AREAS SHALL BE LOCATED WITHIN THE LIMITS OF CONSTRUCTION. IF THE CONTRACTOR REQUIRES ADDITIONAL STAGING OR STORAGE SPACE, THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO DETERMINE AN ACCEPTABLE ON– OR OFF–SITE LOCATION. THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH ACQUIRING ADDITIONAL STAGING AREAS
4. THE CONTRACTOR SHALL NOT DISTURB ANY WETLANDS.
5. CONTRACTOR OPERATIONS SHALL NOT INTERFERE OR RESTRICT THE OWNER'S ACCESS AND OPERATION OF THE FACILITY.
6. ALL MATERIALS AND COMPONENTS OF THE WATER SYSTEM SHALL BE N5F CERTIFIED.
7. NEW WATER MAINS SHALL BE NO SMALLER THAN 8" INSIDE DIAMETER PVC PIPE. THE MINIMUM RESIDUAL PRESSURE AT PEAK DEMAND SHALL BE NO LESS THAN 25 PSIG, AND THE MINIMUM VELOCITY FOR A FULL FLOWING PIPE SHALL BE NO LESS THAN 2 FEET PER SECOND.
8. CONSTRUCTION PLANS ARE IN LOUISIANA STATE PLANE SOUTH COORDINATE SYSTEM. THE VERTICAL DATUM FOR ALL ELEVATIONS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
9. A TEMPORARY BENCHMARK HAS BEEN ESTABLISHED. THE HORIZONTAL AND VERTICAL LOCATION OF THE TEMPORARY BENCHMARK IS AS FOLLOWS

   CBM IS A YELLOW BENCH TIE IN POWER POLE WITH ELEVATION OF 24.44'

   NORTHING: 715385.31'
   EASTING: 3641446.80'
   ELEVATION: 24.44'

10. THE CONTRACTOR SHALL USE THE HORIZONTAL AND VERTICAL CONTROLS ESTABLISHED FOR PROJECT.
11. THE CONTRACTOR SHALL FIELD VERIFY ALL ELEVATIONS, GRADES AND MEASUREMENTS PRIOR TO STARTING ANY CONSTRUCTION.
12. TO ENSURE THE CONSTRUCTION OPERATIONS REMAIN IN THE RIGHT–OF–WAY OR UTILITY SERVITUDE, THE CONTRACTOR SHALL STAKE THE RIGHT–OF–WAY AND/OR SERVITUDE LINE PRIOR TO COMMENCING WORK.
13. NEW WATER MAINS SHALL BE INSTALLED USING OPEN–CUT METHODS UNLESS WHERE SPECIFIED ON THE PLANS.
14. MINIMUM COVER OVER THE NEW WATER MAIN SHALL BE AT LEAST 3 FEET UNLESS OTHERWISE STATED IN THE PLANS OR AS APPROVED BY THE OWNER IN WRITING.
15. THE CONTRACTOR SHALL PROVIDE RED–LINE DRAWINGS TO BE USED BY THE ENGINEER OF RECORD FOR THE PROJECT IN THE PREPARATION OF RECORD DRAWINGS / AS–BUILT DRAWINGS. RECORD DRAWINGS / AS–BUILT DRAWINGS SHALL BE SUBMITTED AS PART OF THE PROJECT CLOSE–OUT DOCUMENTS.
16. EXISTING UTILITY LOCATIONS AS SHOWN ON THE PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL CONTACT LOUISIANA ONE CALL TO LOCATE AND MARK SUBSURFACE UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND RESOLVING CONFLICTS WITH THE RESPECTIVE UTILITY OWNERS. A LIST OF UTILITY OWNERS AND POINTS OF CONTACT ARE PROVIDED BELOW.

AT&T
STEVE BERGERON
(985) 327–6432

ATMOS
RODNEY BABIN
(985) 290–0897

CLECO
PAUL GITZ
(985) 807–3755

17. THE CONTRACTOR SHALL VERIFY THE REQUIRED HORIZONTAL AND VERTICAL CLEARANCES WITH THE RESPECTIVE UTILITY OWNER PRIOR TO BEGINNING WORK.
18. CONCERNS REGARDING THE DEPARTMENT OF UTILITIES FACILITIES SHALL BE DIRECTED TO THE FOLLOWING:

    FIELD OPERATIONS SUPERVISOR
    DEPARTMENT OF UTILITIES
    (985) 893–1717

19. THE CONTRACTOR SHALL PROTECT SURROUNDING FACILITIES, INCLUDING BUT NOT LIMITED TO BUILDINGS, PAVEMENT, LANDSCAPING AND UTILITIES FROM DAMAGE. THE CONTRACTOR SHALL REPAIR OR REPLACE DAMAGED FACILITIES AT NO ADDITIONAL COST TO THE OWNER. THE CONTRACTOR SHALL REPAIR OR REPLACE DAMAGED FACILITIES TO THE OWNERS SATISFACTION.
20. LOCATIONS OF UTILITIES IDENTIFIED BY DEPARTMENT OF UTILITIES ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL AFFECTED UTILITIES (I.E. WATER, SEWER, GAS, ETC.) PRIOR TO DIGGING AND/OR BORING. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE PROJECT.
21. SERVICE INTERRUPTIONS ASSOCIATED WITH FINAL CONNECTIONS SHALL BE APPROVED BY THE DEPARTMENT OF UTILITIES PRIOR TO COMMENCING THE TIE–IN WORK. THE CONTRACTOR SHALL CONTACT THE DEPARTMENT AT LEAST 5 DAYS PRIOR TO HIS PROPOSED SERVICE INTERRUPTION DATE.
22. CUSTOMERS AFFECTED BY THE PLANNED SERVICE INTERRUPTION SHALL BE NOTIFIED IN WRITING 48 HOURS IN ADVANCE OF APPROVED SERVICE OUTAGE DATE.
23. THE CONTRACTOR SHALL RESTORE THE GROUND IN AND AROUND THE WORK AREA TO THE SATISFACTION OF THE OWNER. THE WORK AREA SHALL BE CLEANED AND MADE READY FOR RE–OCCUPANCY BY THE OWNER UPON COMPLETING ALL CONSTRUCTION ACTIVITIES.
24. THE WORK AREA SHALL BE KEPT CLEAN THROUGHOUT THE DURATION OF THE PROJECT. THE CONTRACTOR SHALL COLLECT AND REMOVE ANY DEBRIS OR TRASH FROM WORK AREA ON DAILY BASIS. DEBRIS OR TRASH SHALL BE STORED IN REFUSE CONTAINERS OR BINS UNTIL REMOVAL FROM THE SITE.

WELL NOTES

1. THE WELL SYSTEM (INCLUDING PUMPS, WATER TOWER, ETC.) SHALL REMAIN IN–SERVICE THROUGHOUT THE DURATION OF THE PROJECT. A TEMPORARY BYPASS LINE AND DISINFECTION SYSTEM SHALL BE ESTABLISHED TO ALLOW FOR THE INSTALLATION OF THE SEQUESTERING AGENT INJECTION POINT.
2. DOUBLE CHECK VALVES SHALL BE INSTALLED AND USED TO PREVENT THE SEQUESTERING AGENT AND CHLORINE FROM ENTERING THE WELL.
3. ALL MATERIALS USED FOR THE PROJECT SHALL BE ANSI/NSF APPROVED. MATERIALS SHALL BE CLEARLY LABELED AS ANSI/NSF APPROVED FROM THE MANUFACTURER.
4. THE CONTRACTOR SHALL COORDINATE WITH DEPARTMENT OF UTILITIES REGARDING ACCESS TO AND OPERATION OF THE WELL SITE.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MH
DRAWN BY: PW
CHECKED BY: JAB
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
BENCH ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

GENERAL NOTES

SHEET NO.
G–002
SHEET 2 OF 92

BID ITEMS - BASE BID			
ITEM NO.	DESCRIPTION	QUANTITY	UNIT
1	MOBILIZATION	1	LUMP SUM
2	EARTHWORK & SITE IMPROVEMENTS	1	LUMP SUM
3	SEWER LIFT STATION & FORCE MAIN	1	LUMP SUM
4	YARD PIPING & WELL PUMPS	1	LUMP SUM
5	CHEMICAL FEED SYSTEM	1	LUMP SUM
6	FILTER BUILDING	1	LUMP SUM
7	SITE ELECTRICAL & CONTROLS SYSTEM	1	LUMP SUM
8	EXPLORATORY EXCAVATION	5	EACH

NOTES:

1. REFER TO ESTIMATED WORK QUANTITIES THIS SHEET. ESTIMATED WORK QUANTITIES ARE PROVIDED TO BIDDERS FOR REFERENCE ONLY. BIDDERS SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO BID.
2. BIDDERS ARE ADVISED THAT NOT ALL REQUIRED WORK QUANTITIES ARE SHOWN ON THIS SHEET. THE FULL AND COMPLETE EXTENT OF REQUIRED WORK IS SHOWN IN THE BID DRAWINGS AND SPECIFICATIONS. ALL BIDS SHALL BE IN ACCORDANCE WITH THE BIDDING DOCUMENTS.
3. ALL WORK WILL BE PAID BASED ON LUMP SUM PAYMENT EXCEPT FOR EXPLORATORY EXCAVATION WHICH SHALL BE PAID BASED ON THE NUMBER OF EXCAVATIONS PERFORMED IN THE FIELD.

ESTIMATED WORK QUANTITIES

LUMP SUM BASE BID ITEM NO. 1
MOBILIZATION

INCLUDES:PREPARATORY WORK AND OPERATIONS, INCLUDING THOSE NECESSARY FOR MOVEMENT OF PERSONNEL, EQUIPMENT, SUPPLIES, AND INCIDENTALS TO THE PROJECT SITE; THE ESTABLISHMENT OF OFFICES, BUILDINGS, AND OTHER FACILITIES NECESSARY FOR WORK ON THE PROJECT; COSTS ATTRIBUTABLE TO PROVIDING AND INSTALLING EROSION CONTROL MEASURES; THE COST OF BONDS AND ANY REQUIRED INSURANCE; THE COST OF REQUIRED PERMITS AND ANY OTHER PRECONSTRUCTION EXPENSES NECESSARY FOR START OF THE WORK, EXCLUDING THE COST OF CONSTRUCTION MATERIALS INCLUDED IN OTHER BID ITEMS; AND ALL INCIDENTALS NECESSARY FOR A COMPLETE AND WORKING PROJECT NOT INCLUDED ELSEWHERE IN THE BID.

LUMP SUM BASE BID ITEM NO. 2
EARTHWORK & SITE IMPROVEMENTS

INCLUDES: SITE DEMOLITION/SITE PREPARATION, REMOVAL OR SITE DEBRIS AND OBSTRUCTIONS, EXCAVATION AND BACKFILLING FOR NEW BUILDING, SITE GRADING, SURFACE RESTORATION, CONSTRUCTION OF ENTRANCE DRIVEWAY CULVERT, RAMP, AND CONCRETE APRON, CONSTRUCTION OF LIMESTONE ACCESS DRIVES, CONSTRUCTION OF CHAIN-LINK FENCES AND GATES, AND ALL INCIDENTALS REQUIRED.

BID ITEM NO. 2 ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	QUANTITY	UNIT
1	GENERAL EXCAVATION	500	CUBIC YARD
2	EMBANKMENT (STRUCTURAL SAND)	500	CUBIC YARD
3	6" REINFORCED CONCRETE APRON	90	SQUARE YARD
4	8" LIMESTONE BASE BELOW APRON	20	CUBIC YARD
5	GEOTEXTILE FABRIC BELOW APRON	90	SQUARE YARD
6	8" LIMESTONE SURFACE COURSE (ROAD)	61	CUBIC YARD
7	STRUCTURAL SAND BASE (ROAD)	92	CUBIC YARD
8	GEOTEXTILE FABRIC (ROAD)	275	SQUARE YARD
9	15" RCP DRAIN CULVERT AT APRON	30	LINEAR FEET
10	TIE-IN NEW RCP CULVERT TO EXIST. CULVERT	1	EACH

LUMP SUM BASE BID ITEM NO. 3
SEWER LIFT STATION & FORCE MAIN

INCLUDES: INSTALLATION OF SEWER GRINDER PUMP STATION, LIMESTONE BASE, EXCAVATION AND BACKFILL, INSTALLATION OF SEWER FORCE MAIN INCLUDING ALL UTILITY OFFSETS AND FITTINGS REQUIRED, TIE-IN SEWER FORCE MAIN TO EXISTING SEWER LIFT STATION, AND ALL INCIDENTALS REQUIRED FOR A COMPLETE AND WORKING SYSTEM.

BID ITEM NO. 3 ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	QUANTITY	UNIT
1	DUPLEX GRINDER PUMP LIFT STATION	1	EACH
2	LIMESTONE BASE BELOW LIFT STATION	1	CUBIC YARD
3	2" SCH. 80 PVC SEWER FORCE MAIN	160	LINEAR FEET
4	TIE-IN FORCE MAIN TO EXIST. LIFT STATION	1	EACH

LUMP SUM BASE BID ITEM NO. 4
YARD PIPING & WELL PUMPS

INCLUDES: NEW WELL PUMPS, PUMP SUPPORTS, PIPE SUPORTS, ABOVE-GROUND DUCTILE IRON FLANGED PIPE, VALVES, AND FITTINGS, TRENCH EXCAVATION AND EMBANKMENT, UNDERGROUND DUCTILE IRON WATER PIPE, UNDERGROUND C-900 PVC WATER PIPE, DUCTILE IRON VALVES AND FITTINGS, THRUST RESTRAINTS, THRUST BLOCKING, TIE-INS TO EXISTING LINES, HORIZONTAL AND VERTICAL OFFSETS, AND ALL INCIDENTALS REQUIRED FOR A COMPLETE AND WORKING SYSTEM.

BID ITEM NO. 4 ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	QUANTITY	UNIT
1	60 HP HORIZONTAL SPLIT CASE PUMP	2	EACH
2	8" FLANGED DUCTILE IRON PIPE	50	LINEAR FEET
3	12" RESTRAINED JOINT DUCTILE IRON PIPE	150	LINEAR FEET
4	14" RESTRAINED JOINT DUCTILE IRON PIPE	100	LINEAR FEET
5	12" C-900 PVC PIPE	150	LINEAR FEET
6	8" C-900 PVC PIPE	230	LINEAR FEET
7	DUCTILE IRON FITTINGS	5000	POUND
8	TIE-IN TO EXISTING 12" WATER LINE	2	EACH

LUMP SUM BASE BID ITEM NO. 5
CHEMICAL FEED SYSTEM

INCLUDES: EXCAVATION AND EMBANKMENT, CHEMICAL FEED PIPE, JOINTS, FITTINGS, TIE-INS, CHEMICAL FEED PUMPS, EQUIPMENT, CHEMICAL STORAGE TANKS AND ACCESSORIES, CHLORINE AND TURBIDITY ANALYZERS COMPLETE WITH SAMPLE AND DRAIN TUBING AND ALL ANCILLARY EQUIPMENT, AND ALL INCIDENTALS REQUIRED FOR A COMPLETE WORKING SYSTEM.

BID ITEM NO. 5 ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	QUANTITY	UNIT
1	1" CHLORINE FEED PVC PIPING	50	LINEAR FEET
2	1" POTASSIUM PERMANGANATE PVC PIPING	50	LINEAR FEET
3	1" POLYMER FEED PVC PIPING	100	LINEAR FEET
4	65-GALLON CHEMICAL STORAGE TANK	3	EACH
5	1000-GALLON BULK CHLORINE STORAGE TANK	1	EACH
6	CHEMICAL INJECTION TIE-IN	3	EACH
7	FREE CHLORINE ANALYZER	1	EACH
8	TOTAL CHLORINE ANALYZER	1	EACH
9	TURBIDITY ANALYZER	1	EACH
10	DIAPHRAGM CHEMICAL PUMP (DUPLEX PUMP)	3	EACH

LUMP SUM BASE BID ITEM NO. 6
FILTER BUILDING

INCLUDES: COMPLETE FILTER BUILDING, INCLUDING METAL BUILDING WITH CONCRETE MASONRY BUILDING INSIDE METAL BUILDING. INCLUDES CONCRETE FOUNDATION, STEEL BUILDING AND CONCRETE MASONRY (CMU) BUILDING, COMPLETE WITH STRUCTURAL, ARCHITECTURAL, ELECTRICAL, PLUMBING, AND HVAC SYSTEMS AND COMPONENTS. INCLUDES POTABLE WATER PRESSURE FILTER SYSTEM COMPLETE WITH ALL FACE PIPING, HEADER PIPING, VALVES, EQUIPMENT, CONTROLS, INCLUDING PIPE SUPPORTS, AND ALL INCIDENTALS REQUIRED FOR A COMPLETE AND WORKING SYSTEM.

BID ITEM NO. 6 ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	QUANTITY	UNIT
1	54'x64' METAL BUILDING	1	EACH
2	56'x66' CONCRETE MAT FOUNDATION	350	CY
3	13'Wx64'Lx14'H CMU BUILDING	900	SF
4	FOUR 9-FT DIA/ VERTICAL PRESSURE FILTER SYSTEM	1	EACH

LUMP SUM BASE BID ITEM NO. 7
SITE ELECTRICAL & CONTROLS SYSTEM

INCLUDES: INCLUDES NEW PAD-MOUNT TRANSFORMER, 200 KW NATURAL GAS STAND-BY GENERATOR, TIE-INS TO ELECTRIC METERS, UNDERGROUND FEEDERS, SCADA CONTROLS, PANELS, JUNCTION BOXES, RECEPTACLES, CONCRETE PADS, FOOTINGS, EXCAVATION AND EMBANKMENT, AND ANY INCIDENTALS REQUIRED FOR A COMPLETE WORKING SYSTEM. REFER TO ELECTRICAL DRAWINGS.

LUMP SUM BASE BID ITEM NO. 8
EXPLORATORY EXCAVATION

INCLUDES: EXPLORATORY EXCAVATION AT SELECT LOCATIONS DETERMINED BY THE OWNER OR ENGINEER WITHIN OR NEAR THE PROJECT AREA, TO DETERMINE THE EXACT LOCATION, SIZE, AND TYPE OF EXISTING UTILITIES. EXPLORATORY EXCAVATION SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 2 32 19 OF THE PROJECT SPECIFICATIONS.

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MH
DRAWN BY: PW
CHECKED BY: JAB
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

WORK QUANTITIES

SHEET NO.
G-003
SHEET 3 OF 92

GENERAL WATER STANDARD NOTES

1. ALL MATERIALS SHALL BE COMPLY WITH ALL APPLICABLE AWWA STANDARD SPECIFICATIONS AND NSF STANDARD SPECIFICATIONS FOR POTABLE WATER SYSTEMS.

2. ALL MATERIALS USED IN POTABLE WATER DISTRIBUTION SHALL MEET THE REQUIREMENTS OF AND BE NSF61 CERTIFIED. ALL MATERIALS SHALL BE LEAD FREE.

3. THE CONTRACTOR SHALL PROVIDE A ONE–YEAR WARRANTY FOR ALL NEWLY INSTALLED WATER INFRASTRUCTURE ASSOCIATED WITH THE CONSTRUCTION OF THE PROJECT, INCLUDING BUT NOT LIMITED TO WATERLINE EXTENSIONS, NEW WATER MAINS, VALVES, AND FIRE HYDRANTS. THE WARRANTY SHALL EXTEND FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE. THE CONTRACTOR SHALL FURNISH ALL MATERIALS AND LABOR REQUIRED TO CORRECT DEFICIENCIES IN THE SYSTEM AT NO COST TO DEPARTMENT OF UTILITIES.

4. THE CONTRACTOR SHALL STAKE THE EXISTING AND PROPOSED RIGHT–OF–WAY AND/OR UTILITY SERVITUDE LINES PRIOR TO CONSTRUCTION OF NEW WATER MAINS AND FACILITIES.

5. THE CONTRACTOR SHALL USE THE ESTABLISHED HORIZONTAL AND VERTICAL CONTROLS. BENCHMARKS AND OTHER CONTROLS AS STATED AND SHOWN ON PLANS SHALL BE VERIFIED AND ESTABLISHED PRIOR TO THE START OF CONSTRUCTION.

6. PARALLEL SEWER LINES (I.E. GRAVITY SEWER LINES AND SEWER FORCE MAINS) AND WATER LINES SHALL BE LAID IN SEPARATE TRENCHES WITH THE HORIZONTAL CLEARANCE BETWEEN ALL WATER LINES AND ALL SEWER LINES OF 10'. THE HORIZONTAL CLEARANCE BETWEEN GRAVITY SEWER LINES AND SEWER FORCE MAINS SHALL BE 10'. IN THE EVENT A WATER LINE CROSSES OVER A SEWER LINE CROSS, THE MINIMUM VERTICAL CLEARANCE SHALL BE 18" BETWEEN THE WATER AND SEWER LINES. ALL WATER LINES SHALL BE ABOVE SEWER LINES. ANY CLEARANCES LESS THAN THE ABOVE MENTIONED SHALL BE APPROVED BY DEPARTMENT OF UTILITIES.

7. MINIMUM HORIZONTAL CLEARANCES OF FIVE FEET (5') AND MINIMUM VERTICAL CLEARANCE OF EIGHTEEN INCHES (18"') SHALL BE MAINTAINED BETWEEN WATER LINES AND OTHER UTILITIES, SUCH AS COMMUNICATION LINES, SUBSURFACE ELECTRICAL LINES, AND GAS LINES. IF WATER LINES AND SEWER LINES ARE LOCATED ON OPPOSITE SIDES OF THE STREET/ROAD, THE SUBSURFACE ELECTRICAL LINE SHALL BE LOCATED ON THE SAME SIDE AS THE SEWER LINE.

8. EXCAVATIONS FOR WATER LINES AND STRUCTURES SHALL BE EXCAVATED, BEDDED AND BACKFILLED IN ACCORDANCE WITH THE NOTES BELOW AND THE PROVIDED WATER DETAILS.

   a. WATER MAINS SHALL BE BEDDED IN A CLEAN SAND. THE CLEAN SAND BEDDING MATERIAL SHALL PLACED IN LOOSE 8" LIFTS AND COMPACTED TO 95% OF OPTIMAL DRY DENSITY AS DETERMINED BY ASTM D698.

   b. THE MINIMUM THICKNESS FOR PIPE BEDDING MATERIAL UNDER ALL WATER MAINS SHALL BE 6" OR AS DICTATED BY THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT. THE BEDDING MATERIAL SHALL EXTEND TO THE SPRINGLINE OF THE PIPE (I.E. HALF PIPE O.D.). THE MORE STRINGENT REQUIREMENT SHALL CONTROL.

   c. WHEN A SOFT AND/OR WET EXCAVATION BOTTOM HAS BEEN ENCOUNTERED, THE EXCAVATION BOTTOM SHALL BE STABILIZED IN ACCORDANCE WITH THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT.

   d. WHEN GEOTECHNICAL REPORT IS NOT AVAILABLE, A 6" THICK CRUSHED No. 57 LIMESTONE FOUNDATION SHALL BE USED TO STABILIZE A SOFT AND/OR WET EXCAVATION BOTTOM. A MINIMUM OF 6" OF THE SOFT AND/OR WET NATIVE MATERIAL SHALL BE REMOVED PRIOR TO PLACING THE CRUSHED LIMESTONE FOUNDATION. THE CRUSHED LIMESTONE FOUNDATION SHALL BE PLACE ON TOP OF A COMBINATION OF GEOTEXTILE AND BI–AXIAL GEOGRID FABRICS. THE CRUSHED LIMESTONE FOUNDATION SHALL BE PLACED IN LOOSE 8" LIFTS AND COMPACTED TO 90% OF THE RELATIVE DRY DENSITY AS DETERMINED BY ASTM D4253. THE GEOTEXTILE FABRIC SHALL ENCASE THE LIMESTONE FOUNDATION. THE MORE STRINGENT REQUIREMENTS SHALL CONTROL.

   e. WATER VALVES AND WATER STRUCTURES (I.E. MANHOLES, VALVE VAULTS, EQUIPMENT PADS) SHALL BE CONSTRUCTED ON No. 57 CRUSHED LIMESTONE BASE. THE MINIMUM THICKNESS OF THE LIMESTONE BASE AND THE USE OF GEO–SYNTHETIC FABRICS SHALL BE DICTATED BY THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT. AT A MINIMUM, THE LIMESTONE BASE SHALL HAVE A MINIMUM THICKNESS 12" UNDER WATER STRUCTURE AND 6" UNDER WATER VALVES. THE LIMESTONE BASE SHALL BE PLACED ON TOP OF A COMBINATION OF GEOTEXTILE AND BI–AXIAL GEOGRID FABRICS. THE CRUSHED LIMESTONE MATERIAL SHALL BE PLACED IN LOOSE 8" LIFTS AND COMPACTED TO 90% OF THE RELATIVE DRY DENSITY AS DETERMINED BY ASTM D4253. THE GEOTEXTILE FABRIC SHALL ENCASE THE LIMESTONE BASE. THE MORE STRINGENT REQUIREMENTS SHALL CONTROL.

   f. ALL GEOTEXTILE FABRIC AND GEOGRID FACBRIC SHALL BE PLACED IN ACCORDANCE WITH THE PROVIDED WATER DETAILS OR AS DICTATED BY THE RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT. THE MORE STRINGENT REQUIREMENT SHALL CONTROL.

8. THE COVER BETWEEN THE TOP OF PIPE FOR ALL WATER MAINS AND FINISHED GRADE SHALL BE AT LEAST 3' FOR LANDSCAPED/UNIMPROVED AREAS AND 5' UNDER ROADS.

9. WATER SERVICE CONNECTIONS SHALL HAVE A BRASS TAPPING SADDLE, BRASS CORPORATION STOP, AND A MINIMUM 1" CONNECTION SIZE. SERVICE CONNECTION PIPING SHALL BE AWWA C901 POLYETHYLENE TUBING, PE3408 DR9. WATER SERVICE CONNECTION SHALL HAVE MAXIMUM COVER OF 2'.

10. THE LOCATION OF THE WATER SERVICE CONNECTIONS SHALL BE STAMPED IN THE CURB FACE OR ROAD SURFACE USING THE "W↑" SYMBOL AS SHOWN IN STANDARD DETAILS, AND THE SYMBOL SHALL BE AT LEAST 4" BY 8". THE ARROW SHALL POINT IN THE DIRECTION OF THE WATER SERVICE CONNECTION.

11. UPON INSTALLATION OF THE WATER SERVICE, A 2" BY 2" STAKE WITH A FLORESCENT BLUE FLAG/STREAMER OR PAINTED FLORESCENT BLUE SHALL DENOTE THE LOCATION OF THE WATER SERVICE. FLORESCENT BLUE SHALL BE USED FOR EASE OF LOCATING BY TAMMANY UTILITIES INSPECTORS. THE WATER SERVICE "WHIP" SHALL BE TIED TO THE STAKE AS SHOWN IN THE WATER SERVICE DETAIL. THE STAKE SHALL EXTEND AT LEAST 3 FEET FROM THE EXISTING GROUND SURFACE. THE STAKE MUST BE MAINTAINED BY THE CONTRACTOR UNTIL THE RESIDENCE OR BUILDING HAS BEEN CONNECTED TO THE SERVICE LINE.

12. RESERVED.

13. DEPARTMENT OF UTILITIES REPRESENTATIVE SHALL BE ON–SITE FOR ALL TESTING REQUIRED FOR THE ACCEPTANCE OF THE DEVELOPMENT. THE DEVELOPER SHALL CONTACT DEPARTMENT OF UTILITIES AT LEAST 48–HOURS PRIOR TO TESTING. THE CONTRACTOR SHALL CONTACT DEPARTMENT OF UTILITIES AT (985) 893–1717 TO COORDINATE SCHEDULING OF TEST.

14. THE CONTRACTOR SHALL RECORD HORIZONTAL AND VERTICAL LOCATION OF ALL NEW WATER INFRASTRUCTURE. THE CONTRACTOR SHALL PROVIDE "RED LINE DRAWINGS" TO THE ENGINEER UPON COMPLETION OF CONSTRUCTION. THE ENGINEER SHALL FIELD VERIFY AND CERTIFY ELEVATIONS, DEPTHS AND LOCATION OF WATER INFRASTRUCTURE WHEN PREPARING THE RECORD DRAWINGS/AS–BUILT PLANS FOR THE PROJECT. DEPARTMENT OF UTILITIES SHALL NOT ACCEPT THE PROJECT UNTIL THE CONTRACTOR PROVIDES AN ACCURATE, VERIFIED SET OF RECORD DRAWINGS/AS–BUILT PLANS FOR THE PROJECT.

15. THE RECORD DRAWINGS/AS–BUILT PLANS SHALL CONTAIN THE FOLLOWING SHEETS OF INFORMATION:

   a. ALL SHEETS SHALL BE STAMPED WITH THE BLOCK "RECORD DRAWINGS" OR "AS–BUILT PLANS" AND SHALL BE DATED.

   b. TITLE SHEET WITH AN INDEX OF SHEETS. ADDITIONAL SHEETS TO CAPTURE CHANGES VIA CHANGE–ORDER/PLAN CHANGE SHALL BE LISTED IN THE INDEX OF SHEETS AND BE ADDED AT THE END OF THE PLAN SET.

   c. GENERAL NOTES AND LEGEND. STRIKE–THROUGH NOTES WHICH DO NOT APPLY.

   d. SITE VICINITY MAP SHOWING NEW WATER AND SEWER INFRASTRUCTURE AND TIE–IN LOCATION TO THE EXISTING SYSTEM(S).

   e. OVERALL WATER PLAN AND SITE/STREET SPECIFIC WATER PLANS SHALL BE PROVIDED AS NEEDED TO SHOW ADDITIONAL INFORMATION AND CLARITY. CONFLICTS AND OFFSETS SHALL BE CALLED OUT ON ALL WATER PLANS.

   f. SUMMARY OF MATERIAL QUANTITIES. FINAL QUANTITIES FOR ALL INSTALLED MATERIALS (I.E. PIPE, ALL VALVES, FIRE HYDRANTS, ETC.) SHALL BE PROVIDED.

   g. SUMMARY OF VALVES AND FITTINGS. INFORMATION REGARDING THE VALVES AND FITTINGS SHALL BE TABULATED. THE LOCATION OF EACH VALVE, TEE, CROSS, AND BEND SHALL BE DETERMINED BY MEASURING ALONG THE CENTERLINE OF THE WATER MAIN FROM FITTING TO FITTING OR VALVE TO FITTING. TABULATIONS SHALL BE FROM STREET INTERSECTION TO STREET INTERSECTION. THE SIZE, TYPE, MANUFACTURE AND MODEL OF THE VALVES AND FITTINGS SHALL BE RECORDED IN THE SUMMARY TABULATIONS AS APPLICABLE. THE TOP–OF–CASTING ELEVATION OF THE VALVE HOUSING SHALL RECORDED AND NOTED IN THE SUMMARY OF VALVES AND FITTINGS.

   h. STANDARD DETAILS – STRIKE THROUGH STANDARD DETAILS NOT USED.

14. THE CONTRACTOR'S REDLINE DRAWINGS SHALL NOT BE SUBSTITUTED FOR OR ACCEPTED BY DEPARTMENT OF UTILITIES AS RECORD DRAWINGS/AS–BUILT PLANS.

15. RESERVED.

REFER TO SHEET G-102 FOR ADDITIONAL WATER STANDARD NOTES

SEWER LINETYPES AND SYMBOLS

SYMBOL	MEANING
SS	GRAVITY SEWER LINE
SC	SEWER SERVICE LINE
SFM	SEWER FORCE MAIN
EFM	EFFLUENT FORCE MAIN
	SINGLE SEWER HOUSE CONNECTION
	DUAL SEWER HOUSE CONNECTION
	SEWER CLEAN–OUT
S	SEWER MANHOLE
LS	SEWER LIFT STATION
	VALVE ON SEWER FORCE MAIN

WATER LINETYPES AND SYMBOLS

SYMBOL	MEANING
W	WATER MAIN
	SINGLE WATER SERVICE CONNECTION
	DUAL WATER SERVICE CONNECTION
WM	WATER METER
	FIRE HYDRANT
W	WATER VALVE & MANHOLE
	BACK FLOW PREVENTER

VALVE SYMBOLS

SYMBOL	MEANING
	CHECK VALVE
	ISOLATION VALVE
	GATE VALVE
	PLUG VALVE
	TAPPING SLEEVE AND VALVE
	AIR RELEASE VALVE
	TEE, VALVE & FIRE HYDRANT ASSEMBLY

GENERAL LINETYPES AND SYMBOLS

SYMBOL	MEANING
R/W	RIGHT–OF–WAY
	SERVITUDE / PROPERTY LINE
OHP	OVERHEAD POWER LINE
	POWER POLE
UGE	UNDERGROUND POWER LINE
T	PAD MOUNTED TRANSFORMER
GAS	GAS LINE
	GAS VALVE & MANHOLE
D	DRAINAGE CULVERT, SUBSURFACE
	TOP OF DITCH
	DRAINAGE DROP INLET OR CATCH BASIN
	DEMOLITION AND REMOVAL
	PORTLAND CEMENT CONCRETE
	GRANULAR BACKFILL, COMPACTED
	BEDDING MATERIAL, COMPACTED
	SELECT FILL (INSITU SOILS), COMPACTED

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MH
DRAWN BY: PW
CHECKED BY: JAB
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

GENERAL NOTES

SHEET NO.
G–101
SHEET 4 OF 92

WATER MAIN NOTES

1. NEW WATER MAINS SHALL BE NO SMALLER THAN 8" INSIDE DIAMETER.
2. NEW WATER MAINS BETWEEN 8" AND 30" DIAMETER SHALL BE AWWA C900 POLYVINYL CHLORIDE (PVC) PIPE AND SHALL HAVE A PRESSURE CLASS OF 235 PSI (DR18). NEW WATER MAINS SHALL BE THE COLOR BLUE AND LABELED AS "WATER". CONNECTIONS TO OTHER WATER MAINS, INCLUDING THOSE OF DIFFERENT MATERIAL, SHALL BE MADE USING THE APPROPRIATE ADAPTERS AND FITTINGS.
3. NEW WATER MAINS INSTALLED USING AN OPEN CUT/TRENCH METHOD SHALL BE POLYVINYL CHLORIDE (PVC) PIPE CONFORMING TO AWWA C900. NEW WATER MAINS BETWEEN 8" AND 48" DIAMETER SHALL HAVE A PRESSURE CLASS OF 235 PSI (DR18). CONNECTIONS BETWEEN PIPE LENGTHS SHALL BE OF AN INTEGRATED "BELL AND SPIGOT" PUSH-ON DESIGN WITH A RUBBER GASKET SEAL. RUBBER SEAL SHALL CONFORM TO AWWA C111. NEW WATER MAINS SHALL BE THE BLUE AND LABELED AS "WATER".
4. TRACER WIRE AND IDENTIFICATION TAPE SHALL BE INSTALLED ALONG THE ENTIRE LENGTH OF THE WATER MAIN FOR ALL LINES INSTALLED USING THE OPEN CUT METHOD. THE TRACER WIRE AND IDENTIFICATION TAPE SHALL BE INSTALLED SIMULTANEOUSLY WITH THE WATER MAIN.
5. JOINT RESTRAINTS FOR PVC PIPE BELL JOINTS SHALL BE RESTRAINED WITH A SERIES 1900 SERRATED RESTRAINT HARNESS MANUFACTURED BY EBBA, INC. OR APPROVED EQUAL.
6. ALL APPLICABLE WATER MAIN JOINTS SHALL BE RESTRAINED IN ACCORDANCE WITH THE PROVIDED DETAIL. THE MINIMUM RESTRAINT LENGTH FOR PVC PIPE JOINTS SHALL BE IN ACCORDANCE WITH THE PROVIDED DETAIL.
7. NEW WATER MAINS INSTALLED USING HORIZONTAL DIRECTIONAL DRILLING (HDD) METHODS SHALL BE HIGH-DENSITY POLYETHYLENE (HDPE) PIPE CONFORMING TO AWWA C906, ASTM D3035 AND ASTM F714. NEW WATER MAINS BETWEEN 8" AND 48" DIAMETER SHALL HAVE A PRESSURE CLASS OF 200 PSI (DR11) AND CONFORM TO DUCTILE IRON PIPE SIZES (DIPS). CONNECTIONS BETWEEN PIPE LENGTHS SHALL BE FUSED IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS AND RECOMMENDATIONS. NEW HDPE WATER MAINS SHALL BE THE COLOR BLACK WITH A BLUE STRIPE. CONNECTIONS TO OTHER WATER MAINS, INCLUDING THOSE OF DIFFERENT MATERIAL, SHALL BE MADE USING THE APPROPRIATE ADAPTERS AND FITTINGS.
8. FUSIBLE POLYVINYL CHLORIDE (PVC) PIPE CONFORMING TO AWWA C900 SHALL BE PERMITTED FOR NEW WATER MAINS INSTALLED USING HORIZONTAL DIRECTIONAL DRILLING (HDD) METHODS. NEW WATER MAINS BETWEEN 8" AND 30" DIAMETER SHALL HAVE A PRESSURE CLASS OF 235 PSI (DR18). CONNECTIONS BETWEEN PIPE LENGTHS SHALL BE FUSED BY THE PIPE MANUFACTURER'S APPROVED INSTALLER AND IN ACCORDANCE WITH THE PIPE MANUFACTURER'S INSTRUCTIONS. NEW WATER MAINS SHALL BE THE COLOR BLUE AND LABELED AS "WATER". CONNECTIONS TO OTHER WATER MAINS, INCLUDING THOSE OF DIFFERENT MATERIAL, SHALL BE MADE USING THE APPROPRIATE ADAPTERS AND FITTINGS.
9. FUSIBLE PVC PIPE SHALL BE USED FOR UNINTERRUPTED SEGMENTS OF NEW WATER MAINS GREATER THAN 1,000 LINEAR FEET THAT ARE INSTALLED USING AN OPEN CUT TRENCH METHOD.
10. UPON COMPLETION OF WATER MAIN CONSTRUCTION, THE DRILLING LOGS FOR ALL HHD INSTALLED WATER MAINS SHALL BE PROVIDED WITH THE RECORD DRAWINGS/AS-BUILT PLANS. THE DRILLING LOGS SHALL CONTAIN, AT MINIMUM, THE SIZE OF THE WATER MAIN, THE DEPTH OF INSTALLATION, AND THE LENGTH OF THE SEGMENT.
11. NEW WATER MAIN FITTINGS SHALL BE DUCTILE IRON FITTINGS CONFORMING TO AWWA C110/A21.10 WITH FITTING JOINTS CONFORMING TO AWWA C111/A21.11. THE DUCTILE IRON FITTING SHALL BE EPOXY COATED INSIDE AND OUT. BURIED FITTINGS SHALL BE MECHANICAL JOINT (MJ) FITTINGS. THE CONNECTION BETWEEN THE PVC FORCE MAIN AND THE FITTING SHALL BE RESTRAINED WITH A 2000PV OR 2000SV MEGA-LUG MECHANICAL JOINT THRUST RESTRAINT MANUFACTURED BY EBBA, INC. OR AN APPROVED EQUAL. THE NUTS AND BOLTS SHALL BE TEFLON COATED COR-TEN FASTENERS. ABOVE GROUND FITTINGS SHALL BE FLANGED, AND FASTENERS SHALL BE STAINLESS STEEL.
12. THE CONTRACTOR SHALL INSTALL IDENTIFICATION TAPE ALONG THE ENTIRE LENGTH OF THE NEW WATER MAIN. IDENTIFICATION TAPE SHALL BE INSTALLED BY THE CONTRACTORS ONCE THE BACKFILL HAS BEEN PLACED AND COMPACTED TO AT LEAST 12" ABOVE THE TOP OF THE PIPE AND NOT MORE THAN 18" ABOVE THE CONNECTION.
13. ALL NEW WATER MAINS SHALL UNDERGO HYDROSTATIC TESTING TO VERIFY LEAK TIGHTNESS. NEW WATER MAINS SHALL TESTED A 125 PSI FOR 2 HOURS. THERE SHALL BE NO PRESSURE DROPS DURING THE TEST. IN THE EVENT THE WATER MAIN FAILS THE TEST, THE WATER MAIN PIPES SHALL BE CHECKED AND REPAIRED ACCORDINGLY. THE WATER MAIN SHALL BE RE-TESTED.
14. AFTER SUCCESSFUL PRESSURE TESTING, WATERLINES AND WATER MAINS SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C-601. DISINFECTED LINES SHALL BE TESTED AND APPROVED BY THE LOUISIANA DEPARTMENT OF HEALTH BEFORE BEING PLACED INTO SERVICE. ALL LOUISIANA DEPARTMENT OF HEALTH TEST SAMPLES SHALL BE COLLECTED FROM AN INSTALLED KUPFERLE FOUNDRY COMPANY MODEL # 88 SAMPLE STATION.

WATER FITTINGS AND VALVES NOTES

1. WATER VALVES THREE INCHES (3") OR LARGER SHALL BE AWWA C-509 RESILIENT-SEATED GATE VALVE FOR POTABLE WATER SUPPLY SERVICE. WATER VALVES SHALL BE FUSION BONDED EPOXY AND LINED PER AWWA C-550. VALVES SHALL BE MUELLER SERIES 2360 OR TAMMANY UTILITIES APPROVED EQUAL. WATER VALVES SHALL BE RESTRAINED JOINT WITH MEGALUG AND TEFLON COATED CORE-TEN BOLTS AND NUTS.
2. BURIED VALVES, INCLUDING TWO INCH (2") VALVES, SHALL HAVE A 3-PIECE CAST IRON BOX INSTALLED AND ADJUSTED TO FINISHED GRADE. BURIED VALVES SHALL HAVE AN AWWA OPERATING NUT AND A COVER LABELLED "WATER". EACH VALVE BOX SHALL HAVE A PRECAST OR CAST-IN-PLACE VALVE MEASURING AT LEAST 4" THICK BY 24" BY 24" SQUARE OR 4" THICK BY 24" ROUND.
3. MANHOLE AND VALVE COVERS SHALL HAVE DIAMOND TREAD PATTERN AND HAVE WORD "WATER" CAST ON THE COVER.
4. IN GENERAL, WATER MAINS AND VALVES SHALL BE LOCATED BETWEEN THE RIGHT-OF-WAY LINE AND TOP OF DITCH OR SUBSURFACE DRAINAGE FEATURE. A HORIZONTAL CLEARANCE OF MINIMUM THREE FEET (3') SHALL BE MAINTAINED BETWEEN THE TOP OF DITCH (OR SUBSURFACE DRAINAGE FEATURE) AND EDGE OF THE MAIN AND/OR VALVE. IF THE CLEARANCE REQUIREMENT CANNOT BE MET DUE TO FIELD CONDITIONS, THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO DETERMINE AN ACCEPTABLE LOCATION OF THE MAIN AND/OR THE VALVE, ALL AT NO ADDITIONAL COST TO THE PROJECT. UNDER NO CIRCUMSTANCES VALVES AND THEIR ACCESS BE CONSTRUCTED IN DITCHES OR UNDER SUBSURFACE DRAINAGE FEATURES ARE ACCEPTABLE. ENGINEER'S DECISION SHALL BE FINAL.
5. IN GENERAL, WATER MAINS AND VALVES SHALL BE AT LEAST THREE FEET (3') BELOW FINISHED GRADE BUT NO DEEPER THAN FIVE FEET (5') BELOW FINISHED GRADE. IF THE DEPTH OF THE WATER VALVE IS LESS THAN 3' OR GREATER THAN 5', THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO DETERMINE IF THE DEPTH OF THE WATER VALVE IS ACCEPTABLE. THE WATER VALVE SHALL BE MOVED AT NO ADDITIONAL COST TO THE PROJECT. ENGINEER'S DECISION SHALL BE FINAL.
6. FITTINGS SHALL BE RESTRAINED JOINT DUCTILE IRON USING MEGALUGS AND TEFLON COATED CORE-TEN BOLTS AND NUTS. FITTINGS SHALL CONFORM TO ALL APPLICABLE AWWA/ANSI SPECIFICATIONS REGARDING USE IN POTABLE WATER SYSTEMS.
7. BRASS FITTINGS SHALL BE LEAD FREE. BRASS FITTINGS SHALL BE MUELLER, FORD METER BOX COMPANY, OR TAMMANY UTILITIES APPROVED EQUAL. REFER TO SHEET C-503 FOR APPROVED MODELS FROM MUELLER AND FORD METER BOX COMPANY.
8. CONNECTIONS TO EXISTING WATERLINES SHALL BE MADE USING MULLER STAINLESS STEEL TAPPING SLEEVE AND VALVE, MODEL NO. H-304SS. CONNECTION TO EXISTING WATERLINES USING OTHER TAPPING SLEEVES AND VALVES OTHER THAN MUELLER H-304SS SHALL BE APPROVED BY TAMMANY UTILITIES PRIOR TO USE.
9. WATER SERVICE CONNECTIONS SHALL HAVE A BRASS TAPPING SADDLE, BRASS CORPORATION STOP, AND A MINIMUM 1" CONNECTION SIZE. SERVICE CONNECTION PIPING SHALL BE AWWA C901 POLYETHYLENE TUBING, PE3408 DR9. WATER SERVICE CONNECTION SHALL HAVE MAXIMUM COVER OF 2'. A U-BRANCH SHALL BE INSTALLED ON WATER SERVICE CONNECTION WHIP. THE LOCATION OF THE WATER SERVICE CONNECTIONS SHALL BE STAMPED IN THE CURB FACE OR ROAD SURFACE USING THE "W↑" SYMBOL, AND THE LETTERING SHALL BE AT LEAST 4" BY 8".
10. ALL WATER SERVICE CONNECTION SHALL BE LOCATED AT THE LOT LINE. WATER SERVICE CONNECTIONS SHALL NOT BE LOCATED WITHIN THE DRIVEWAY.
11. ONE SAMPLE STATION SHALL BE INSTALLED BETWEEN VALVES ON THE WATER MAIN OR BETWEEN A VALVE AND DEAD-END OR CUL-DE-SAC.
12. ALL NEW SAMPLE STATIONS SHALL BE KUPFERLE FOUNDRY COMPANY BRAND – MODEL # 88-SS.

REFER TO SHEET G-101 FOR ADDITIONAL WATER STANDARD NOTES

ST. TAMMANY PARISH GOVERNMENT
DEPT. OF UTILITIES
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620 N. TYLER STREET
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STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
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CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

WATER STANDARD NOTES
SHEET 2 OF 2

SHEET NO.
G-102
SHEET 5 OF 92

SURVEY LEGEND

NOTE: NOT ALL SYMBOLS/LINES IN LEGEND MAY BE PRESENT IN THIS SURVEY

- EXISTING RIGHT OF WAY
- SERVITUDE
- EDGE OF WATER BODY
- EDGE OF SWAMP
- EDGE OF MARSH
- 6" VC — CATCH BASIN ON VERTICAL CURB
- 6" MC — CATCH BASIN ON MOUNTABLE CURB
- CULVERT
- 12" RCP — DROP INLET, DRAIN LINE
- 18" CMP — DRAIN MANHOLE, DRAIN LINE
- DITCH WITH CENTERLINE
- LEVEE TOP AND TOE
- EDGE OF WOODS (THICK COVERAGE)
- TREE ROW
- TREE (WITH DRIP LINE), TREE STAND, BUSH
- HEDGE ROW
- SHRUBBERY BED OR BOX
- BUILDING, WITH PORCH AND STAIRS
- FENCE WITH GATE
- PROPERTY CORNER FOUND
- PROPERTY CORNER SET UNLESS NOTED, 5/8" IRON ROD
- TEMPORARY BENCHMARK (TBM)
- TV PEDESTAL, TV MANHOLE/VAULT
- TVM — TV UTILITY MARKER, BORE HOLE
- POWER LINE, UNDERGROUND ABOVEGROUND
- POWER POLE, DEADMAN
- COMBINATION POLE, GUY POLE
- POWER JUNCTION, VAULT
- POWER DROP, TRANSFORMER
- ELM — POWER UTILITY MARKER, BORE HOLE
- GAS LINE, UNDERGROUND ABOVEGROUND
- GAS LINE CASING, UNDERGROUND ABOVEGROUND
- GAS RISER, REGULATOR, VENT
- GAS SERVICE WITH METER, WITHOUT METER
- GVM — GAS VALVE, UTILITY MARKER, BORE HOLE
- RAILROAD MILE POST, SWITCH
- RAILROAD SIGNAL, CONTROL BOX
- 6" PVC — SEWER MANHOLE, LINE
- SFM — SEWER BLOWOUT, FORCE MAIN LINE
- SEWER CLEANOUT, PUMP
- SVM — SEWER UTILITY MARKER, BORE HOLE
- SEWER LIFT STATION, TREATMENT STATION
- TRP — TRAFFIC SIGNAL POWER, UNDERGROUND ABOVEGROUND
- TC — LD — TRAFFIC INTERCONNECT, LOOP DETECTOR
- TRAFFIC SIGNAL, SUSPENDED, CANTILEVERED
- TRAFFIC DEADMAN, MISC. POLE
- TRAFFIC POWER VAULT, CONTROL BOX
- TRAFFIC SIGN, FEDERAL AID MARKER
- PARKING METER, LIGHT STANDARD, VAULT
- TRAFFIC CAMERA POLE, CONTROL BOX, PULL BOX
- TELEPHONE LINE, UNDERGROUND
- TFO — TELEPHONE FIBER OPTIC LINE, UNDERGROUND
- TELEPHONE BOOTH, CROSS CONNECT
- TELEPHONE PEDESTAL, MANHOLE
- TELEPHONE UTILITY MARKER, BORE HOLE
- WATER LINE, UNDERGROUND ABOVEGROUND
- WATER LINE CASING, UNDERGROUND ABOVEGROUND
- FIRE HYDRANT, WATER VALVE VAULT
- WATER METER, CLEANOUT, WELL
- WVM — WATER UTILITY MARKER, BORE HOLE
- BILLBOARD SUPPORT, SIGN POLE
- MAILBOX, STORAGE TANK VENT
- FLAGPOLE, MONITORING WELL
- MECHANICAL POINT E.G. A/C, COMPRESSOR, PUMP, ETC.
- × 1.45' — TOP OF SILT ELEVATION

COMMON SURVEY ABBREVIATIONS

AC	ASBESTOS CONCRETE
BOS	BOTTOM OF STRUCTURE
CI	CAST IRON
CMP	CORRUGATED METAL PIPE
CPP	CORRUGATED PLASTIC PIPE
CSW	CONCRETE SIDEWALK
EOP	EDGE OF PAVEMENT
FCA	FIELD CONNECTION ASSUMED
GI	GALVANIZED IRON
POCA	POINT OF CONNECTION ASSUMED
PVC	POLYVINYL CHLORIDE
RCP	REINFORCED CONCRETE PIPE
RCPA	REINFORCED CONCRETE ARCH PIPE
STL	STEEL
TC	TERRACOTTA OR CLAY
TM	TOP OF METER
TN	TOP OF NUT
TP	TOP OF PIPE
TV	TOP OF VALVE
UNK	UNKNOWN
UPOC	UNKNOWN POINT OF CONNECTION

GRAPHIC SCALE

100 0 50 100 200 400

1 INCH = 100 US SURVEY FEET

GENERAL NOTES

THE LOCATIONS OF UNDERGROUND AND OTHER NONVISIBLE UTILITIES SHOWN HEREON HAVE BEEN DETERMINED FROM DATA EITHER FURNISHED BY THE AGENCIES CONTROLLING SUCH DATA AND/OR EXTRACTED FROM RECORDS MADE AVAILABLE TO US BY THE AGENCIES CONTROLLING SUCH RECORDS. WHERE FOUND, THE SURFACE FEATURES OF LOCATIONS ARE SHOWN. THE ACTUAL NONVISIBLE LOCATIONS MAY VARY FROM THOSE SHOWN HEREON. EACH AGENCY SHOULD BE CONTACTED RELATIVE TO THE PRECISE LOCATION OF ITS UNDERGROUND INSTALLATION PRIOR TO ANY RELIANCE UPON THE ACCURACY OF SUCH LOCATIONS SHOWN HEREON, INCLUDING PRIOR TO EXCAVATION AND DIGGING.

VERTICAL DATUM BASIS

ELEVATIONS SHOWN ON THIS SURVEY ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) UTILIZING GEOID 12B. THEY ARE DERIVED FROM GPS OBSERVATIONS REFERENCED TO THE LOUISIANA STATE UNIVERSITY CONTINUOUSLY OPERATING REFERENCE STATIONS (CORS) NETWORK IN ACCORDANCE WITH LOUISIANA R.S. 50:173.1 COVERING VERTICAL CONTROL STANDARDS.

SERVITUDES

THE SERVITUDES AND RESTRICTIONS SHOWN ON THIS SURVEY ARE LIMITED TO THOSE SET FORTH IN THE DESCRIPTION FURNISHED US AND THERE IS NO REPRESENTATION THAT ALL APPLICABLE SERVITUDES AND RESTRICTIONS ARE SHOWN HEREON. THE SURVEYOR HAS MADE NO TITLE SEARCH OR PUBLIC RECORD SEARCH IN COMPILING THE DATA FOR THIS SURVEY.

UTILITY INFORMATION

SUBSURFACE UTILITY INFORMATION SHOWN HEREON, WHICH WAS NOT DERIVED FROM DIRECT FIELD OBSERVATION, WERE TAKEN FROM MUNICIPAL GEOGRAPHIC INFORMATION SYSTEMS (GIS) DATA AVAILABLE; THESE DATA ARE SHOWN TO QUALITY LEVEL D STANDARDS. UNLESS OTHERWISE NOTED, GIS-DERIVED SUBSURFACE UTILITIES HAVE NOT BEEN FIELD VERIFIED BY THE SURVEYOR.

UTILITY QUALITY LEVEL

THE SUBSURFACE UTILITIES AS SHOWN ON THE MAP OF SURVEY WERE IDENTIFIED USING INDUSTRY STANDARD DETECTION METHODOLOGIES IN STRICT ACCORDANCE WITH THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. QUALITY LEVELS AND DEFINITIONS PER CI/ASCE STANDARD NO. 38-02:

QUALITY LEVEL D – QL-D: DEPICTED ACCORDING TO UTILITY RECORD INFORMATION AND IN-FIELD VISUAL INSPECTION. NO ELECTRONIC **DESIGNATING INFORMATION WAS OBTAINED.**

QUALITY LEVEL C – QL-C: EXISTING UTILITY STRUCTURES HAVE BEEN FIELD LOCATED AND SURVEYED TO ASSIST IN THE DEPICTING THE UTILITIES SHOWN ON THE RECORDS. NO ELECTRONIC DESIGNATING INFORMATION WAS OBTAINED.

QUALITY LEVEL B – QL-B: INFORMATION WAS OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROPRIATE HORIZONTAL POSITION OF THE SUBSURFACE UTILITIES. QL-B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION.

QUALITY LEVEL A – QL-A: OBTAIN PRECISE HORIZONTAL AND VERTICAL POSITION OF THE UTILITY LINE BY EXCAVATING A TEST HOLE. THE TEST HOLE SHALL BE DONE USING VACUUM EXCAVATION OR COMPARABLE NON-DESTRUCTIVE EQUIPMENT IN A MANNER AS TO CAUSE NO DAMAGE TO THE UTILITY LINE.

CONSTRUCTION BENCHMARK (CBM)

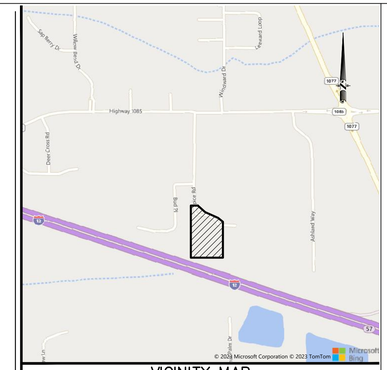
CBM IS A YELLOW BENCH TIE SET IN THE WEST FACE OF A POWER POLE. SET 1 FOOT ABOVE THE CENTERLINE. POLE IS LOCATED AT THE SOUTHWEST CORNER OF THE MAIN BLACK STORAGE TANK
ELEVATION: 24.44' N.A.V.D. 88 GEOID 12B

SPECIAL FLOOD HAZARD AREA

I HAVE CONSULTED THE FEDERAL INSURANCE ADMINISTRATION FLOOD HAZARD BOUNDARY MAPS AND FOUND THIS PROPERTY IS NOT IN A SPECIAL FLOOD HAZARD AREA.

FIRM ZONE: C
BASE FLOOD ELEVATION: N/A (N.A.V.D. 88)
COMMUNITY PANEL NO. 22520502O5C
MAP DATED/REVISED: 10/17/1989

GRID NORTH
NORTH REFERENCED TO LOUISIANA STATE PLANE COORDINATE SYSTEM SOUTH ZONE, NAD 83



VICINITY MAP
NOT TO SCALE

SHEET INDEX

SHEET	STREET	BEG. STA.	END. STA.
V-001	COVER SHEET		
V-101	PLAN AND PROFILE SHEET	100+00	105+60
V-102	BOUNDARY SHEET		
V-301 – V-302	CROSS SECTIONS		
V-501	THREE POINT TIES		

LA ONE CALL TICKET RESPONSES

CALL BEFORE YOU DIGI DIAL 811, OR LOGON AT WWW.LAONECALL.COM
LA ONECALL IS NOT REQUIRED TO MARK FOR A SURVEY PER LOUISIANA REGULATIONS; THEREFORE, ALL DATA MAY NOT BE SHOWN.
TICKET NUMBERS FOR THIS PROJECT:
230439980

UTILITY CO. NAME	RESPONSE
ST TAMM PAR GOVT/TAMM UTIL	MAP
CLECO POWER, LC	MAP
ATMOS ENERGY	MAP
TOWN OF MADISONVILLE	CLEAR
COGENT COMMUNICATION	CLEAR
CHARTER COMMUNICATIONS	NO RESPONSE
AT&T DISTRIBUTION	CLEAR
MCI COMMUNICATIONS	CLEAR
UNITI FIBER	NO RESPONSE

IF THIS SURVEY IS ON PRIVATE LAND, LA ONE CALL & PARTICIPATING UTILITY COMPANIES WILL NOT MARK ON PRIVATE LAND.

NOTES:
1. ONLY UTILITY COMPANIES LISTED ON THE LA ONE CALL TICKET(S) ARE LISTED HERE, AND MAY NOT REPRESENT ALL UTILITIES PRESENT ON SITE.
2. UNLESS NOTED, ONE CALL UTILITIES ARE LIMITED TO QUALITY LEVEL C OR D, DEPENDING ON THE ACTION OF THE UTILITY OWNER.

BFM CORPORATION LLC
A PROFESSIONAL LAND SURVEYING COMPANY
15 Veterans Memorial Boulevard
Kenner, Louisiana – 70062
(504) 468-8900 Fax (504) 467-0065
www.bfmcorporation.com – info@bfmcorporation.com

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ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY:	MH
DRAWN BY:	JAB
CHECKED BY:	JAB
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	08/21/2023
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

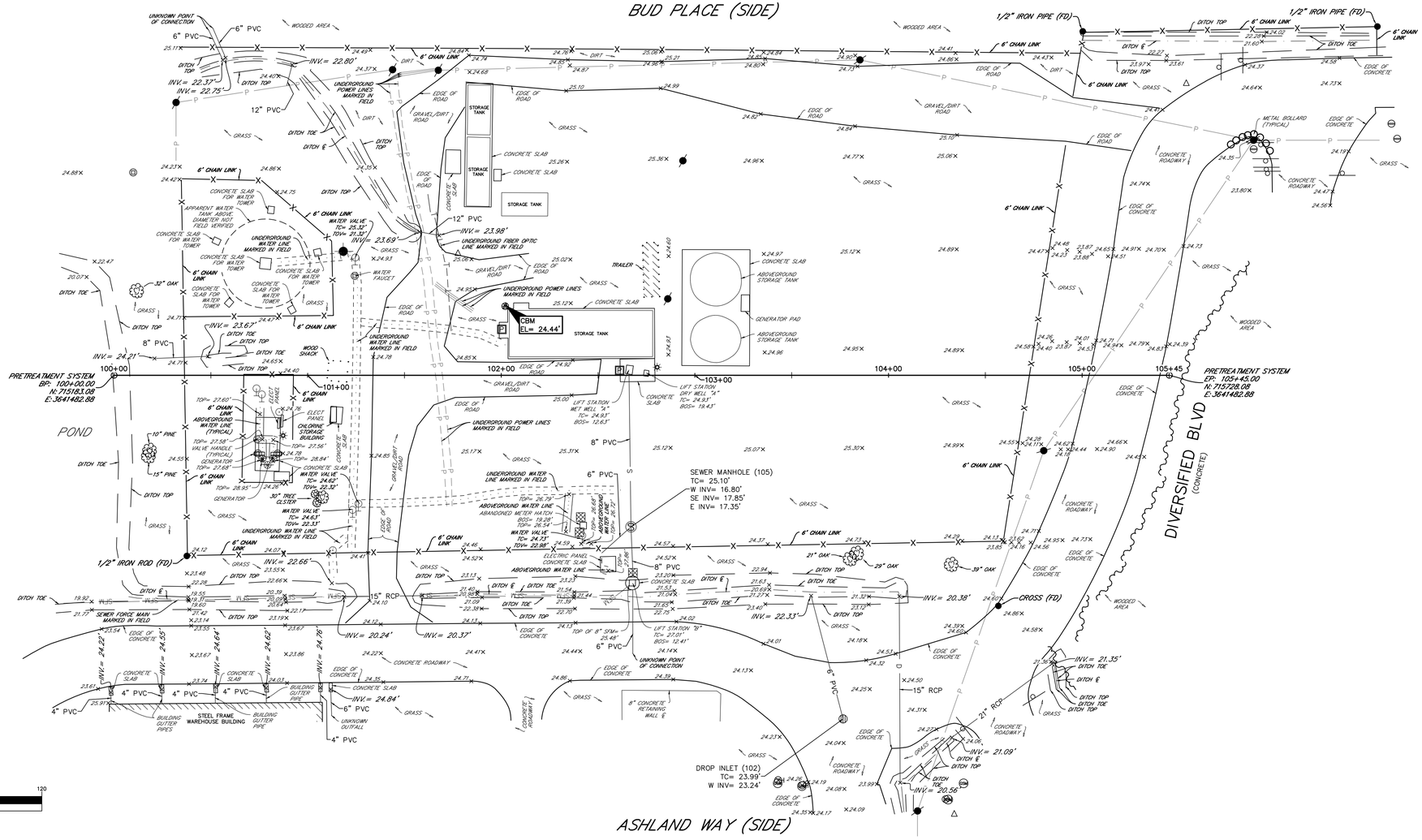
STATE OF LOUISIANA
GARY J. LAMBERT, JR.
License No. 5259
PROFESSIONAL LAND SURVEYOR
8/30/2023

DIVERSIFIED WATER WELL
PRETREATMENT
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SHEET NO.

SHEET 1 OF 6

GRID NORTH
NORTH REFERENCED TO LOUISIANA STATE PLANE COORDINATE SYSTEM SOUTH ZONE, NAD 83



GRAPHIC SCALE

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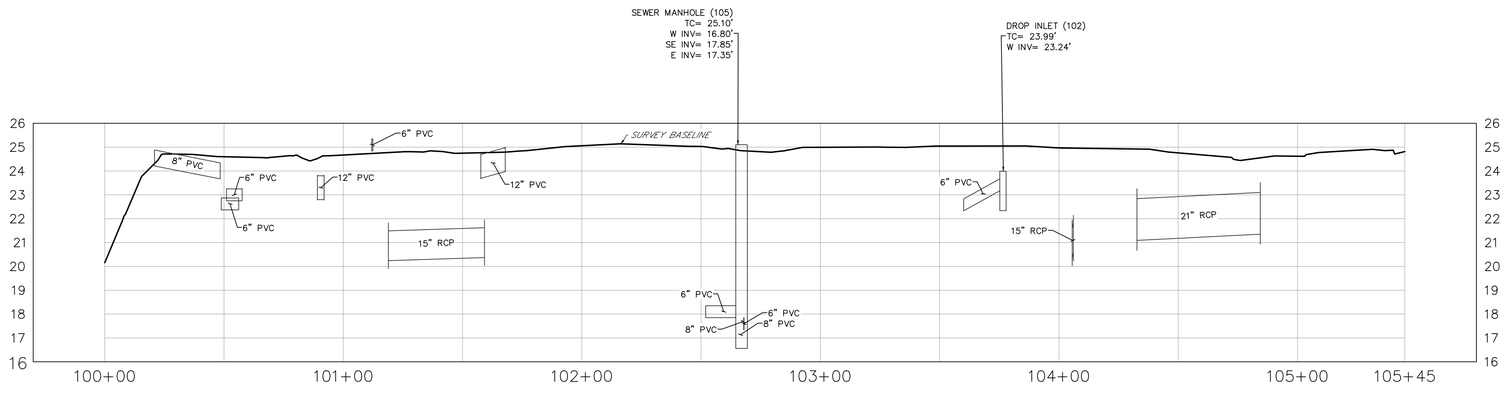
1 INCH = 30 US SURVEY FEET



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SCALE:

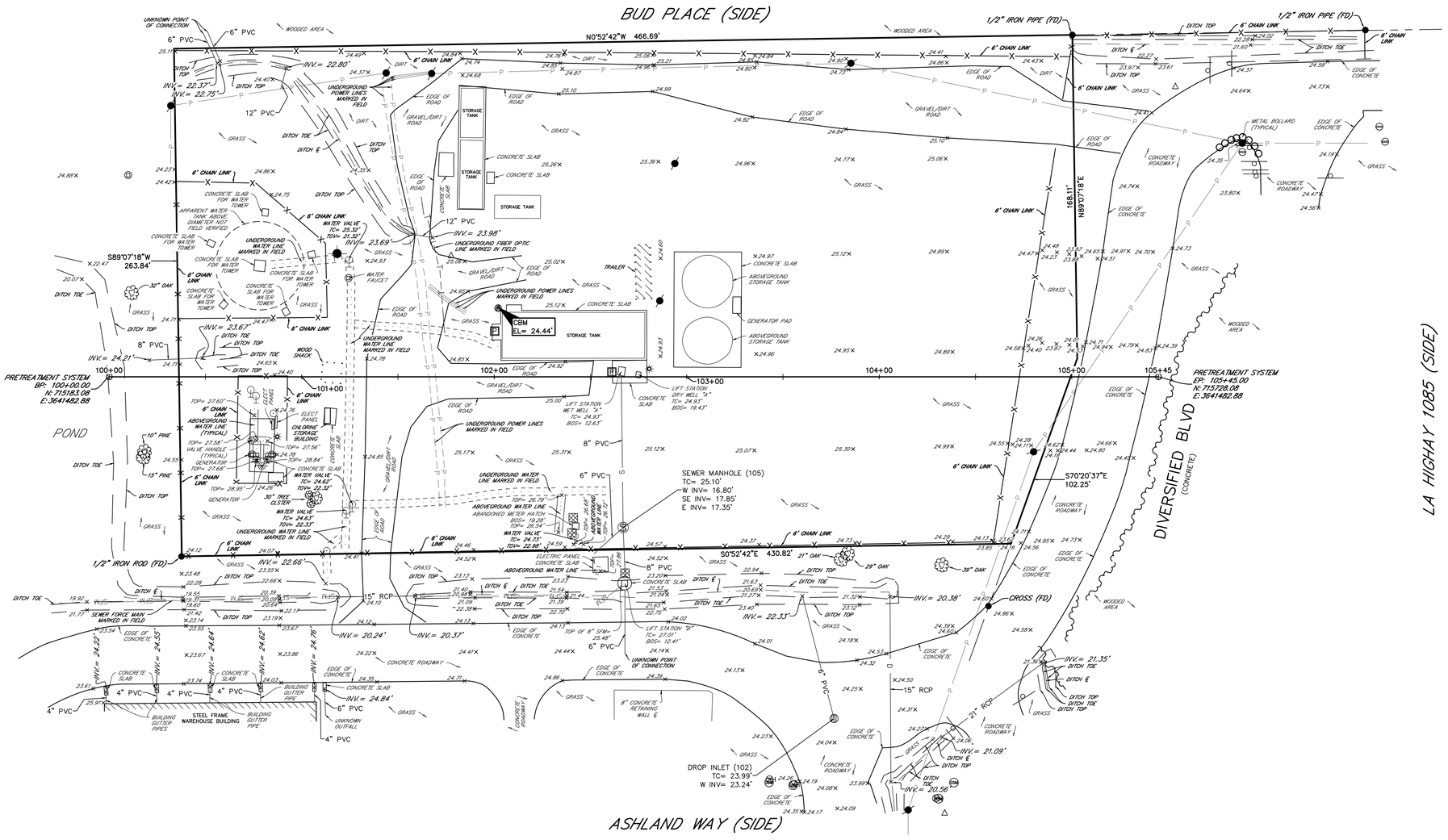
STATE OF LOUISIANA
5/30/2025
GARY J. LAMBERT, JR.
License No. 5259
PROFESSIONAL LAND SURVEYOR

DIVERSIFIED WATER WELL
PRETREATMENT
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SHEET NO.

SHEET 2 OF 6

GRID NORTH
NORTH REFERENCED TO
LOUISIANA STATE PLANE
COORDINATE SYSTEM
SOUTH ZONE, NAD 83



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30 0 15 30 60 120

1 INCH = 30 US SURVEY FEET

BFM CORPORATION LLC
A PROFESSIONAL LAND SURVEYING COMPANY
15 Veterans Memorial Boulevard
Kenner, Louisiana – 70062
(504) 468-8800 Fax (504) 467-0065
www.bfmcorporation.com – info@bfmcorporation.com

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH
GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MH
DRAWN BY:
CHECKED BY: JAB
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181

ISSUE DATE: 08/21/2023
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA
5/30/2025
GARY J. LAMBERT, JR.
License No. 5259
PROFESSIONAL LAND SURVEYOR

DIVERSIFIED WATER WELL
PRETREATMENT
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SHEET NO.

SHEET 3 OF 6

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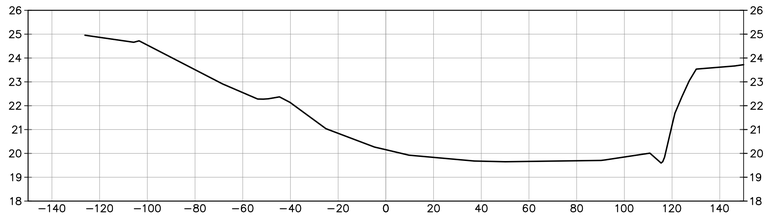

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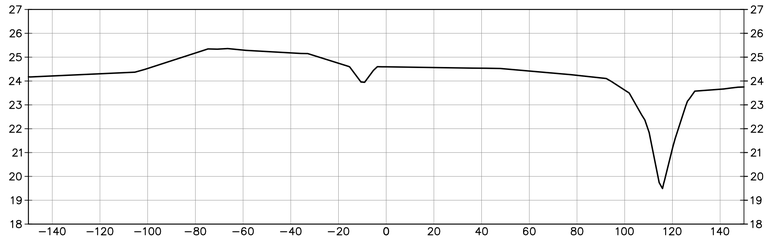

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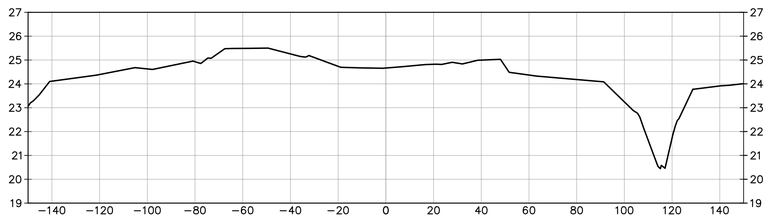

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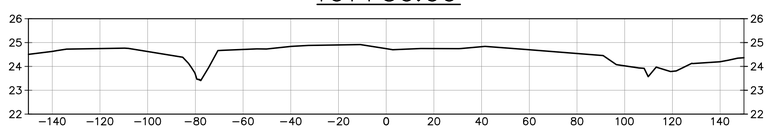

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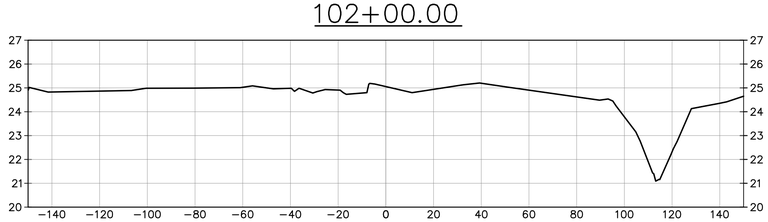

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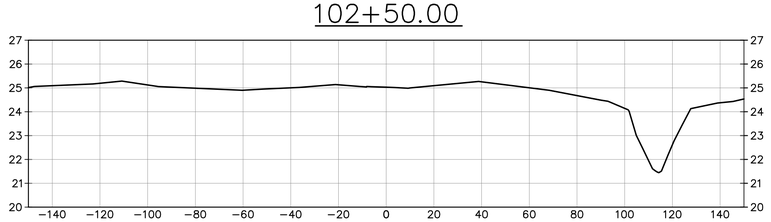

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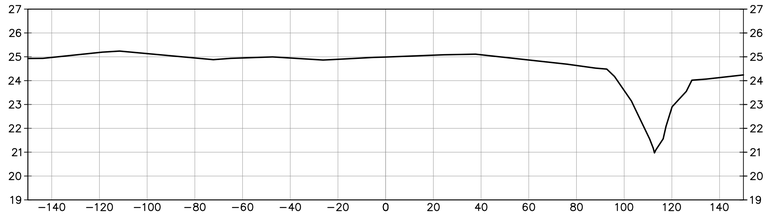
PRETREATMENT
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SHEET NO.

SHEET 4 OF 6

103+00.00



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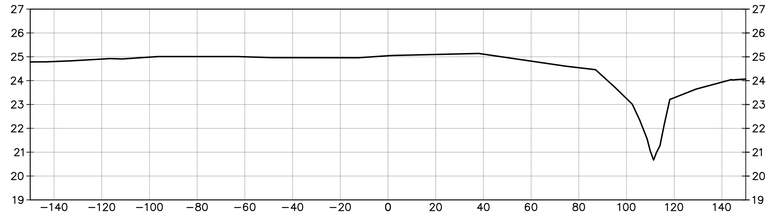

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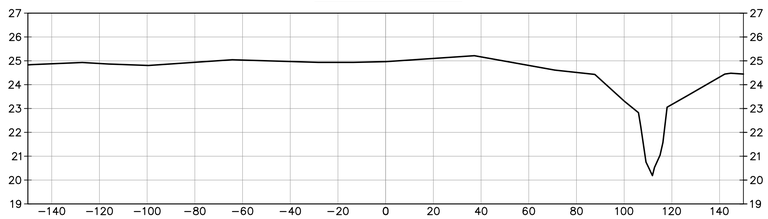

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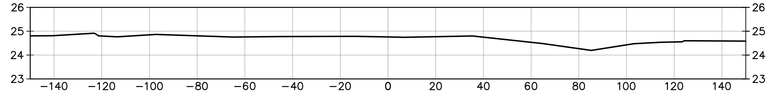

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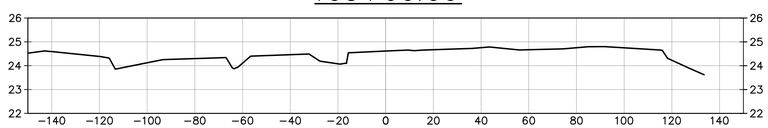

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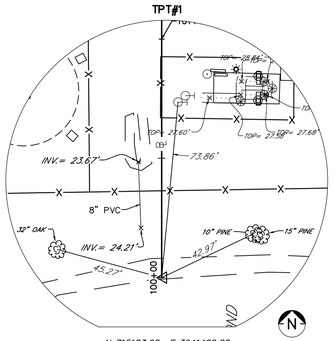
DIVERSIFIED WATER WELL
PRETREATMENT
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SHEET NO.

SHEET 5 OF 6



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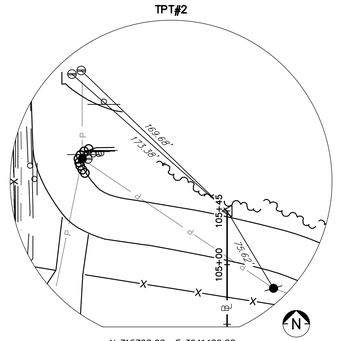
PRETREATMENT SYSTEM
STA: 100+00.00
OFF: 0.00
1" = 30'



N: 715728.08 E: 3641482.88

PRETREATMENT SYSTEM
STA: 105+45.00
OFF: 0.00
1" = 60'

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DIVERSIFIED WATER WELL
PRETREATMENT
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SHEET NO.

SHEET 6 OF 6

12"X¾" SADDLE TAP W/ CORP STOP FOR SAMPLING LINE.
TIE IN AT WATER TOWER OUTLET LINE (2 / C-019)
REQ'D NEW GATE VALVE AT HYDRANT
EXIST. 12" OUTLET LINE
VALVE
FIRE HYDRANT (EXIST. TO REMAIN)
VALVE
45° D.I. BEND
CONCRETE SLAB FOR WATER TOWER
CONCRETE SLAB FOR WATER TOWER (1 / C-015, 2 / C-015)
REQ'D 6' CHAIN LINK SECURITY FENCE
WATER FAUCET
VALVE
GATE VALVES
12" D.I. WATER LINE
SEWER LIFT STATION (1 / C-021)
LS
GATE VALVE
REQ'D HYDRANT ASSEMBLY
4' x 4' CONC. WALK
12" D.I. WATER LINE
REQ'D 14"x12" D.I. RED TEE
¾" WATER SAMPLING LINE FOR TURBILITY & CHLORINE ANALYZERS
REQ'D 14" FILL LINE
DITCH TOP
DITCH TOE
12" D.I. EFFLUENT LINE
12" x 12"D.I. TEE GOING DOWN
4' x 4' CONC. WALK
8'-0" REQ'D LIMESTONE ACCESS ROAD
REQ'D 8' CHAIN LINK SECURITY FENCE (1 / C-015, 2 / C-015)
DITCH TOP
14" 90° D.I. BEND
REQ'D 4' ACCESS GATE (4 / C-015)
GATE VALVES
ELEC. PANEL
14" STATIC IN-LINE MIXER
6' CHAIN LINK
8"x14" D.I. INCREASER
14" WATER LINE
1 / C-018
4' x 4' CONC. ACCESS PAD
FLOW METER
4'-0"
VALVE HANDLE (TYPICAL)
14" 90° D.I. BEND
14" D.I. RAW WATER INFLUENT LINE
REQ'D 12' LIMESTONE ACCESS ROAD
12'-0"
8" BACKWASH WASTE
12" BACKWASH SUPPLY
6' x 4' CONC. ACCESS WALK (1 / C-018)
SEE SHEET C-008 FOR PIPING DETAIL
PIPE BOLLARDS
REQ'D UPGRADED 60HP HORIZONTAL SPLIT-CASE PUMPS, MOTORS, AND PIPING (1 / C-019)
6' CHAIN LINK
WELL COLUMN
CONCRETE SLAB
REQ'D 15' DOUBLE SWING GATE (3 / C-015)
REQ'D 3" SERVICE LINE (2 / C-020)
NEW PADMOUNT TRANSFORMER (SEE ELECTRICAL DWGS)
NEW STAND-BY GENERATOR
REQ'D 20' DOUBLE SWING GATE (3 / C-015)
DITCH TOP
6' CHAIN LINK
EXISTING 12" WATER SERVICE TO DIVERSIFIED FOODS
REQ'D 12"X12"X3" D.I. TEE
EXISTING 12" WATER TO DISTRIBUTION
GATE VALVE
CUT-IN EXISTING WATERLINE &INSTALL NEW 12"X12" D.I. TEE WITH RESTRAINED MECHANICAL JOINTS (1 / C-019)
ABANDONED METER HATCH BOS= 19.28'
6' CHAIN LINK
ELECTRIC PANEL
CONCRETE SLAB
8" PVC
6" PVC
TO DITCH
REQ'D 12" C-900 PVC WATER LINE
EDGE OF ROAD
GRAVEL/DIRT ROAD
UNDERGROUND POWER LINES MARKED IN FIELD
TRAILER
CONCRETE SLAB
EXISTING WWTP
45° D.I. BEND
5'-0"
CONCRETE ACCESS RAMP (2 / C-018)
REQ'D 2" BACKFLOW PREVENTER
EDGE OF ROAD
12'-0" REQ'D LIMESTONE ACCESS ROAD
REQ'D 2" WATER SERVICE TO WWTP (A / C-021)
REQ'D 2" PVC SEWER FORCE MAIN
3'-0"
CONCRETE ACCESS RAMP (2 / C-018)
2" GATE VALVE WITH VALVE BOX
20'x6' CONCRETE SLAB
CAUTION: EXSIT. UNDERGROUND POWER LINES MARKED IN FIELD
8'-0"
REQ'D 12" BACKFLOW PREVENTER (1 / C-020)
REQ'D 12" MAG METER (1 / C-020)
PIPE BOLLARD (4 / C-018)
UNDERNEATH EXISTING PIPE
REQ'D 12" C-900 PVC WATER LINE
LIFT STATION WET WELL "A" TC= 24.93' BOS= 12.63'
LIFT STATION DRY WELL "A" TC= 24.93' BOS= 19.43'
CONCRETE SLAB
2 / C-021

DETAILED SITE PLAN

SCALE: 1"=10'

10 0 5 10 20 40

SCALE: 1" = 10'-0" HORIZ.

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	AS NOTED

STATE OF LOUISIANA
MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

DETAILED SITE PLAN

SHEET NO.
C-001
SHEET 12 OF 92

BACKWASH LINE DISCHARGE (1 / C-022)

8" BACKWASH WASTE

DITCH TOP

DITCH TOE

DITCH ℄

6" CHAIN LINK

DIRT

EDGE OF ROAD

GRAVEL/DIRT ROAD

UNDERGROUND POWER LINES MARKED IN FIELD

STORAGE TANK

CONCRETE SLAB

CONCRETE SLAB FOR WATER TOWER

APPARENT WATER TANK ABOVE, DIAMETER NOT FIELD VERIFIED

WATER FAUCET

UNDERGROUND FIBER OPTIC LINE MARKED IN FIELD

SHOOT CBM FOR SITE

TRAILER

ABOVEGROUND STORAGE TANK

GENERATOR PAD

EXISTING WWTP

25.75

25.65

25.50

25.30

25.20

24.80

24.40

24.10

B C-015

A C-015

C C-015

8'-0" REQ'D LIMESTONE ACCESS ROAD

NEW FILTER BUILDING F.F.E. 26.0

12'-0" REQ'D LIMESTONE ACCESS ROAD

40'-0"

REQ'D 15" RCP x 30' LENGTH

REQ'D CONCRETE ENTRANCE APRON AND RAMP (1 / C-016)

VALVE HANDLE (TYPICAL)

ABANDONED METER HATCH BOS= 19.28'

LIFT STATION DRY WELL "A" TC= 24.93' BOS= 19.43'

LIFT STATION WET WELL "A" TC= 24.93' BOS= 12.63'

LIFT STATION "B" TC= 27.01' BOS= 12.41'

TOP OF 8" SFM= 25.48'

UNKNOWN POINT OF CONNECTION

ELECTRIC PANEL CONCRETE SLAB

8" PVC

6" PVC

STEEL FRAME WAREHOUSE BUILDING

BUILDING GUTTER PIPE

UNKNOWN OUTFALL

8" CONCRETE RETAINING WALL

GRASS

CONCRETE ROADWAY

EDGE OF CONCRETE

CONCRETE SLAB

CONCRETE ROADWAY

DIVERSIFIED BLVD (CONCRETE)

WOODED AREA

ME (Tr

LEGEND

REQ'D FINISH GRADE

REQ'D SLOPE

OVERALL CIVIL SITE PLAN

SCALE: 1"=20'

20 0 10 20 40 60

SCALE: 1" = 20'-0" HORIZ.

ST. TAMMANY PARISH GOVERNMENT

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COVINGTON, LA 70433

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SCALE:	AS NOTED

STATE OF LOUISIANA
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License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

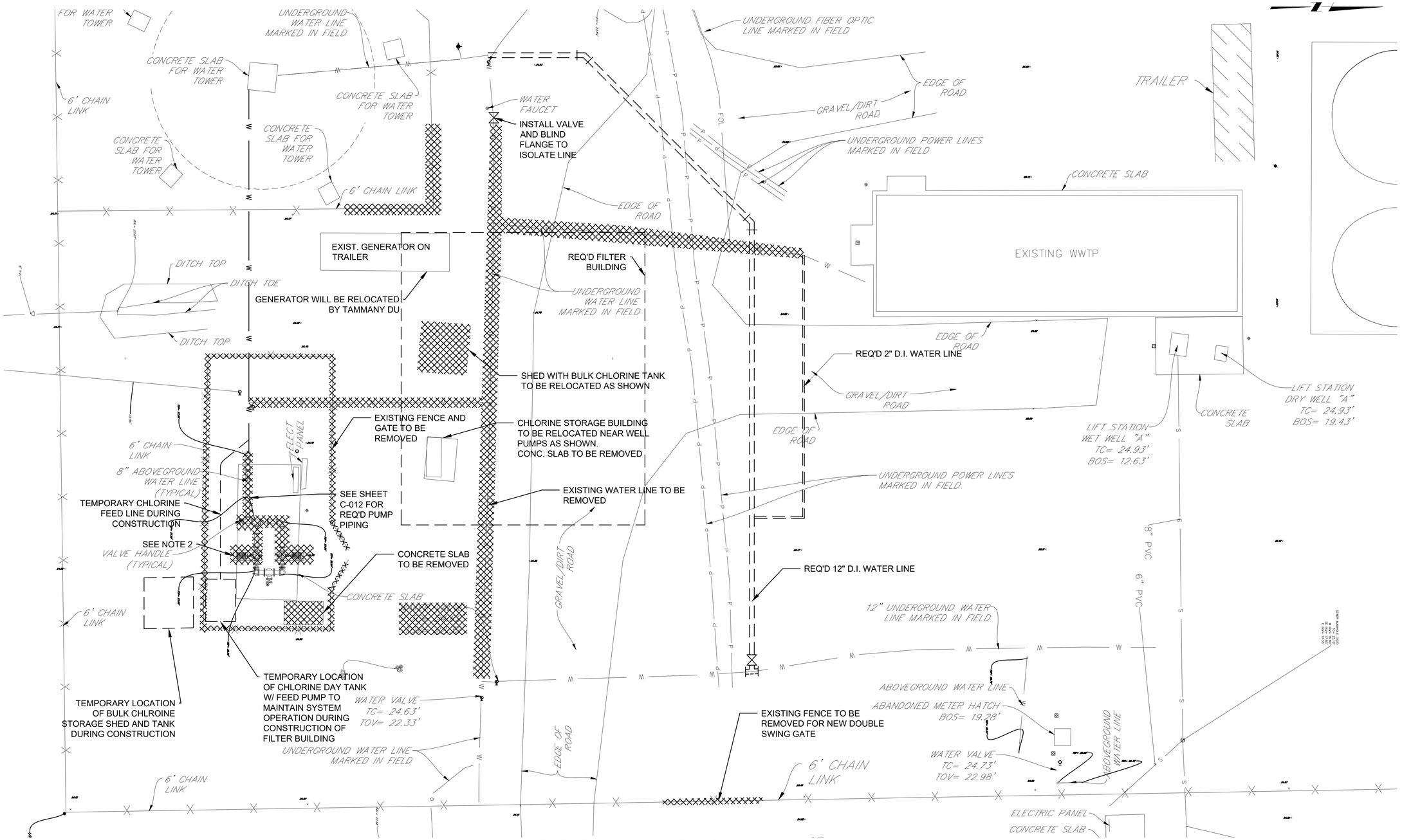
OVERALL CIVIL SITE PLAN

SHEET NO.
C-002
SHEET 13 OF 92

NOTES:
1.THE EXISTING WATER WELL AND WASTEWATER TREATMENT SITES MUST REMAIN FULLY OPERATIONAL THROUGH THE LENGTH OF ITS CONTRACT. ANY OUTAGE OF THIS FACILITY AND/OR OTHER DAMAGES DUE TO THE CONTRACTOR'S NEGLIGENCE SHALL BE REPAIRED IMMEDIATELY BY CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACTOR. CONTRACTOR SHALL INFORM THE DU AT LEAST 72 HOURS IN ADVANCE FOR ANY COORDINATION REQUIRED FOR THE TIE-IN THE EXISTING FACILITY TO THE NEW FACILITY, WEATHER PERMITTING. REFER TO SPECIFICATIONS SECTION 03, V. SPECIAL PROVISIONS

WATERLINE RELOCATION RECOMENDED CONSTRUCTION SEQUENCE
1. CONSTRUCT AND INSTALL NEW WATER MAIN
2. ISOLATE WATERLINE, CUT-IN WATER LINE TO ALLOW FOR TIE-IN, AND INSTALL NEW DUCTILE IRON MECHANICAL JOINT RESTRAINED FITTINGS AND VALVES AS SHOWN. HOT TAPS WILL NOT BE ACCEPTABLE

WATERLINE RELOCATION NOTES
1. ALL WATER SERVICE INTERRUPTIONS SHALL BE COORDINATED WITH ST. TAMMANY PARISH DEPARTMENT OF UTILITIES AT LEAST 72 HOURS PRIOR TO EXPECTED SHUT DOWNS. ALL SHUT DOWNS SHALL OCCUR DURING LOW DEMAND PERIODS BETWEEN THE HOURS OF 10:00 PM & 5:00 AM TO LIMIT CUSTOMER IMPACT.
2. WATER SERVICE INTERRUPTIONS SHALL LAST NO LONGER THAN 4 HOURS. IF CONTRACTOR EXCEEDS THE REQUIRED 4-HOUR LIMIT, CONTRACTOR WILL PAY OWNER LIQUIDATION DAMAGES OF $500 PER HOUR FOR EACH ADDITIONAL HOUR OF WATER SHUTDOWN



UTILITY RELOCATION / DEMOLTION SITE PLAN

SCALE: 1"=10'

0 5 10 20 40

SCALE: 1" = 10'-0" HORIZ.

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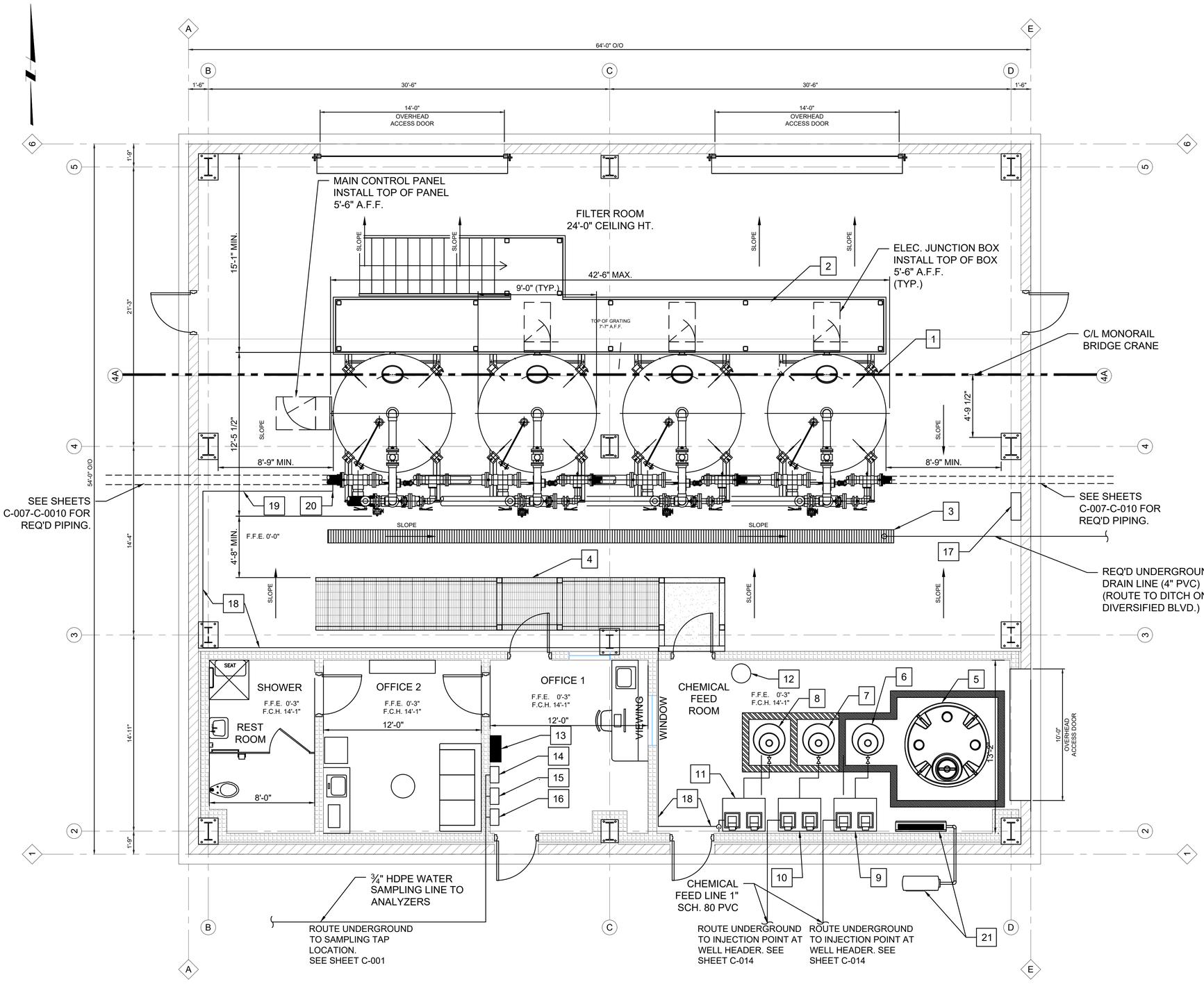
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

UTILITY RELOCATION/DEMOLITION SITE PLAN

SHEET NO.
C-003
SHEET 14 OF 92

Plot Date: Mon Jul-15-2024 - 05:26PM
User: Phil
DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\C-003 - Diversified_Demolition.dwg - 7/15/2024 2:53 PM



KEY NOTES

NO.	DESCRIPTION
1	FILTRATION SYSTEM ASSEMBLY WITH FACE PIPNG, VALVES AND CONTROLS. RE: SPEC SECTION 46 61 21
2	MAINTENANCE ACCESS AND ELEVATED WALKING PLATORM. RE STRUCT.
3	FLOOR TRENCH DRAIN. RE: MECH.
4	MEZZANINE STAIRS RE: STRUCT.
5	1000 GALLON SODIUM HYPOCHLORITE BULK STORAGE TANK.
6	65 GALLON SODIUM HYPOCHLORITE DAY TANK.
7	65 GALLON POTASSIUM PERMANGANATE DAY TANK.
8	65 GALLON POLYMER SOLUTION DAY TANK.
9	SODIUM HYPOCHLORITE DUPLEX FEED PUMPS
10	POTASSIUM PERMANGANATE DUPLEX FEED PUMPS
11	POLYMER SOLUTION DUPLEX FEED PUMPS
12	COMBINATION SHOWER AND EYE WASH SAFETY STATION. RE: PLUMB.
13	SCADA PANEL
14	TURBIDITY MONITOR. RE: SHEET C-013.
15	FREE CHLORINE MONITOR. RE: SHEET C-013.
16	TOTAL CHLORINE MONITOR. RE: SHEET C-013.
17	DISPLAY UNIT FOR MAG FLOW METER AT BACKWASH SUPPLY LINE.
18	1" SCH. 80 PVC POLYMER FEED LINE INSTALLED 14'-0" AFF USING GALVANIZED STEEL SUPPORT CLIPS ANCHORED TO CMU WALL/STEEL GIRTS @ 6'-0" O,C, MINIMUM
19	1" SCH. 80 PVC POLYMER FEED LINE INSTALLED 20'-0" AFF USING GALVANIZED STEEL CLEVIS HANGERS @ 6'-0" O,C, MINIMUM
20	1" SCH. 80 PVC POLYMER INJECTION INTO 12" FILTER EFFLUENT LINE AT FILTER SKID. SEE DETAIL 3/C-019
21	12,000 BTU MINI-SPLIT A/C SYSTEM. SEE SHEET C-011

NOTE: A/C SYSTEM FOR CHEMICAL FEED ROOM SHALL BE STAND-ALONE UNIT INDEPENDENT FROM, AND NOT CONNECTED TO, PERSONNEL OFFICES, RESTROOM, AND FILTER ROOM. PROVIDE SEPARATE MINI-SPLIT A/C SYSTEM FOR CHEMICAL ROOM AS SHOWN IN DRAWINGS.

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
FILTER PROCESS FLOOR PLAN
SCALE: 1/4" = 1'0"

ST. TAMMANY PARISH GOVERNMENT

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MADISONVILLE, LOUISIANA
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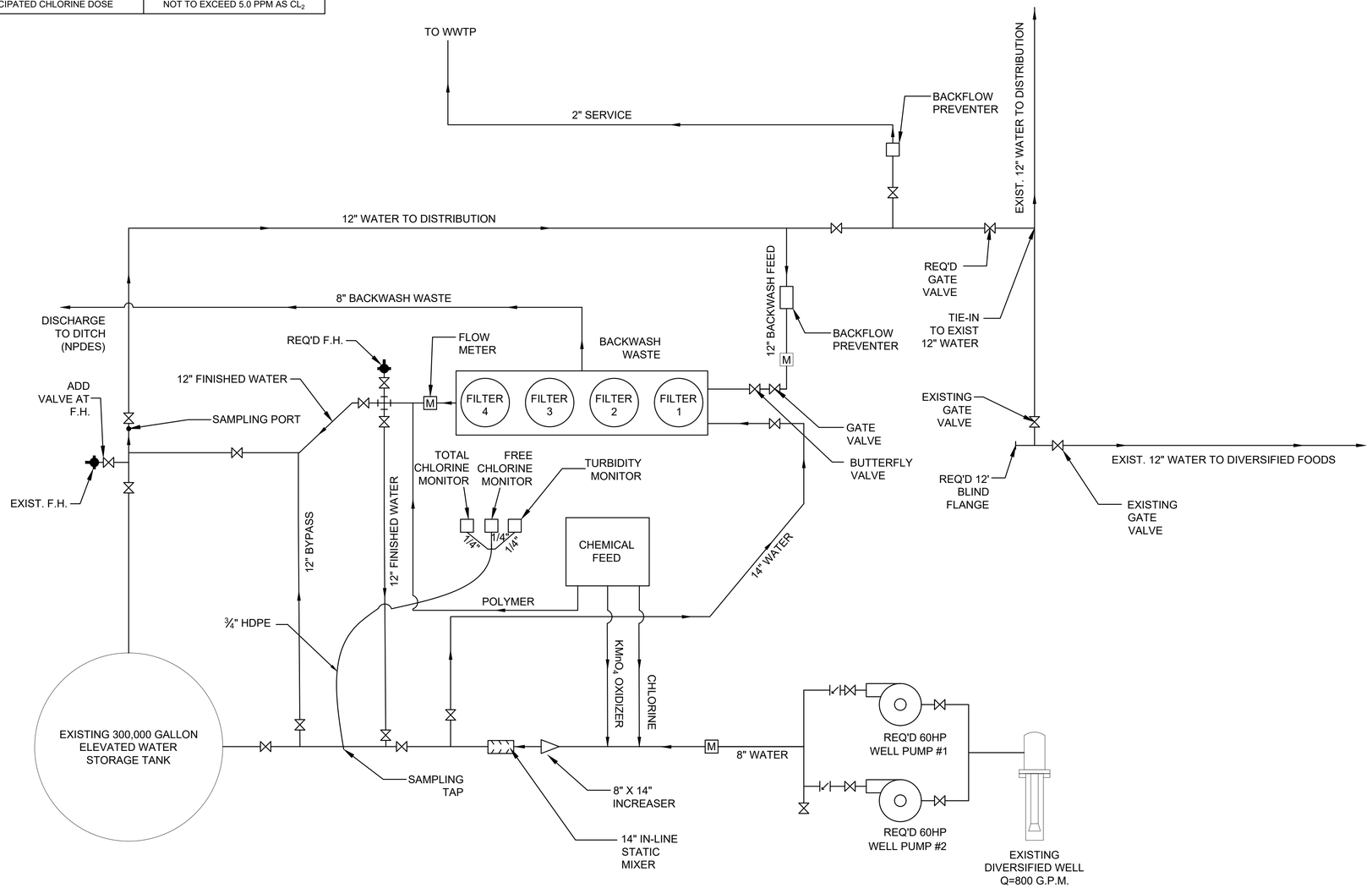
FILTER PROCESS FLOOR PLAN

SHEET NO.
C-004
SHEET 15 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\C-004 - Diversified_ Filter Process Floor Plan.dwg - 7/15/2024 2:59 PM User: Phil Plot Date: Mon Jul-15-2024 - 05:26PM

CHLORINE FEED EQUIPMENT DATA	
TYPE OF SOLUTION PUMPED	12.5% SODIUM HYPOCHLORITE (NaOCl)
WEIGHT OF NaOCl PER GALLON	10 POUNDS
TOTAL NUMBER OF CHLORINE PUMPS	2
NUMBER OF DUTY PUMPS	1
NUMBER OF STAND-BY PUMPS	1
TYPE OF PUMP	PERISTALTIC
PUMPING CAPACITY OF EACH PUMP	2.0 GAL/HOUR
ANTICIPATED CHLORINE DOSE	NOT TO EXCEED 5.0 PPM AS CL_2



PROCESS FLOW DIAGRAM
SCALE: N.T.S.

LEGEND

Q	1 FLOW RATE
Q	2 FLOW RATE
M	METER
	GATE VALVE
	CHECK VALVE
	BALL VALVE
	PLUG VALVE
//	AIR HEADER

DIVERSIFIED WELL EXISTING INFORMATION	
OWNER	ST. TAMMANY PARISH GOVERNMENT
LDNR WELL No.	103-1151
LOCATION	0.25 MILE WEST OF LA-1077 & LA-1085
LATITUDE	30º 27' 43"
LONGITUDE	90º 11' 20"
CASING SIZE	16" TO 12"
CASING MATERIAL	304 STAINLESS STEEL
DEPTH	1,845 BELOW GROUND SURFACE
PUMP MANUFACTURER	UNKNOWN / TBD
PUMP MODEL	UNKNOWN / TBD
PUMP SIZE	8", 50 HP
PUMP DISCHRARGE	8"
FLOW RATE (MAX.)	800 GPM
FLOW RATE (AVG.)	800 GPM
POWER SOURCE	CLECO
POWER	480 V, 240 AMP, 3 PH
STORAGE TYPE	ELEVATED TANK / WATER TOWER
STORAGE SIZE	300,000 GALLONS
DISINFECTION	CHLORINE

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

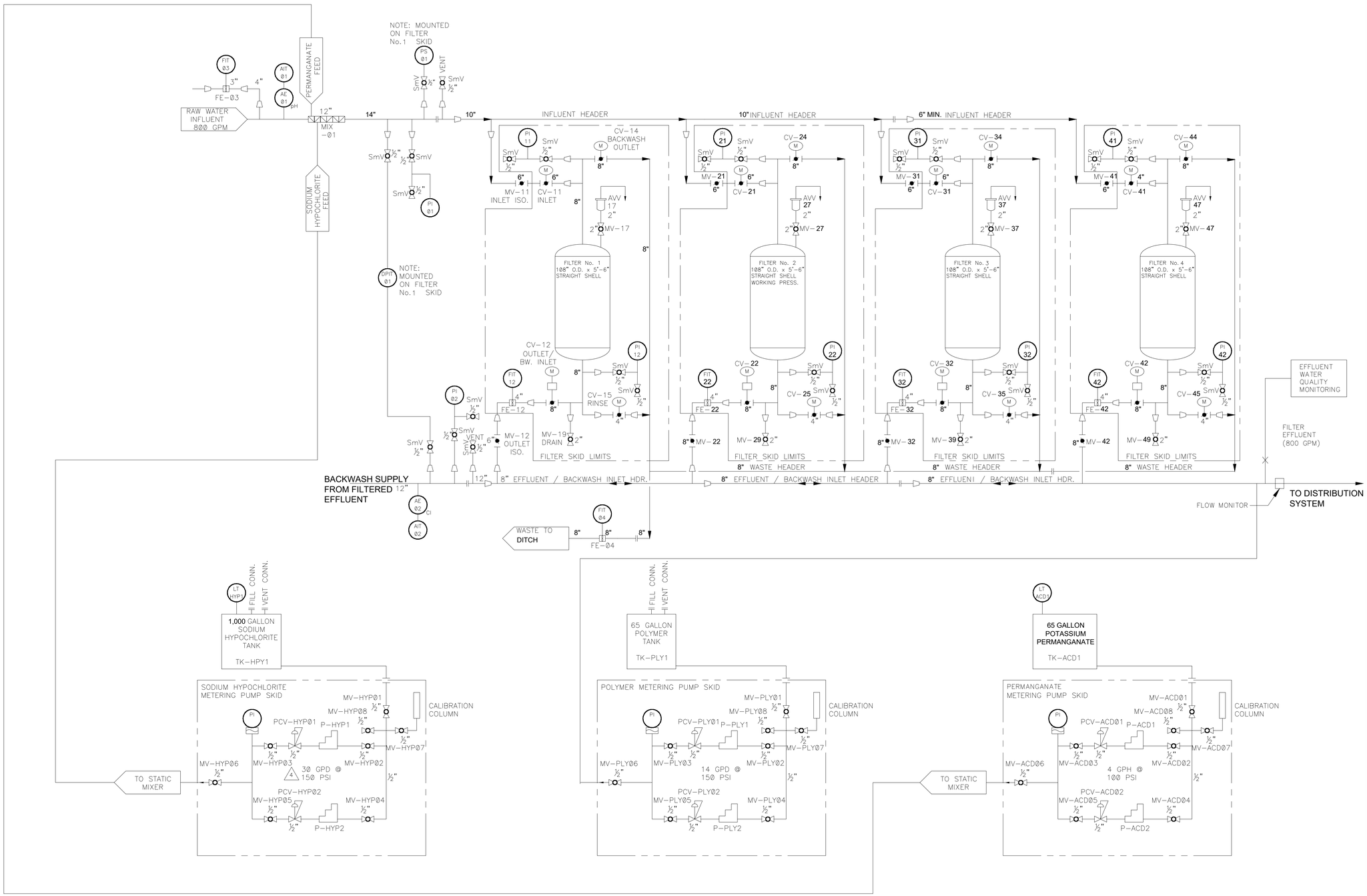
DESIGNED BY: MH
DRAWN BY: PW
CHECKED BY: JAB
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE: N.T.S.

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

PROCESS FLOW DIAGRAM

SHEET NO.
C-005
SHEET 16 OF 92



FILTER SYSTEM P&ID

SCALE: N.T.S.

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ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
MATTHEW P. RAHN
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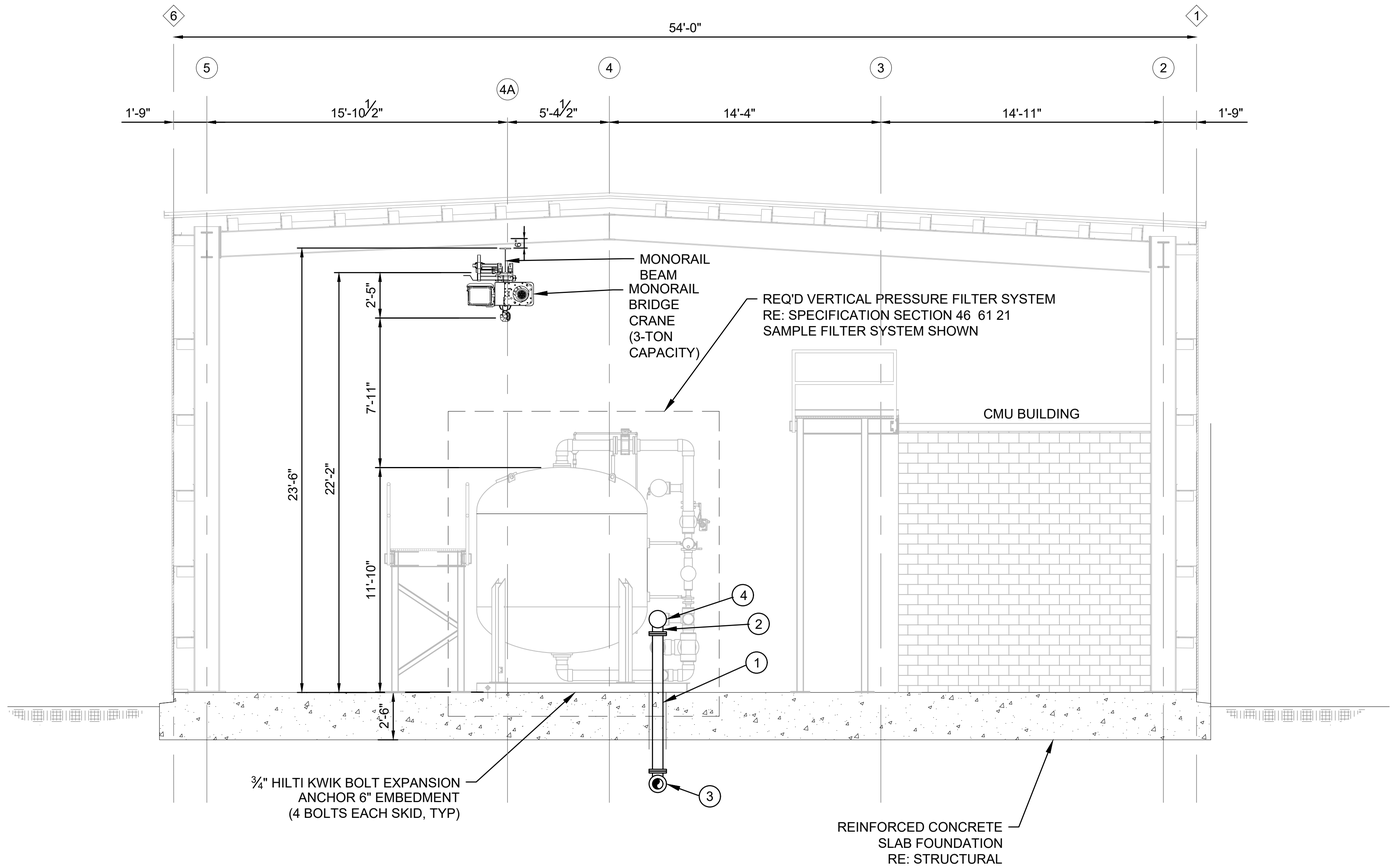
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER SYSTEM P&ID

SHEET NO.
C-006
SHEET 17 OF 92



TYPICAL CROSS SECTION
LOOKING EAST
SCALE: 1/4"=1'-0"

GENERAL SHEET NOTES

1. ALL ABOVE GROUND OR NON-BURIED DUCTILE IRON PIPE SHALL BE FLANGED U.N.O.

KEY NOTES

NO.	DESCRIPTION	SYSTEM TYPE
1	8" D.I. PIPE	EFFLUENT
2	8" x 8" D.I. TEE	EFFLUENT
3	8" D.I. 90° BEND	EFFLUENT
4	8" D.I. FLANGE BLIND	EFFLUENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	¼"=1'-0"

STATE OF LOUISIANA
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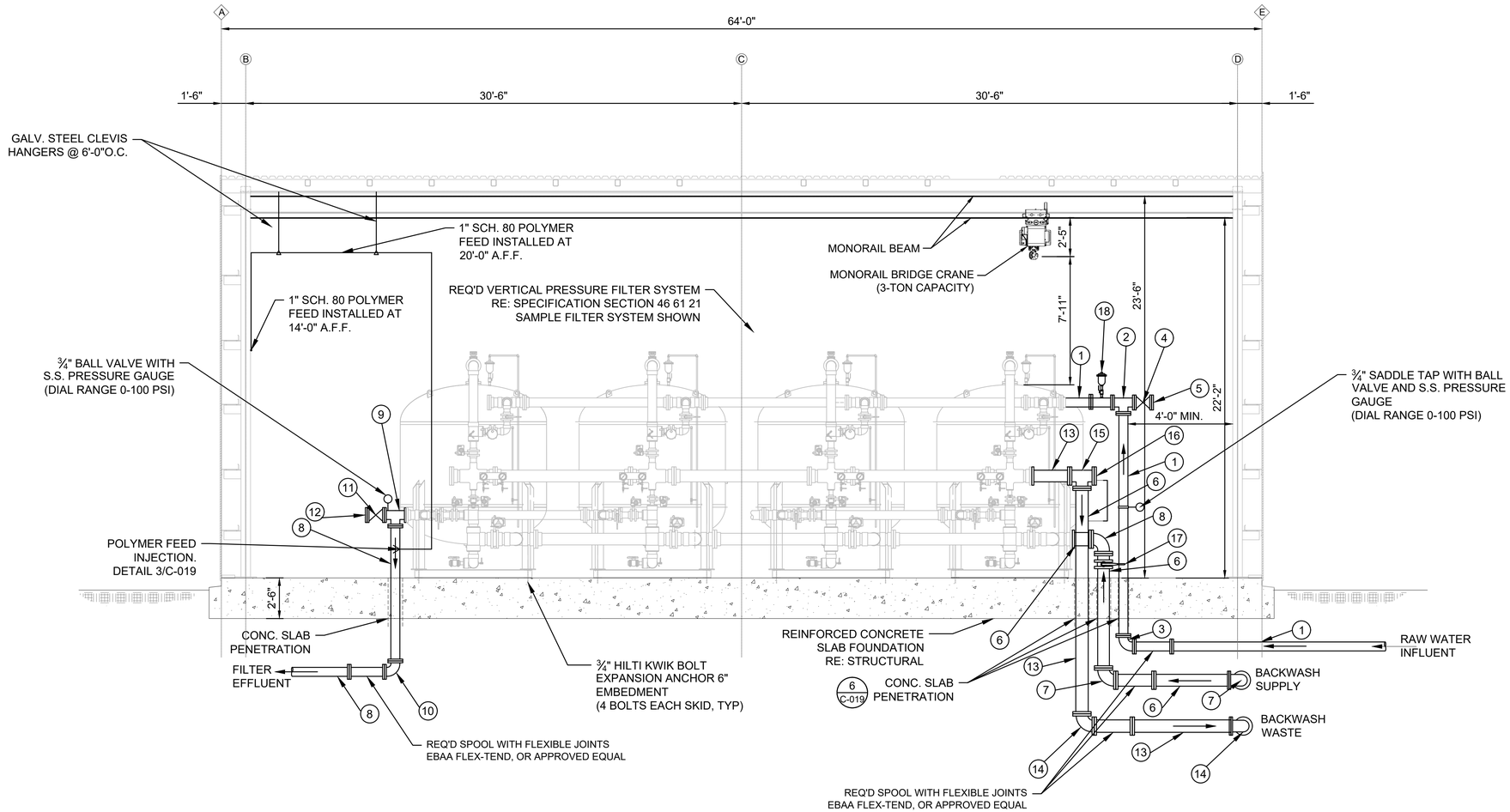
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER LAYOUT CROSS SECTION

SHEET NO.
C-007
SHEET 18 OF 90



FILTER BUILDING PROCESS CROSS SECTION
LOOKING NORTH
SCALE: 1/4"=1'-0"

GENERAL SHEET NOTES

1. RESERVED
2. RESERVED

KEY NOTES

NO.	DESCRIPTION	SYSTEM TYPE
1	14" D.I. PIPE	INFLUENT
2	14" x 14" TEE	INFLUENT
3	14" 90° D.I. BEND	INFLUENT
4	14" GATE VALVE	INFLUENT
5	14" BLIND FL	INFLUENT
6	12" D.I. PIPE	BACKWASH SUPPLY
7	12" 90° D.I. BEND	BACKWASH SUPPLY
8	12" D.I. PIPE	EFFLUENT
9	12" x 12" D.I. TEE	EFFLUENT
10	12" 90° D.I. BEND	EFFLUENT
11	12" GATE VALVE	EFFLUENT
12	12" FLANGE BL	EFFLUENT
13	8" D.I. PIPE	BACKWASH WASTE
14	8" 90° D.I. BEND	BACKWASH WASTE
15	8" x 8" D.I. TEE	BACKWASH WASTE
16	8" FLANGE BL	BACKWASH WASTE
17	12" BUTTERFLY VALVE	BACKWASH SUPPLY
18	AIR RELEASE VALVE	INFLUENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE:	ANSI D
SCALE:	

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DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER LAYOUT CROSS SECTION

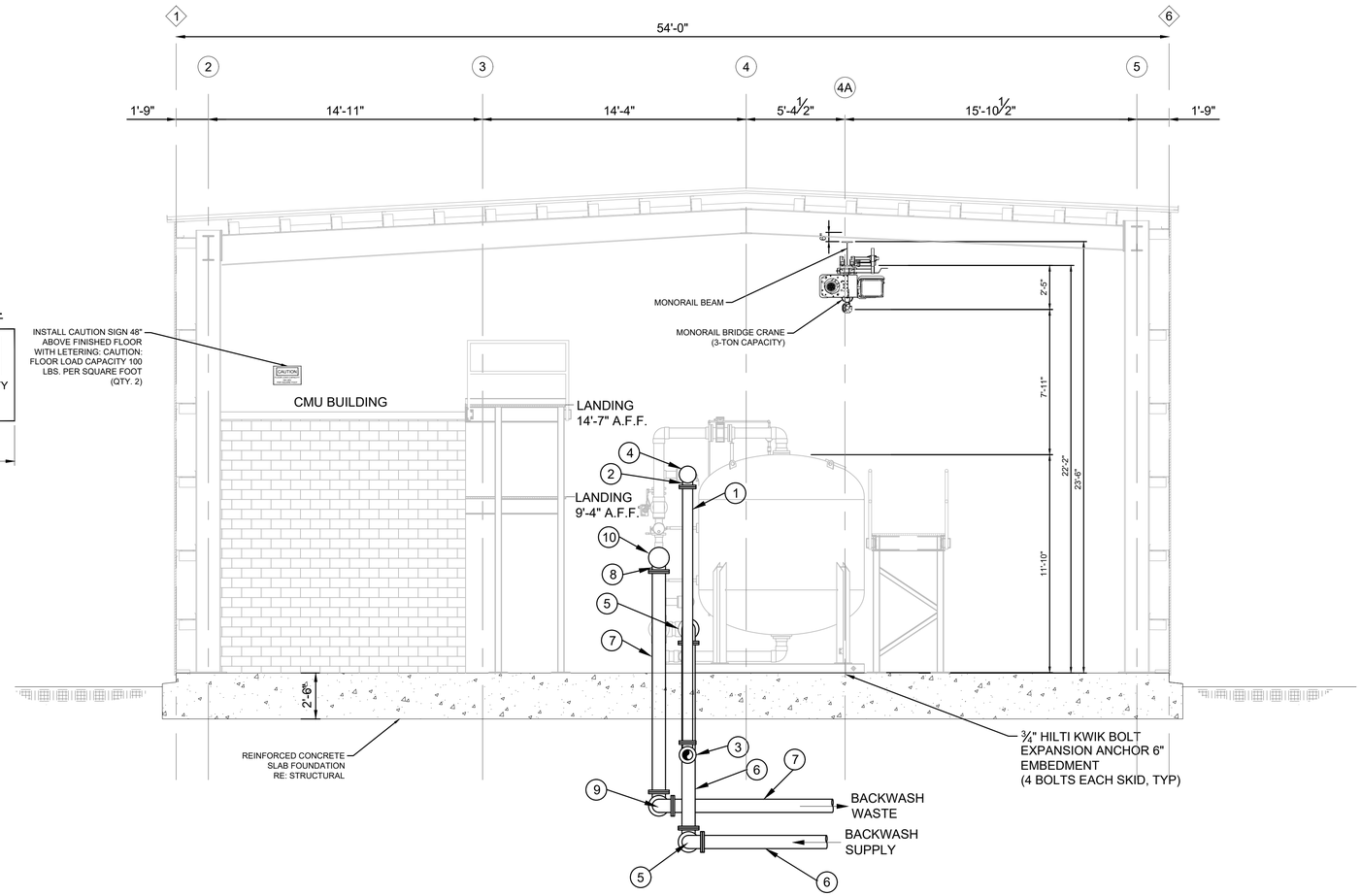
SHEET NO.
C-008
SHEET 19 OF 92

KEY NOTES

NO.	DESCRIPTION	SYSTEM TYPE
1	14" D.I. PIPE	INFLUENT
2	14" x 14" D.I. TEE	INFLUENT
3	14" 90° D.I. BEND	INFLUENT
4	14" D.I. BLIND FL	INFLUENT
5	12" 90° D.I. BEND	BACKWASH SUPPLY
6	12" D.I. PIPE	BACKWASH SUPPLY
7	8" D.I. PIPE	BACKWASH WASTE
8	8" x 8" D.I. TEE	BACKWASH WASTE
9	8" D.I. 90° BEND	BACKWASH WASTE
10	8" D.I. BLIND FL	BACKWASH WASTE

SIGN DETAIL

INSTALL CAUTION SIGN 48" ABOVE FINISHED FLOOR WITH LETERING: CAUTION: FLOOR LOAD CAPACITY 100 LBS. PER SQUARE FOOT (QTY. 2)



TYPICAL CROSS SECTION LOOKING WEST

SCALE: 1/4"=1'-0"

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
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ISSUE DATE:	04/15/2024
APPROVED BY:	
SHEET SIZE:	ANSI D
SCALE:	

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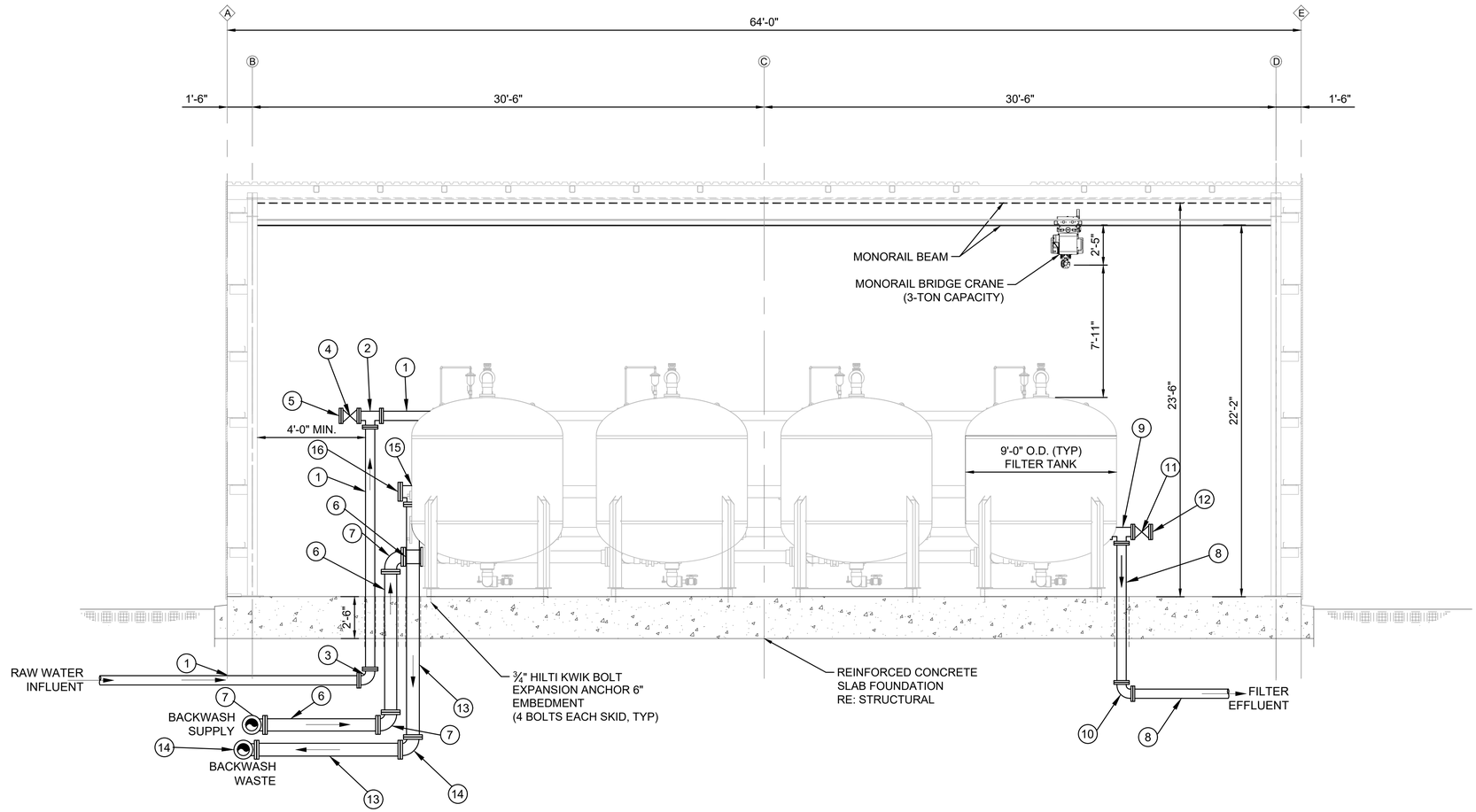
IN
CIVIL ENGINEERING
7/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER LAYOUT CROSS SECTION

SHEET NO.
C-009
SHEET 20 OF 92



FILTER BUILDING PROCESS CROSS SECTION
LOOKING SOUTH
SCALE: 3/8"=1'-0"

GENERAL SHEET NOTES

1. RESERVED

KEY NOTES

NO.	DESCRIPTION	SYSTEM TYPE
1	14" D.I. PIPE	INFLUENT
2	14" x 14" D.I. TEE	INFLUENT
3	14" 90° D.I. BEND	INFLUENT
4	14" GATE VALVE	INFLUENT
5	14" BLIND FL	INFLUENT
6	12" D.I. PIPE	BACKWASH SUPPLY
7	12" 90° D.I. BEND	BACKWASH SUPPLY
8	12" D.I. PIPE	EFFLUENT
9	12"x12" D.I. TEE	EFFUENT
10	12" 90° D.I. BEND	EFFLUENT
11	12" GATE VALVE	EFFUENT
12	12" BLIND FL	EFFLUENT
13	8" D.I. PIPE	BACKWASH WASTE
14	8" D.I. TEE	BACKWASH WASTE
15	8" 90° D.I. BEND	BACKWASH WASTE
16	8" BLIND FLANGE	BACKWASH WASTE

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
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SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
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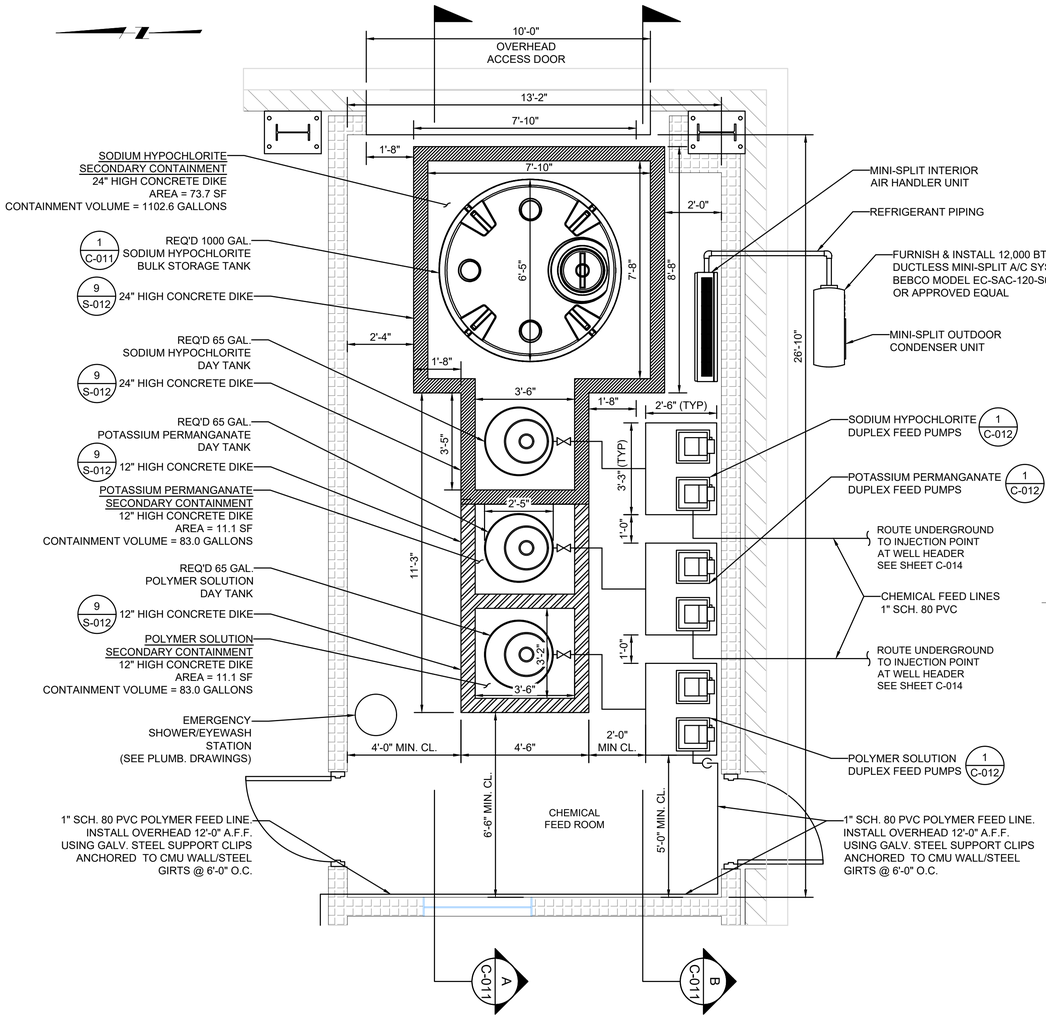
7/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

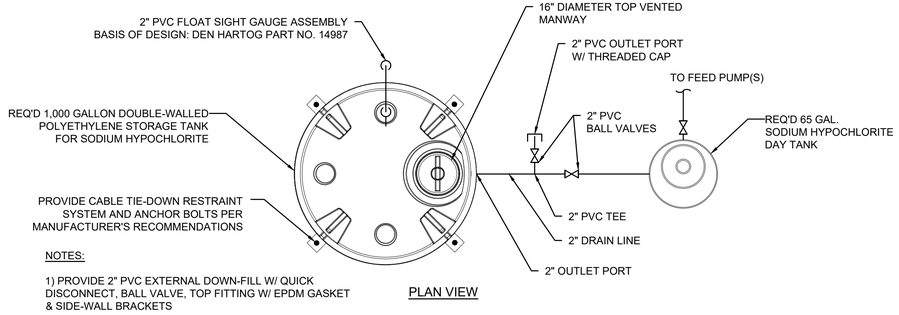
FILTER LAYOUT CROSS SECTION

SHEET NO.
C-010
SHEET 21 OF 92



PLAN - CHEMICAL FEED ROOM

SCALE: 3/8" = 1'-0"

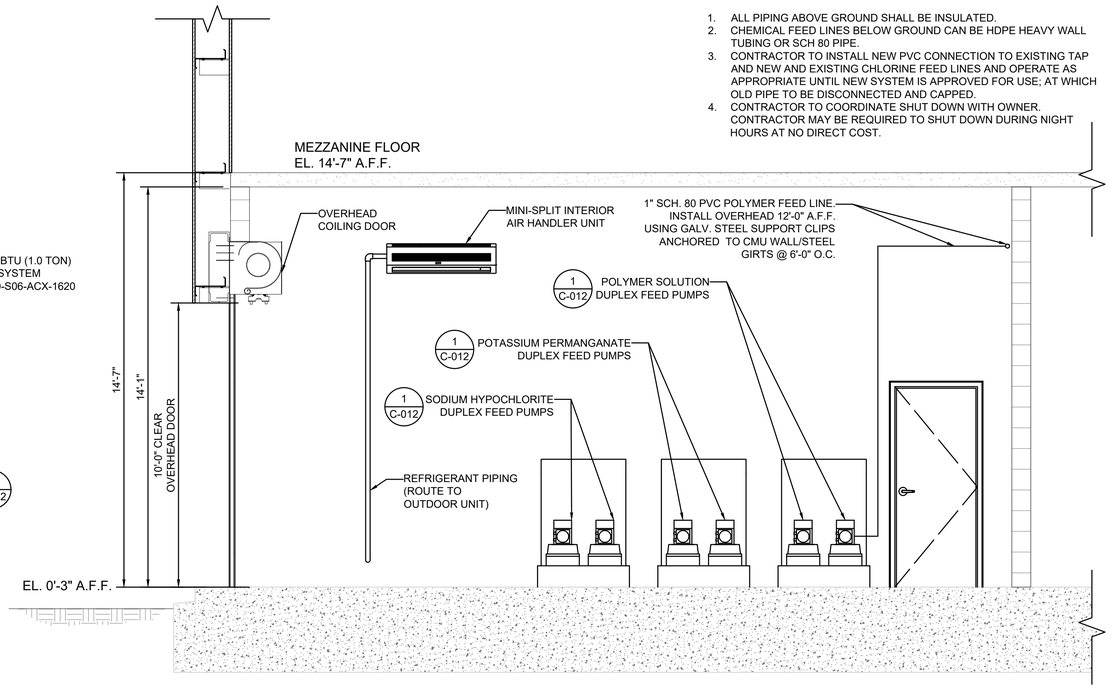


1 C-011 DETAIL - 1,000 GALLON SODIUM HYPOCHLORIDE STORAGE TANK

SCALE: 3/8" = 1'-0"

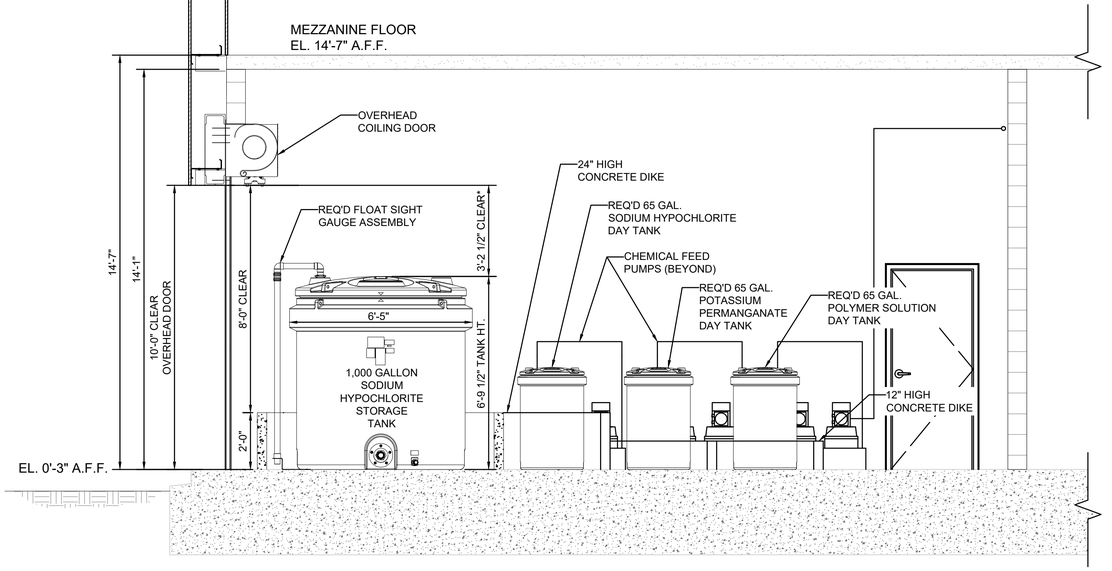
NOTES:

1. ALL PIPING ABOVE GROUND SHALL BE INSULATED.
2. CHEMICAL FEED LINES BELOW GROUND CAN BE HDPE HEAVY WALL TUBING OR SCH 80 PIPE.
3. CONTRACTOR TO INSTALL NEW PVC CONNECTION TO EXISTING TAP AND NEW AND EXISTING CHLORINE FEED LINES AND OPERATE AS APPROPRIATE UNTIL NEW SYSTEM IS APPROVED FOR USE; AT WHICH OLD PIPE TO BE DISCONNECTED AND CAPPED.
4. CONTRACTOR TO COORDINATE SHUT DOWN WITH OWNER. CONTRACTOR MAY BE REQUIRED TO SHUT DOWN DURING NIGHT HOURS AT NO DIRECT COST.



B C-011 INTERIOR ELEVATION - CHEMICAL FEED ROOM

SCALE: 3/8" = 1'-0"



*MAXIMUM VERTICAL CLEARANCE OF 1'-2 1/2" AVAILABLE FOR 1000 GAL. TANK REMOVAL/REPLACEMENT WHEN LIFTING OVER 24" CONCRETE DIKE.

A C-011 INTERIOR ELEVATION - CHEMICAL FEED ROOM

SCALE: 3/8" = 1'-0"

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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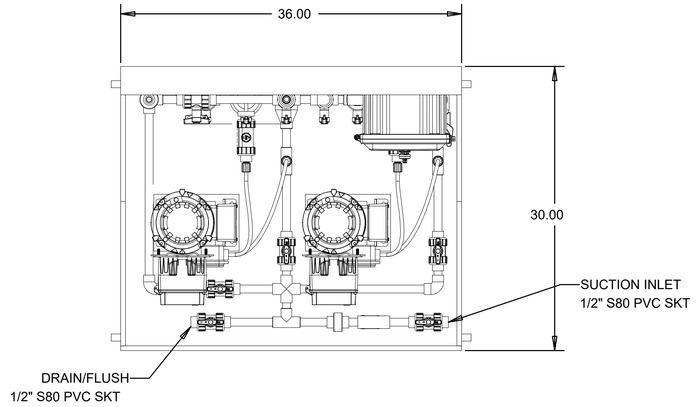
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	3/8"=1'-0"

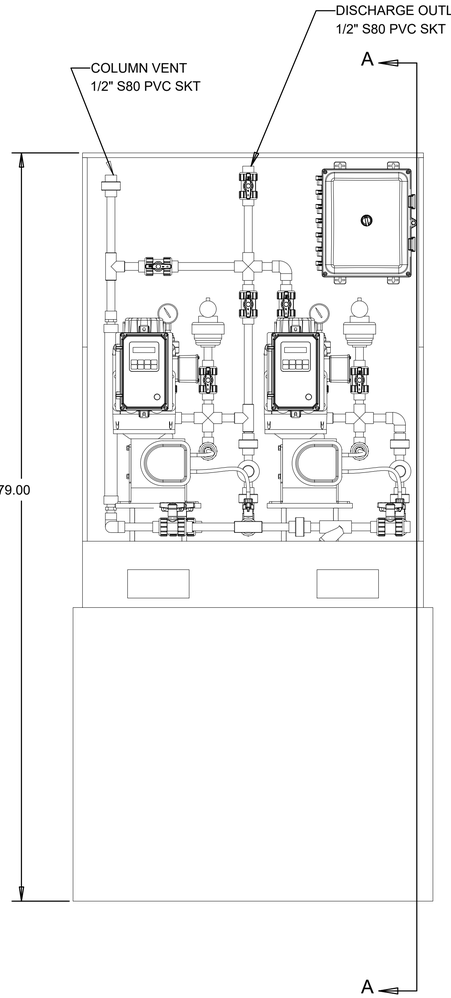
STATE OF LOUISIANA
MATTHEW P. HAUN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

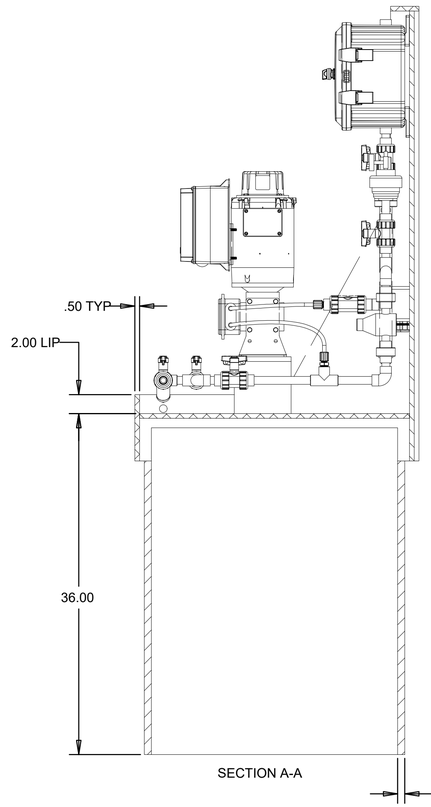
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

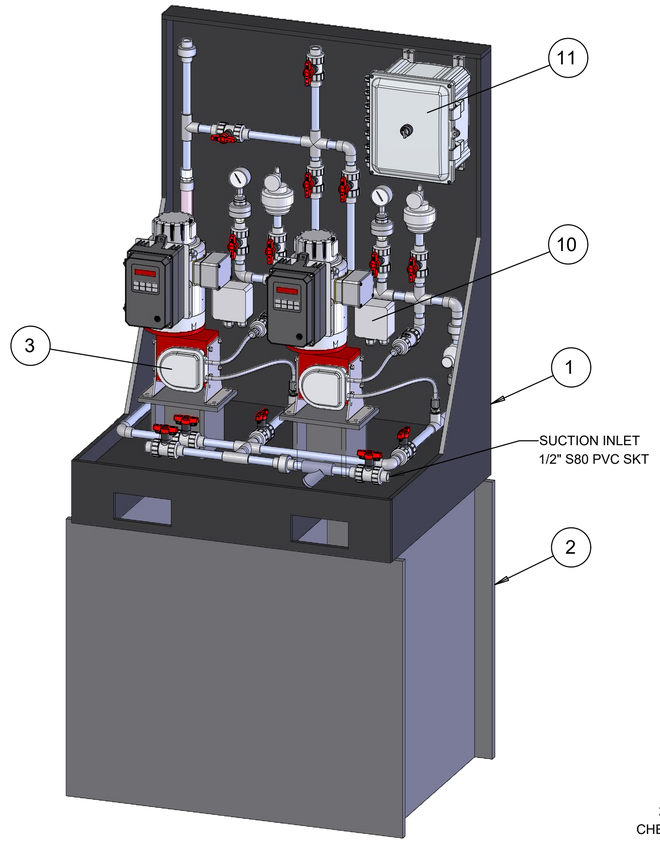
CHEMICAL FACILITIES PLAN AND ELEVATION

SHEET NO.
C-011
SHEET 22 OF 92









1 C-012 CHEMICAL FEED DUPLEX PUMP DETAIL
SCALE: N.T.S.

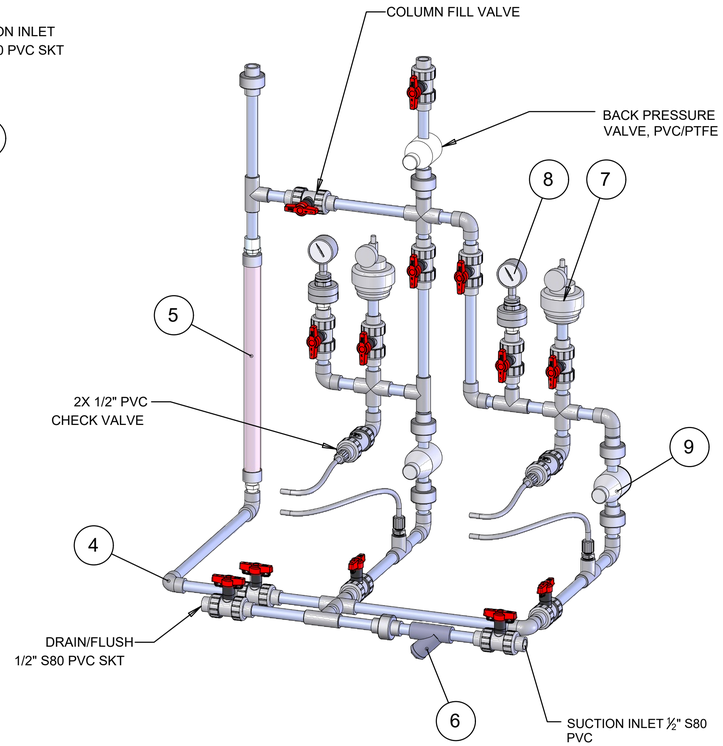
NOTE: CHEMICAL FEED DUPLEX PUMP DETAIL IS TYPICAL FOR ALL LIQUID CHEMICAL FEEDS IN PROJECT

KEY NOTES

ITEM NO.	DESCRIPTION	QTY.
1	BLACK HDPE SKID WELDMENT	1
2	HDPE STAND WELDMENT	1
3	PERISTALTIC PUMP, 0.09-15.6 GPH + MOTOR	2
4	SUCTION-DISCHARGE PIPING ROUTE	1
5	CALIBRATION COLUMN, 200ml, PVC	1
6	Y-STRAINER, 1/2" SOCKET, PVC/EPD,	1
7	PULSATION DAMPENER PVC/EPDM 4 INCH 1/2" SOCKET WELD	2
8	PRESSURE GAUGE AND GUARD, 1/2" FNPT PVC/PTFE, 0-160 PSI, 2" SST CASE	2
9	PRESSURE RELIEF VALVE, 1/2" SKT, PVC/PTFE, 2 PORT	2
10	LEAK DETECTOR WITH SENSOR	2
11	FRP JUNCTION BOX WITH SWITCH, 10" x 8" x 6"	1

NOTE: CHEMICAL DOSAGE PUMP SHALL BE CAPABLE OF PUMPING AGAINST MINIMUM SYSTEM PRESSURE OF 70 PSI.

NOTES:
1.FRAME MATERIAL: ½" THICK THERMAL WELDED BLACK HDPE
2.PIPING MATERIAL: SCHEDULE 80 PVC, EPDM & PTFE (TEFLON) ELASTOMERS
3.CONNECTIONS: SOCKET, NPT OR TUBING TYPE
4.SOLVENT CEMENT: WELD-ON 724



ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

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SHEET SIZE:	ANSI D
SCALE:	NONE

STATE OF LOUISIANA
MATTHEW P. RAHN
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7/15/24
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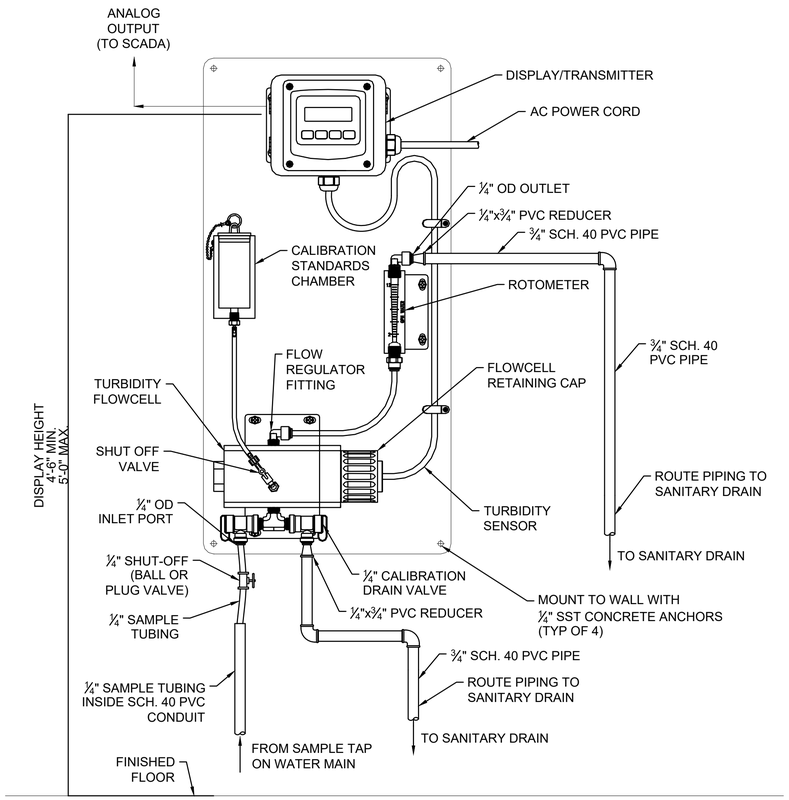
DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

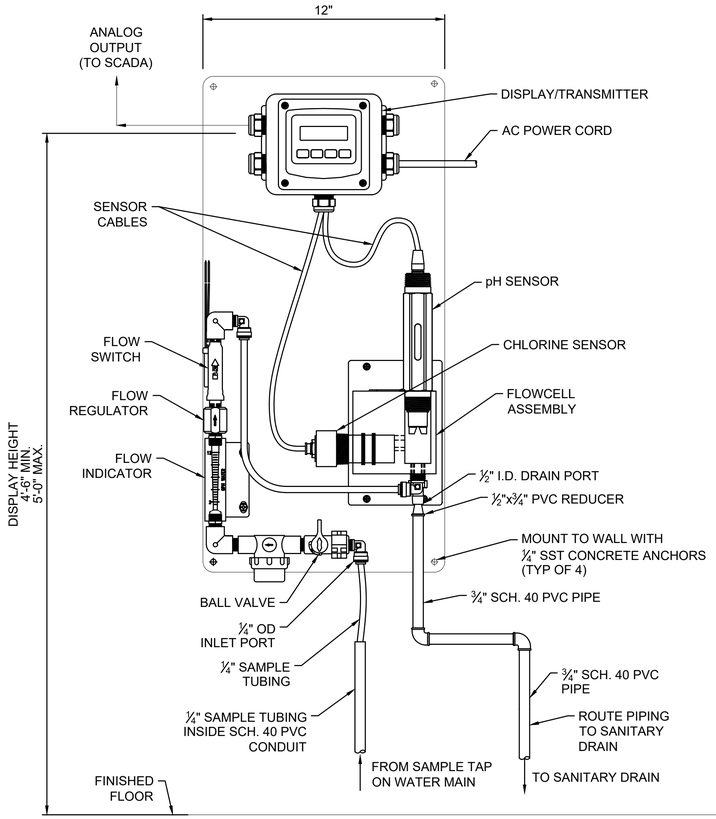
CHEMICAL FEED EQUIPMENT DETAILS

SHEET NO.
C-012
SHEET 23 OF 92



1 C-012 ON-LINE TURBIDITY METER INSTALLATION

SCALE: N.T.S.



2 C-012 ON-LINE FREE/TOTAL CHLORINE MONITOR INSTALLATION

SCALE: N.T.S.

NOTES:

1. LOCATE TURBIDITY AND CHLORINE MONITORS AT LOCATION SHOWN IN THE PLAN
2. FREE/TOTAL CHLORINE MONITOR INSTALLATION DETAIL IS TYPICAL FOR BOTH FREE AND TOTAL CHLORINE ANALYZER. CONTRACTOR TO PROVIDE AND INSTALL ONE (1) FREE CHLORINE MONITOR AND ONE (1) TOTAL CHLORINE MONITOR, AND ONE (1) TURBIDITY MONITOR

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE:	ANSI D
SCALE:	NONE

STATE OF LOUISIANA
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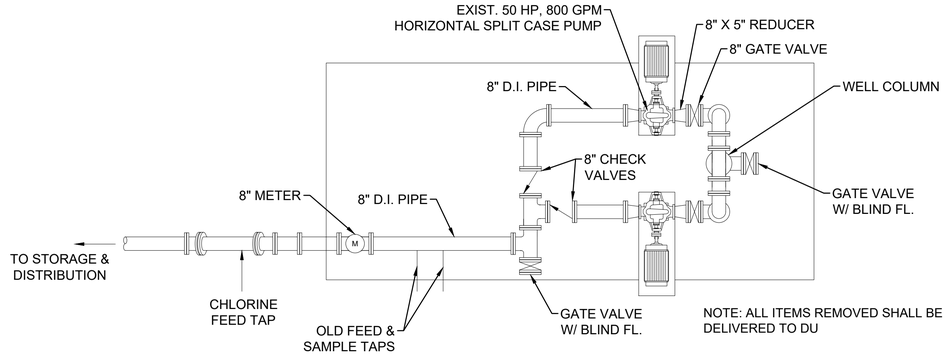
7/15/24

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

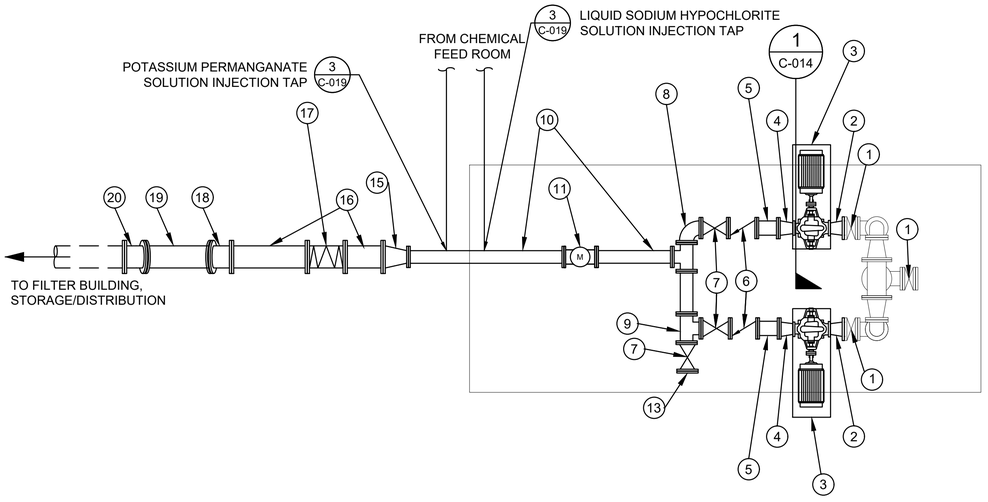
TURBIDITY AND CHLORINE MONITOR DETAILS

SHEET NO.
C-013
SHEET 24 OF 92



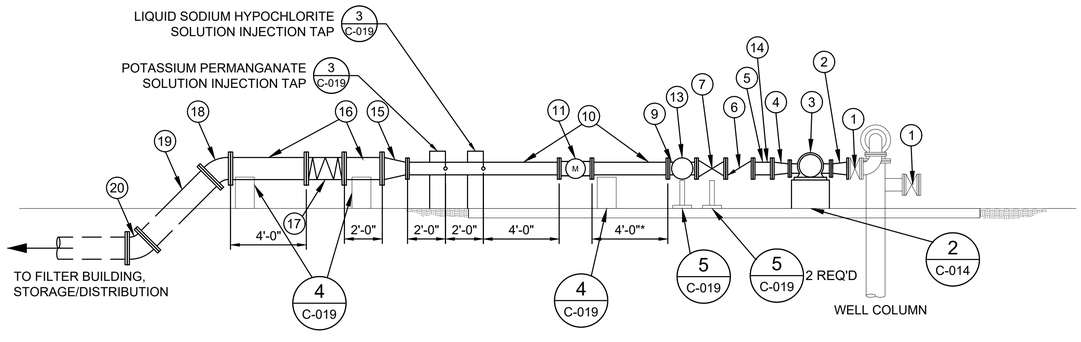
EXISTING WELL PUMP PIPING PLAN

SCALE: 1/4"=1'-0"



REQ'D WELL PUMP PIPING PLAN

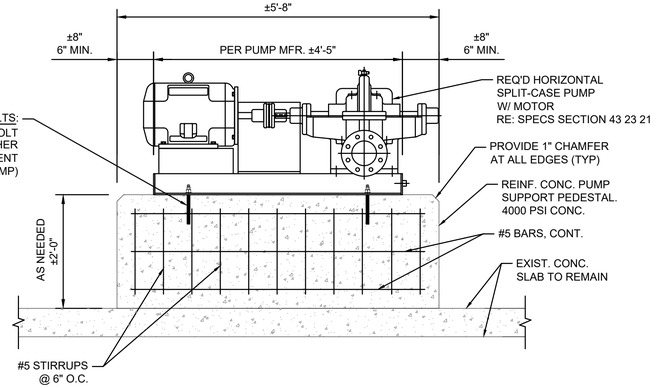
SCALE: 1/4"=1'-0"



*REQUIRED MINIMUM STRAIGHT PIPE DISTANCE BEFORE AND AFTER MAGNETIC FLOW METER SHALL BE 4'-0" OR AS REQUIRED BY MANUFACTURER, WHICH EVER IS GREATER.

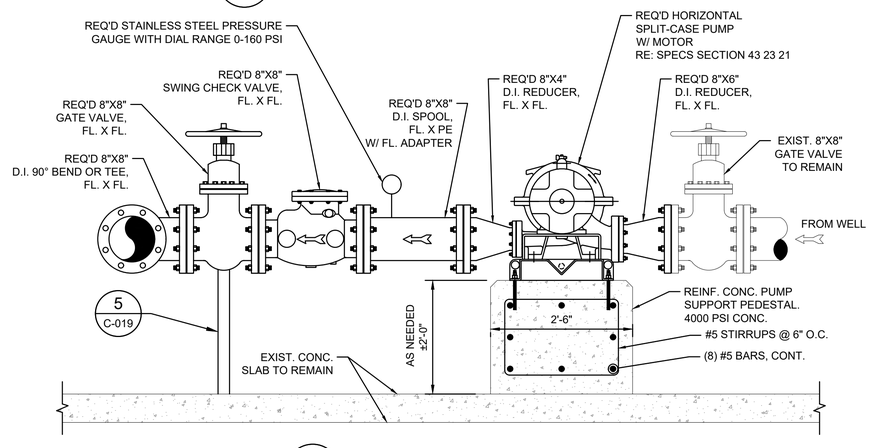
REQ'D WELL PUMP PIPING ELEVATION

SCALE: 1/4"=1'-0"



1 C-014 SECTION - TYPICAL PUMP SUPPORT DETAIL

SCALE: 3/4"=1'-0"



2 C-014 TYPICAL PUMP & PIPING DETAIL

SCALE: 3/4"=1'-0"

KEY NOTES

NO.	DESCRIPTION
1	EXISTING GATE VALVE
2	REQ'D 8"x6" FLANGED REDUCER
3	REQ'D WELL PUMP, MOTOR, AND BASE
4	REQ'D 8"x4" FLANGED REDUCER
5	REQ'D 8" SPOOL PIECE (FLG-PE W/ FLANGE ADAPTER)
6	REQ'D FLANGED SWING CHECK VALVE
7	REQ'D FLANGE GATE VALVE
8	REQ'D 8" 90° BEND (FL-FL)
9	REQ'D 8"x8" TEE (FL)
10	REQ'D 8" D.I. PIPE (FL-FL)
11	REQ'D 8" ELECTROMAGNETIC FLOW METER
12	REQ'D 8" 45° BEND (FL-FL)
13	REQ'D 8" BLIND FLANGE
14	PRESSURE GAUGE (1 PER PUMP)
15	8"x14" CONCENTRIC INCREASER
16	14" D.I. PIPE (FL-FL)
17	14" IN-LINE STATIC MIXER
18	14" 45° D.I. BEND (FL-FL)
19	14" D.I. PIPE (FL-PE)
20	14" 45° D.I. BEND (MJ, REST)

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

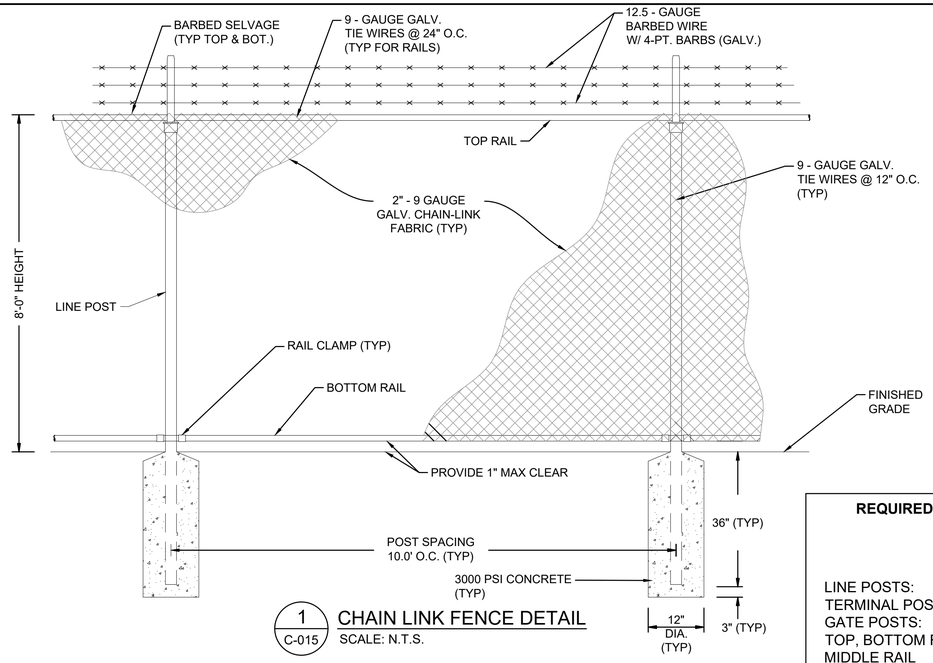
DESIGNED BY:	MH
DRAWN BY:	PW
CHECKED BY:	JAB
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	PW
SHEET SIZE:	ANSI D
SCALE:	AS NOTED

STATE OF LOUISIANA
MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

WATER WELL PUMPS AND PIPING
PLAN AND ELEVATION

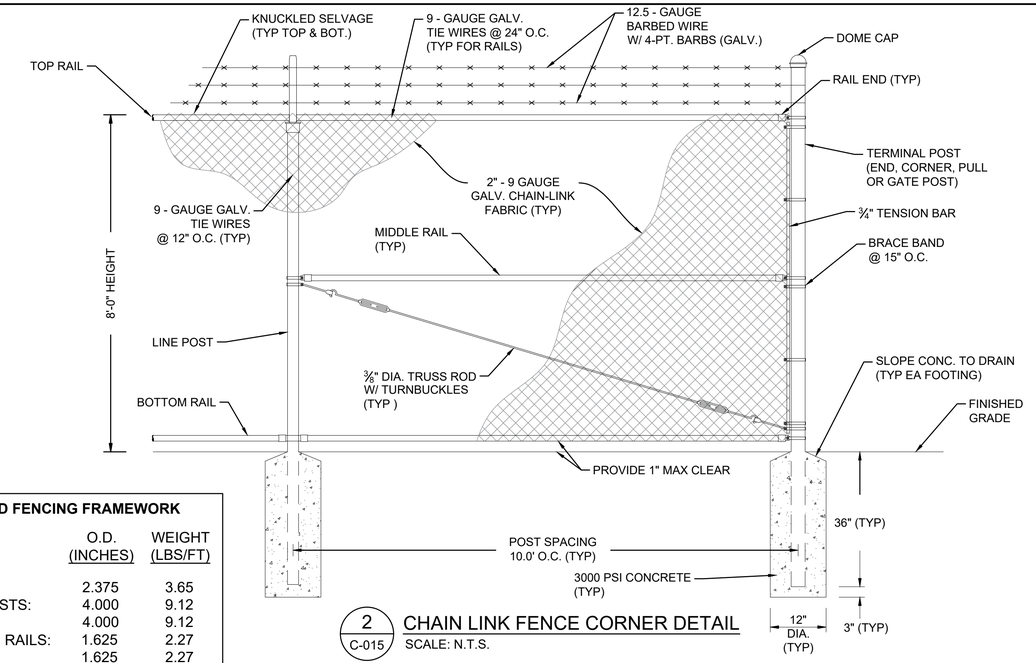
SHEET NO.
C-014
SHEET 25 OF 92



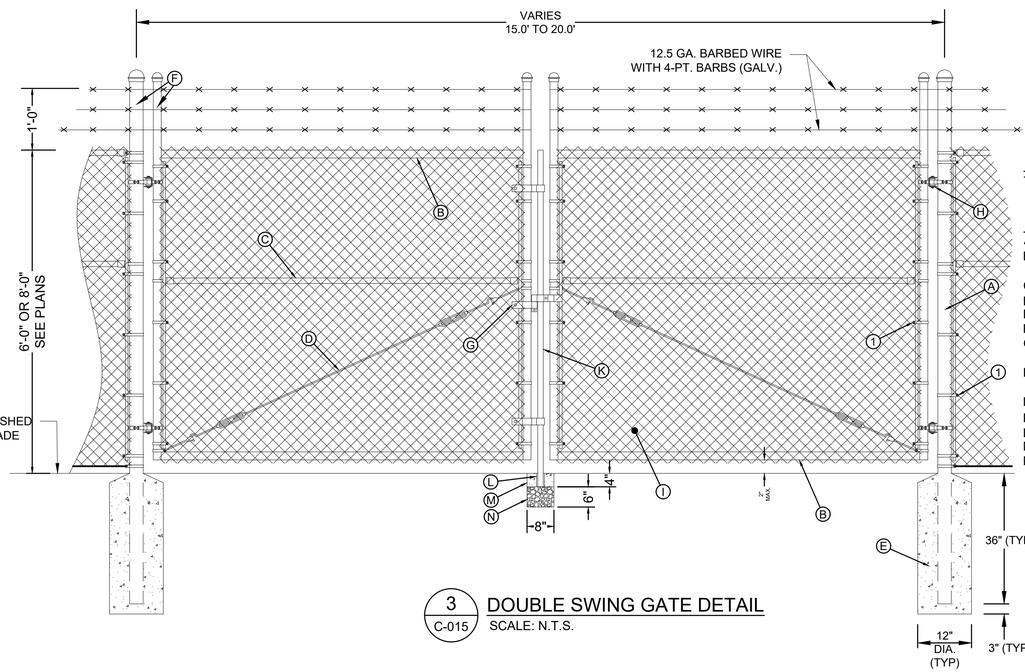
1 C-015 **CHAIN LINK FENCE DETAIL**
SCALE: N.T.S.

REQUIRED FENCING FRAMEWORK

	O.D. (INCHES)	WEIGHT (LBS/FT)
LINE POSTS:	2.375	3.65
TERMINAL POSTS:	4.000	9.12
GATE POSTS:	4.000	9.12
TOP, BOTTOM RAILS:	1.625	2.27
MIDDLE RAIL	1.625	2.27



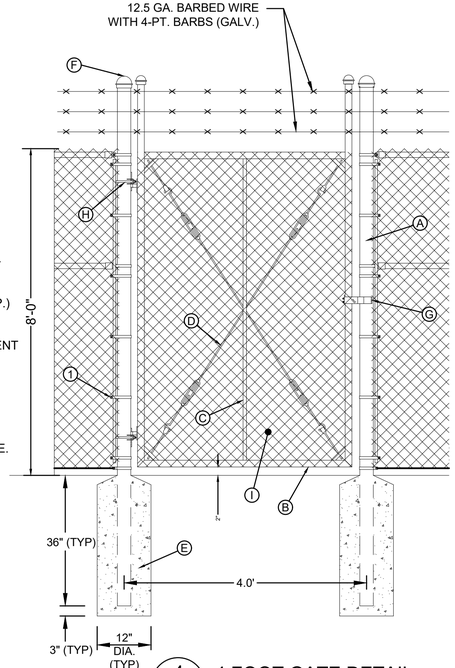
2 C-015 **CHAIN LINK FENCE CORNER DETAIL**
SCALE: N.T.S.



3 C-015 **DOUBLE SWING GATE DETAIL**
SCALE: N.T.S.

GENERAL NOTES:
1. WELD TOGETHER ALL ASSEMBLY BOLTS TO TENSION BANDS AND TENSION BANDS TO POSTS TO PREVENT DISASSEMBLY.

CONSTRUCTION KEY NOTES:
A. 4"O.D. PIPE (9.11 LB./FT.)
B. 1⅞" O.D. PIPE (3.65 LB./FT.) GATE FRAME WELDED. AT ALL JOINTS TO MAKE A SOLID FRAME.
C. 1⅝" O.D. PIPE (2.27 LB./FT.)
D. ⅜" DIA. TRUSS ROD WITH TRUSS TIGHTENER (TYP.)
E. 3000 PSI CONCRETE.
F. POST CAP (TYP.)
G. PLUNGER ROD LATCH, BOLTS WELDED TO PREVENT DISASSEMBLY.
H. HINGE ASSEMBLY, BOLTS WELDED TO PREVENT DISASSEMBLY.
I. 9 GA. GALVANIZED 2" CHAIN-LINK FABRIC.
K. 1⅜" O.D. PIPE (2.27 LB./FT.) PLUNGER ROD.
L. 2⅜" O.D. PIPE (3.65 LB./FT.) PLUNGER ROD GUIDE.
M. 2500 PSI CONCRETE COLLAR AROUND ROD GUIDE.
N. GRAVEL SUMP.



4 C-015 **4 FOOT GATE DETAIL**
SCALE: N.T.S.

GENERAL NOTES:
1. WELD TOGETHER ALL ASSEMBLY BOLTS TO TENSION BANDS AND TENSION BANDS TO POSTS TO PREVENT DISASSEMBLY.

CONSTRUCTION KEY NOTES:
A. 4"O.D. PIPE (9.11 LB./FT.)
B. 2" SQ. STEEL TUBE GATE FRAME WELDED AT ALL JOINTS TO MAKE A SOLID FRAME
C. 1" SQ. STEEL TUBE BRACE (TYP.)
D. ⅜" DIA. TRUSS ROD WITH TRUSS TIGHTENER (TYP.)
E. 3000 PSI CONCRETE
F. POST CAP (TYP.)
G. FULCRUM LATCH
H. HINGE ASSEMBLY, BOLTS WELDED TO PREVENT DISASSEMBLY
I. 9 GA. GALVANIZED 2" CHAIN-LINK FABRIC STRETCHED & WELDED ON TO DOOR FRAME

ST. TAMMANY PARISH GOVERNMENT

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620 N. TYLER STREET
COVINGTON, LA 70433

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SUBMITTED BY:	BBEC, LLC
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SHEET SIZE:	ANSI D
SCALE:	NONE

STATE OF LOUISIANA
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PROFESSIONAL ENGINEER
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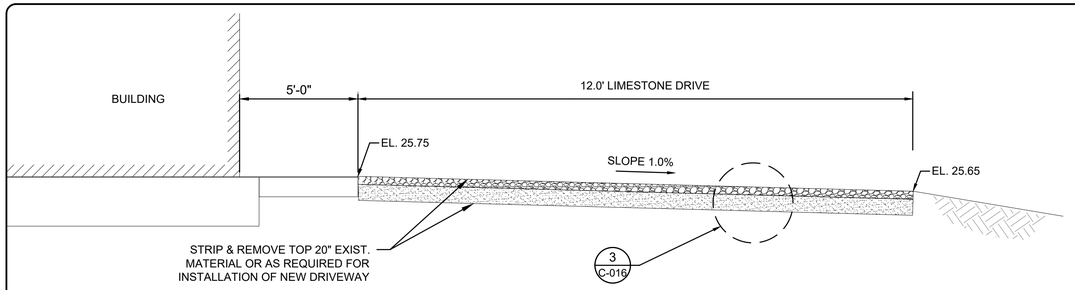
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FENCE DETAILS

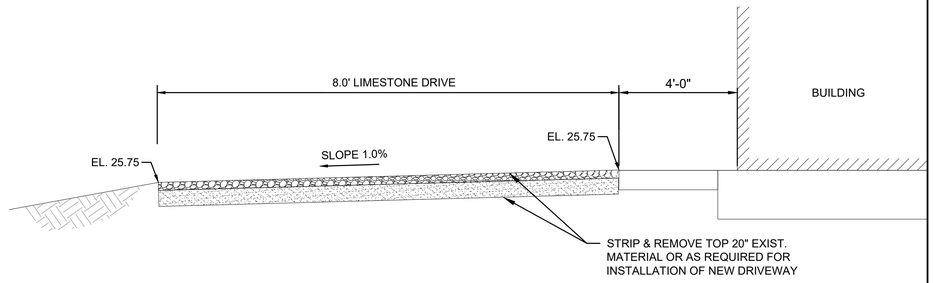
SHEET NO.
C-015
SHEET 26 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\C-015 - Diversified_ Fence Detail.dwg - 7/15/2024 4:48 PM
User: Phil
Plot Date: Mon Jul-15-2024 - 05:29PM

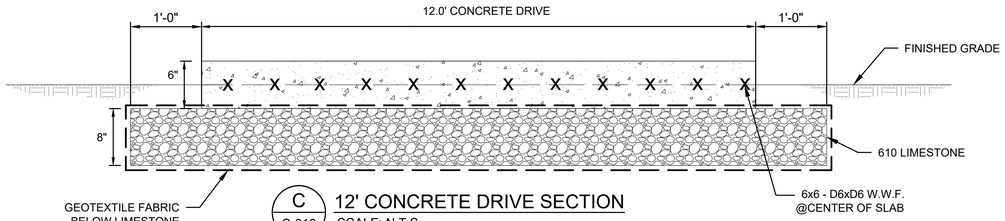


A C-016 12' LIMESTONE ACCESS ROAD SECTION
SCALE: N.T.S.

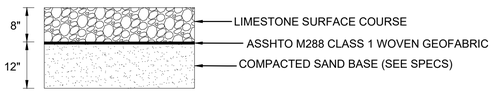
*NOTE: BUILDING FOUNDATION, WATER, SEWER, DRAINAGE WORK NOT SHOWN.



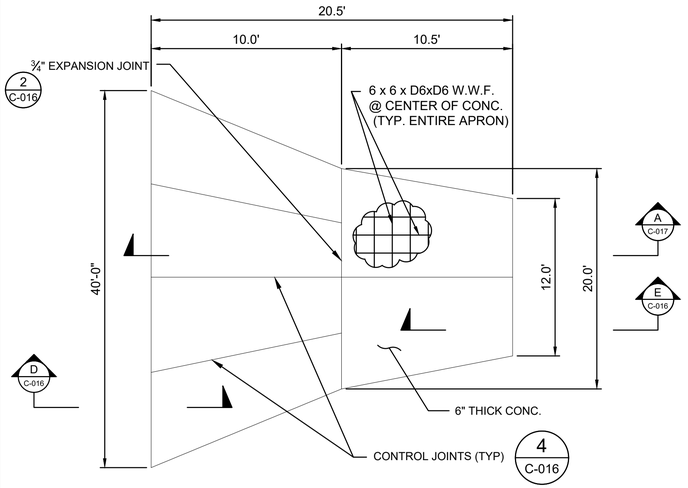
B C-016 8' LIMESTONE ACCESS ROAD SECTION
SCALE: N.T.S.



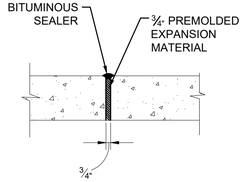
C C-016 12' CONCRETE DRIVE SECTION
SCALE: N.T.S.



3 C-016 TYPICAL LIMESTONE DRIVEWAY DETAIL
SCALE: N.T.S.



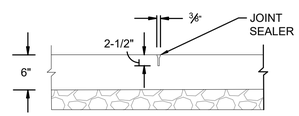
1 C-016 CONCRETE APRON AT DIVERSIFIED BLVD
SCALE: N.T.S.



NOTE:

PROVIDE SIMILAR EXPANSION JOINT AT ABUTMENTS WITH BUILDING PILASTORS.

2 C-016 TYPICAL EXPANSION JOINT FOR CONCRETE APRON
SCALE: N.T.S.



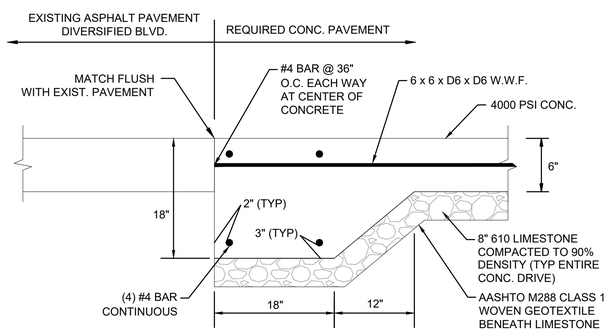
4 C-016 TYPICAL CONTROL JOINT FOR CONCRETE APRON
SCALE: N.T.S.

CONCRETE APRON NOTES:

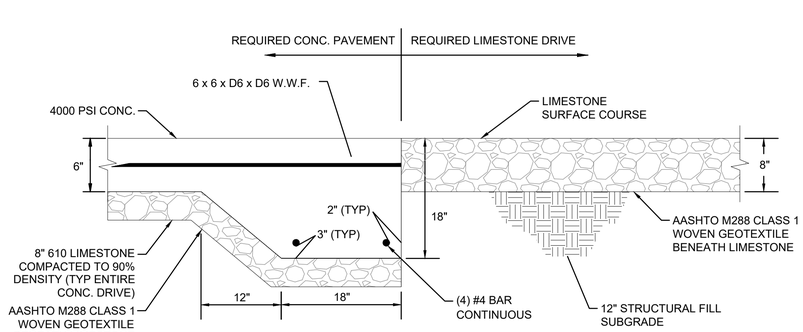
1) STRIP MINIMUM 16" EXISTING SOIL AS NEEDED FOR INSTALLATION OF BASE AND CONCRETE. PROVIDE EXCAVATION, EMBANKMENT, SAND, AND LIMESTONE AT NO DIRECT PAY.

2) TRANSITION CONCRETE PAD SMOOTHLY BETWEEN FINISHED ELEVATIONS SHOWN IN PLANS.

3) CONCRETE PAD TO HAVE EXPANSION JOINTS AT 10'-0" O.C. AND TO BE SCORED AT 10'-0" O.C. EACH WAY.



D C-016 GRADE BEAM AT DIVERSIFIED BLVD.
SCALE: N.T.S.



E C-016 GRADE BEAM AT NEW LIMESTONE DRIVEWAY
SCALE: N.T.S.

DEPT. OF UTILITIES
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CHECKED BY:	JAB
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PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

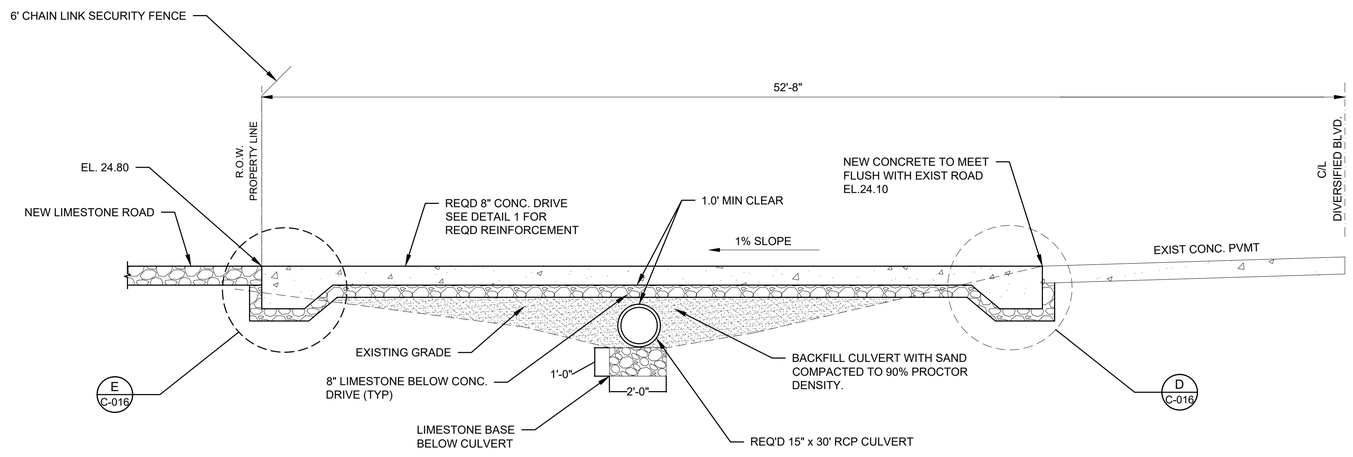
STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

DRIVEWAY AND PAVEMENT DETAILS

SHEET NO.
C-016
SHEET 27 OF 92

Plot Date: Mon Jul-15-2024 - 05:30PM
User: Phil
DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\C-016 - Diversified_Driveway & Pavement Details.dwg - 7/15/2024 4:50 PM



A / C-017 CONCRETE APRON SECTION

SCALE: N.T.S.

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DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

DRIVEWAY AND APRON DETAIL

SHEET NO.
C-017
SHEET 28 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\C-017 - Diversified_Driveway & Pavement Details.dwg - 7/15/2024 5:07 PM
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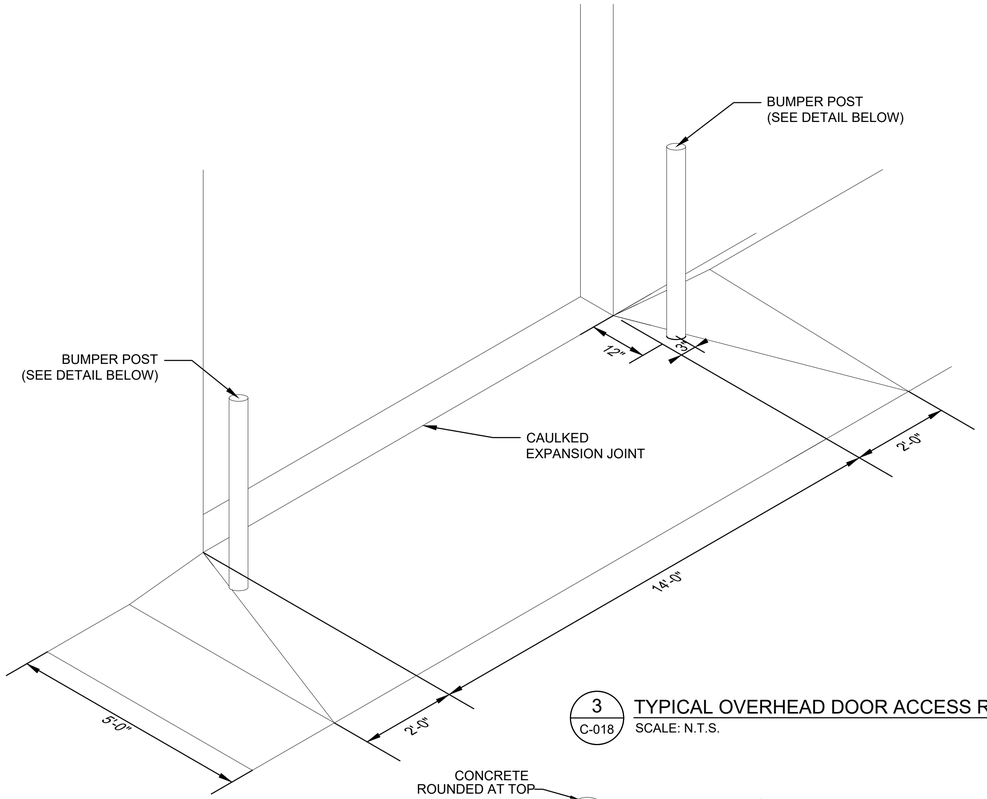
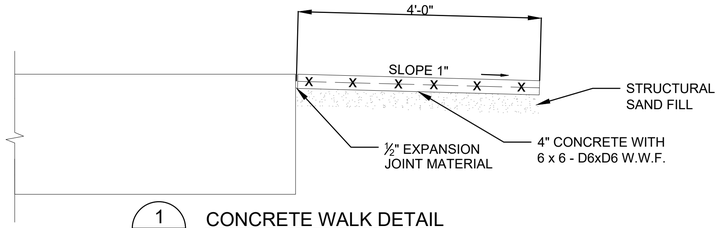
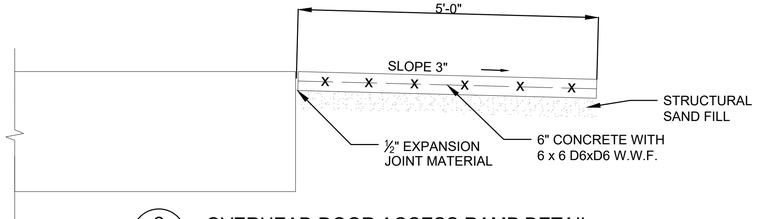
Plot Date: Mon Jul-15-2024 - 05:30PM



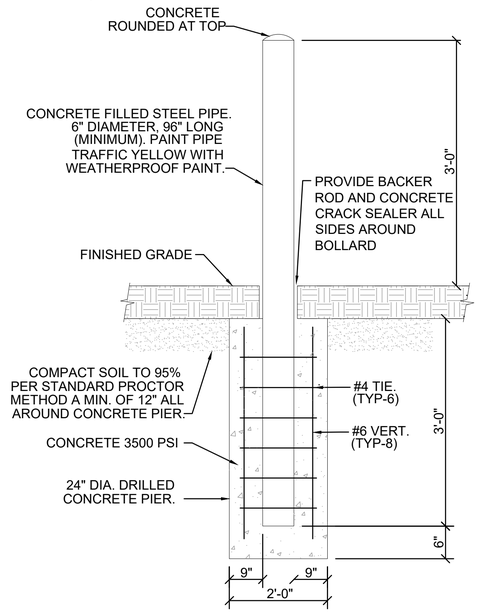
3 C-018 TYPICAL OVERHEAD DOOR ACCESS RAMP ISOMETRIC VIEW
SCALE: N.T.S.



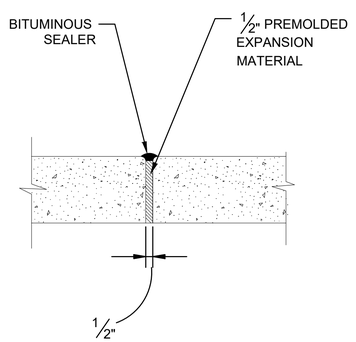
1 C-018 CONCRETE WALK DETAIL
SCALE: N.T.S.



2 C-018 OVERHEAD DOOR ACCESS RAMP DETAIL
SCALE: N.T.S.



4 C-018 CONCRETE BOLLARD DETAIL
SCALE: N.T.S.



EXPANSION JOINT FOR CONCRETE RAMP
SCALE: N.T.S.

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620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE:	ANSI D
SCALE:	N.T.S.

STATE OF LOUISIANA
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IN
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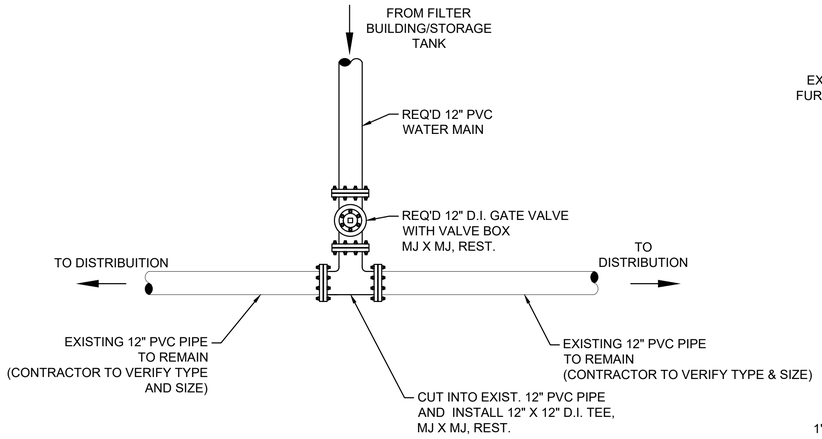
7/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

ACCESS RAMP DETAILS

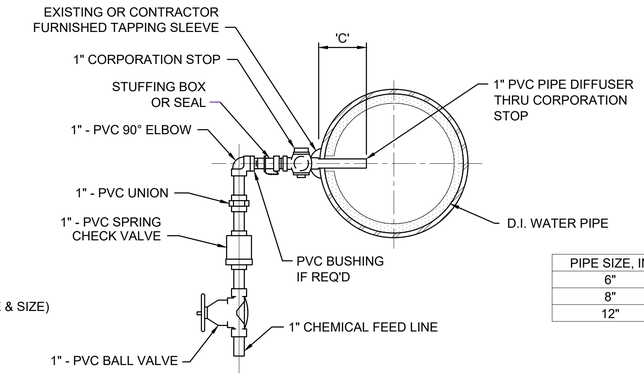
SHEET NO.
C-018
SHEET 29 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\C-018 - Diversified_Typical Ramp Detail.dwg - 7/15/2024 4:59 PM User: Phil Plot Date: Mon Jul-15-2024 - 05:30PM



NOTE:
CONNECTIONS TO EXISTING WATER LINES CAN BE MADE BY CUT-IN BY ISOLATING THE LINE. IF THE EXISTING WATER MAIN CANNOT BE ISOLATED BY EXISTING VALVES, A "HOT TAP" WILL BE ALLOWED.

1 C-019 **REQUIRED WATER MAIN TIE-IN**
SCALE: N.T.S.

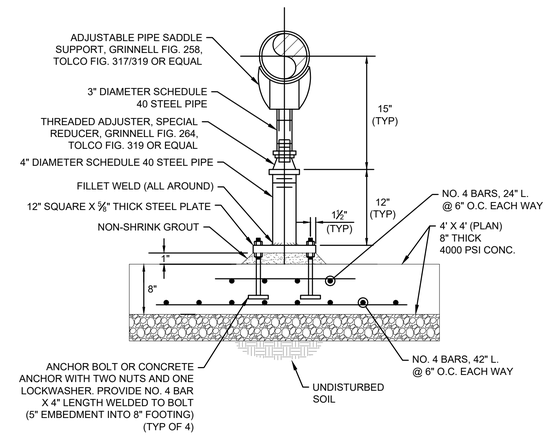


PIPE SIZE, IN	'C', IN
6"	3"
8"	4"
12"	5"

3 C-019 **DETAIL - CHEMICAL FEED CONNECTION**
SCALE: N.T.S.

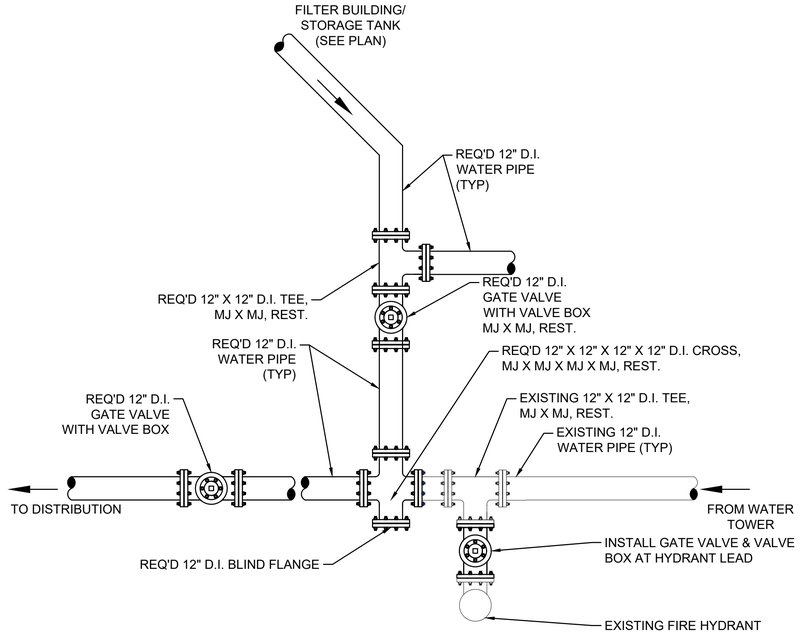
NOTES

1. ALL CHEMICAL FEED PIPING ABOVE GROUND SHALL BE INSULATED.
2. CHEMICAL FEED LINES BELOW GROUND CAN BE HDPE HEAVY WALL TUBING OR SCH 80 PIPE.
3. CONTRACTOR TO INSTALL NEW PVC CONNECTION TO EXISTING TAP AND NEW AND EXISTING CHLORINE FEED LINES AND OPERATE AS APPROPRIATE UNTIL NEW SYSTEM IS APPROVED FOR USE; AT WHICH OLD PIPE TO BE DISCONNECTED AND NEW PVC LINE CAPPED AS SHOWN.



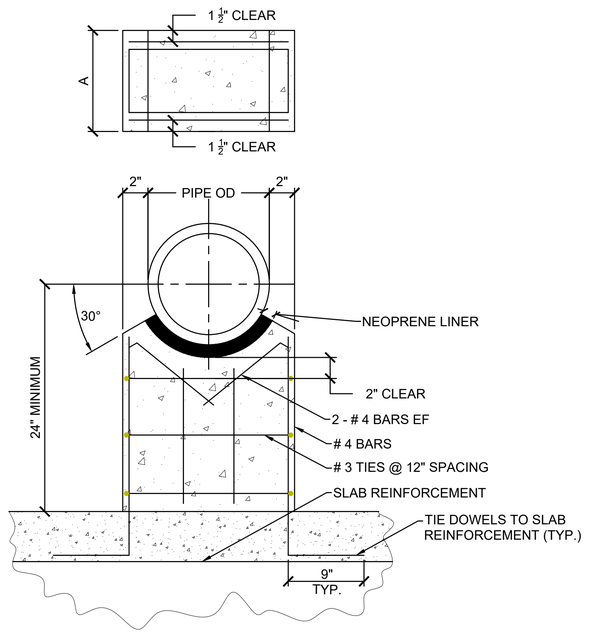
NOTES:
1) ALL STEEL PARTS SHALL BE HOT-DIPPED GALVANIZED.

5 C-019 **ADJUSTABLE PIPE SUPPORT**
SCALE: N.T.S.

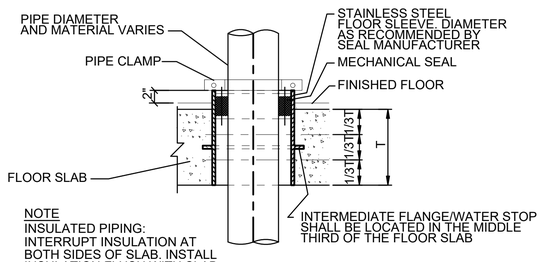


NOTE:
CONNECTIONS TO EXISTING WATER LINES CAN BE MADE BY CUT-IN BY ISOLATING THE LINE. IF THE EXISTING WATER MAIN CANNOT BE ISOLATED BY EXISTING VALVES, A "HOT TAP" WILL BE ALLOWED.

2 C-019 **REQUIRED TIE-IN AT WATER TOWER OUTLET LINE**
SCALE: N.T.S.



4 C-019 **CONCRETE PIPE SUPPORT**
SCALE: N.T.S.



NOTE
INSULATED PIPING:
INTERRUPT INSULATION AT BOTH SIDES OF SLAB. INSTALL INSULATION FLUSH WITH SLAB AFTER WATER TIGHT INSTALLATION OF MECHANICAL SEAL

6 C-019 **CONCRETE SLAB PIPE PENETRATION**
SCALE: N.T.S.

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7/15/24
CIVIL ENGINEERING

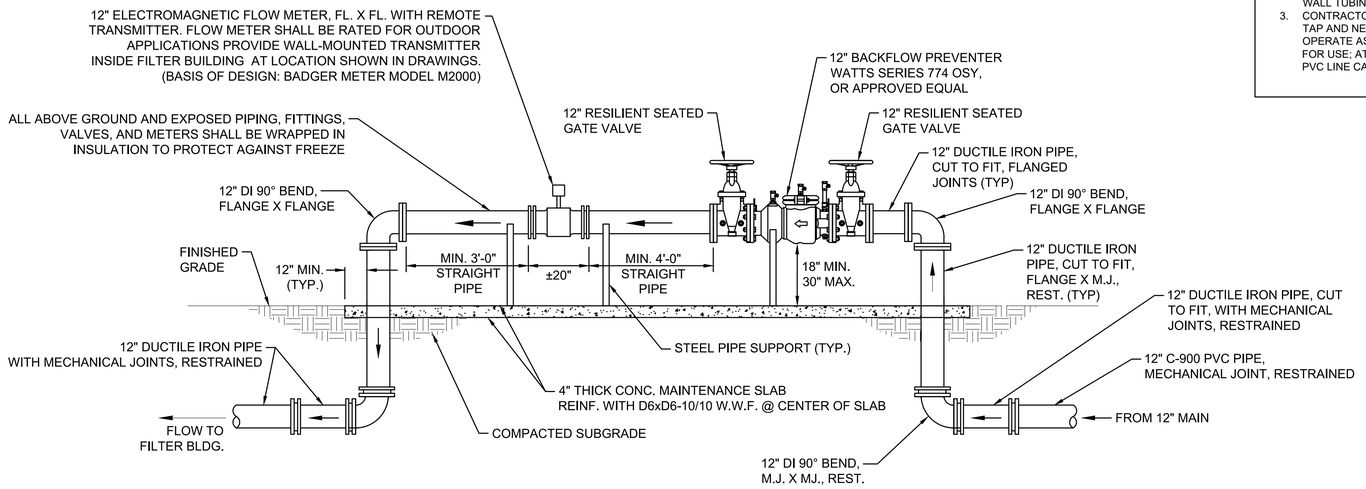
DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

WATER DETAILS

SHEET NO.
C-019
SHEET 30 OF 92

NOTES

1. ALL CHEMICAL FEED PIPING ABOVE GROUND SHALL BE INSULATED.
2. CHEMICAL FEED LINES BELOW GROUND CAN BE HDPE HEAVY WALL TUBING OR SCH 80 PIPE.
3. CONTRACTOR TO INSTALL NEW PVC CONNECTION TO EXISTING TAP AND NEW AND EXISTING CHLORINE FEED LINES AND OPERATE AS APPROPRIATE UNTIL NEW SYSTEM IS APPROVED FOR USE; AT WHICH OLD PIPE TO BE DISCONNECTED AND NEW PVC LINE CAPPED AS SHOWN.

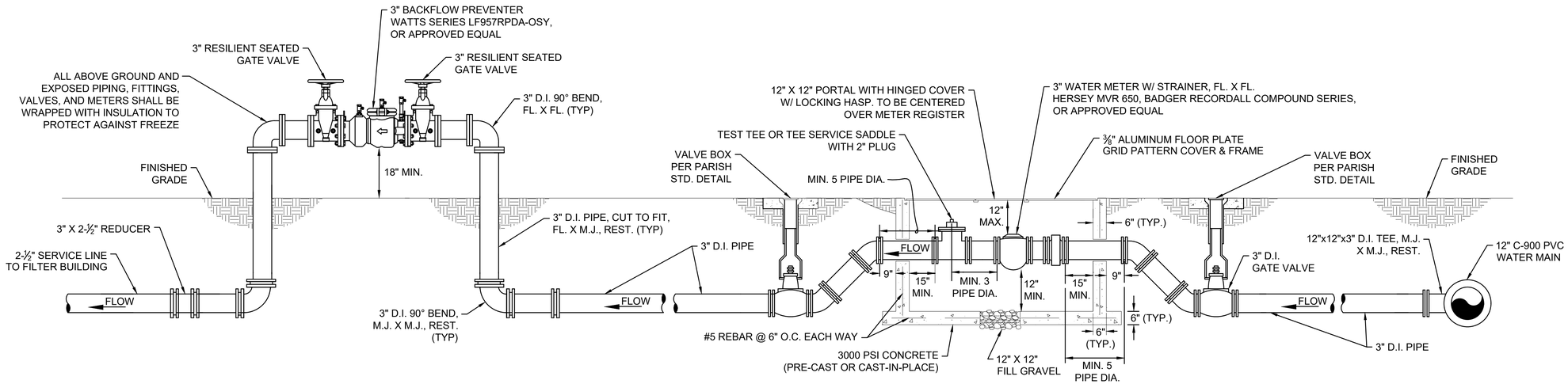


1 / C-020 — 12" BACKFLOW PREVENTER & MAG METER ASSEMBLY AT BACKWASH SUPPLY LINE

SCALE: N.T.S.

NOTES:

1. ALL MECHANICAL JOINTS SHALL BE RESTRAINED.
2. THE METER PIT SHALL BE SIZED AS REQUIRED TO HOUSE THE EQUIPMENT AND TO PROVIDE REQUIRED CLEARANCES.
3. PROVIDE INSULATION AT ALL EXPOSED PIPING FOR FREEZE PROTECTION.
4. PROVIDE PIPE BOLLARDS AT EXPOSED PIPING AS SHOWN IN PLANS.



2 / C-020 — FILTER BUILDING WATER SERVICE METER & BACKFLOW PREVENTER

SCALE: N.T.S.

NOTES:

1. ALL MECHANICAL JOINTS SHALL BE RESTRAINED.
2. THE TEST TEE OR TEE SERVICE SADDLE SHALL NOT BE REQUIRED IF THE METER IS EQUIPPED WITH A TEST PORT.
3. THE METER PIT SHALL BE SIZED AS REQUIRED TO HOUSE THE EQUIPMENT AND TO PROVIDE REQUIRED CLEARANCES.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

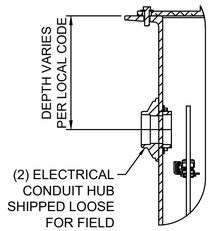
DESIGNED BY: MH
DRAWN BY: PW
CHECKED BY: JAB
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

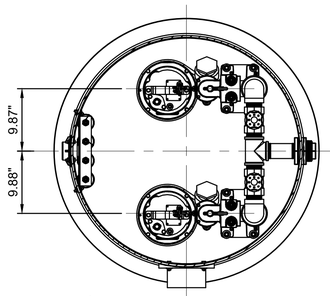
DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

WATER DETAILS

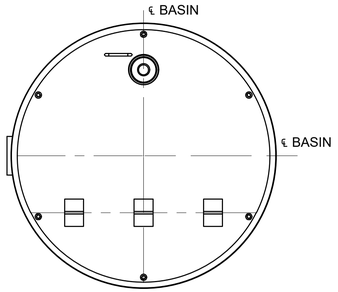
SHEET NO.
C-020
SHEET 31 OF 92



3 / C-021 DETAIL
SCALE: NTS



B / C-021 SECTION: SEWER GRINDER STATION
SCALE: NTS

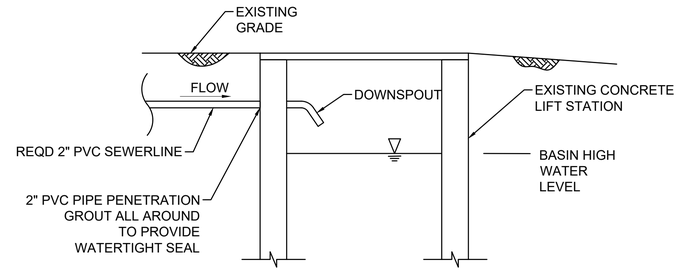


LIFT STATION TIE-IN NOTES:

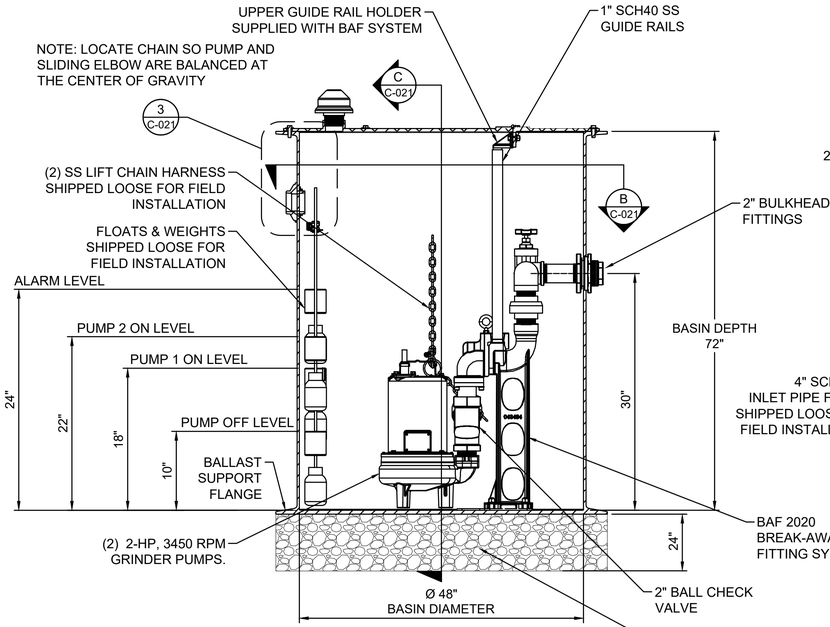
1. CONNECT 2" PVC SEWER FORCE MAIN TO EXISTING SEWER LIFT STATION BASIN. VERIFY BASIN TYPE AND LOCATION PRIOR TO CONSTRUCTION. COORDINATE ALL WORK WITH ST. TAMMANY PARISH DEPARTMENT OF UTILITIES. DETAIL PENETRATION AND SEALING TIE-IN PER LIFT STATION MANUFACTURER'S RECOMMENDATIONS.

2. INSTALL NEW 2" PVC PIPE INVERT ABOVE NORMAL HIGH WATER LEVEL OF EXISTING WET WELL, AND AT A LOCATION THAT SHALL NOT DISRUPT STATION OPERATION, AS CONDITIONS ALLOW. PROVIDE DOWN PIPE AT PENETRATION TO DIRECT FLOW DOWNWARD INTO EXISTING BASIN. IF SITE CONDITIONS WARRANT OTHERWISE, NOTIFY ENGINEER IMMEDIATELY. OBTAIN APPROVAL OF FINAL TIE-IN LOCATION FROM ST. TAMMANY PARISH DEPARTMENT OF UTILITIES PRIOR TO CONSTRUCTION.

3. ANY DAMAGE CONTRACTOR CAUSES TO LIFT STATION BASIN, OR ANY PUBLIC OR PRIVATE PROPERTY SHALL BE REPAIRED AT CONTRACTOR'S SOLE EXPENSE.

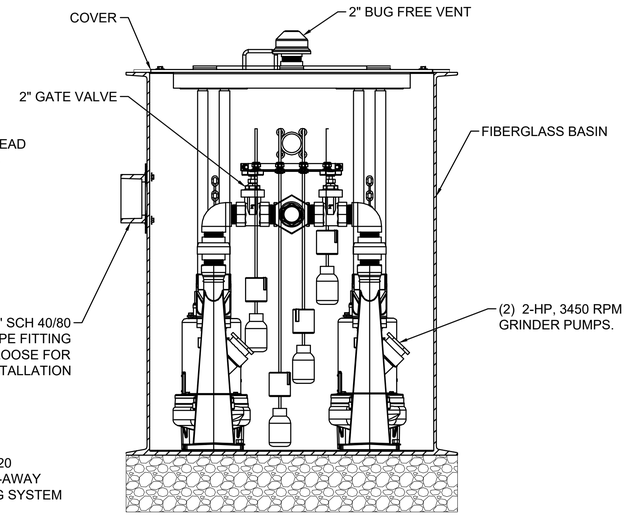


2 / C-021 LIFT STATION TIE-IN DETAIL
SCALE: NTS



NOTES:
1. ALL DIMENSIONS TO BE ± ¼" UNLESS OTHERWISE SPECIFIED.
2. CONSULT FACTORY FOR OTHER DEPTHS.
3. LEVEL CONTROLS MUST BE INSTALLED OUT OF THE INFLUENT FLOW TO AVOID TURBULENCE.
4. ELECTRICAL CONDUIT & FITTINGS TO BE INSTALLED ACCORDING TO STATE AND LOCAL CODES.

1 / C-021 PACKAGED SEWAGE GRINDER STATION
SCALE: NTS



C / C-021 SECTION: SEWER GRINDER
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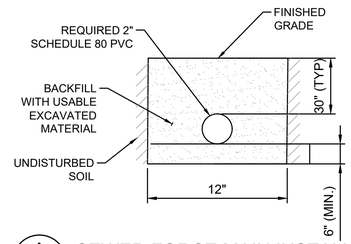

A / C-021 SEWER FORCE MAIN INSTALLATION
SCALE: NTS

ST. TAMMANY PARISH GOVERNMENT
DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

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PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	N.T.S.

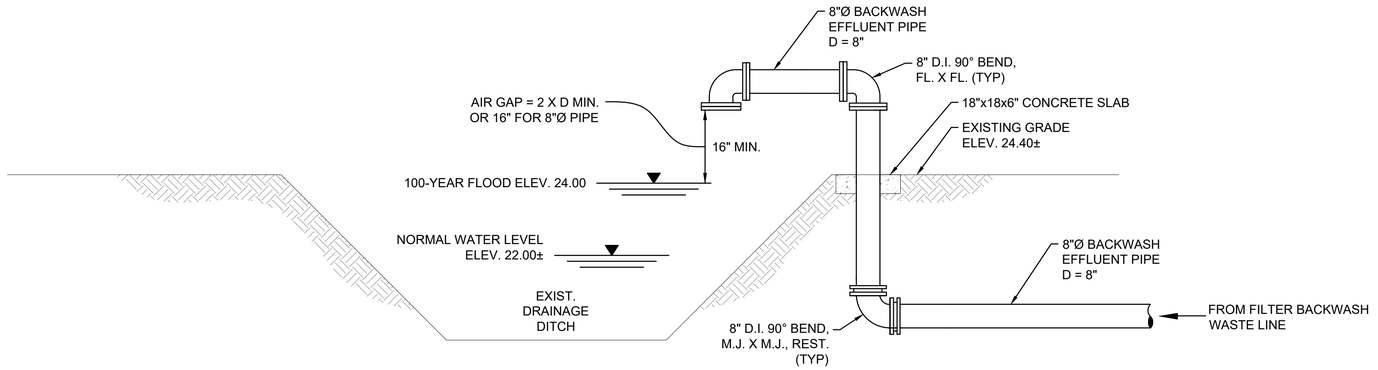
STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SEWER DETAILS

SHEET NO.
C-021
SHEET 32 OF 92

DWG FILE: \\bbec-fs1.bbeclic.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\C-019-C-021 - Diversified _Water & Sewer Details.dwg - 7/15/2024 4:56 PM
User: Phil
Plot Date: Mon Jul-15-2024 - 05:31PM



1 / C-022 FILTER BACKWASH DISCHARGE AIR GAP DETAIL

SCALE: NTS

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ST. TAMMANY PARISH GOVERNMENT

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STATE OF LOUISIANA
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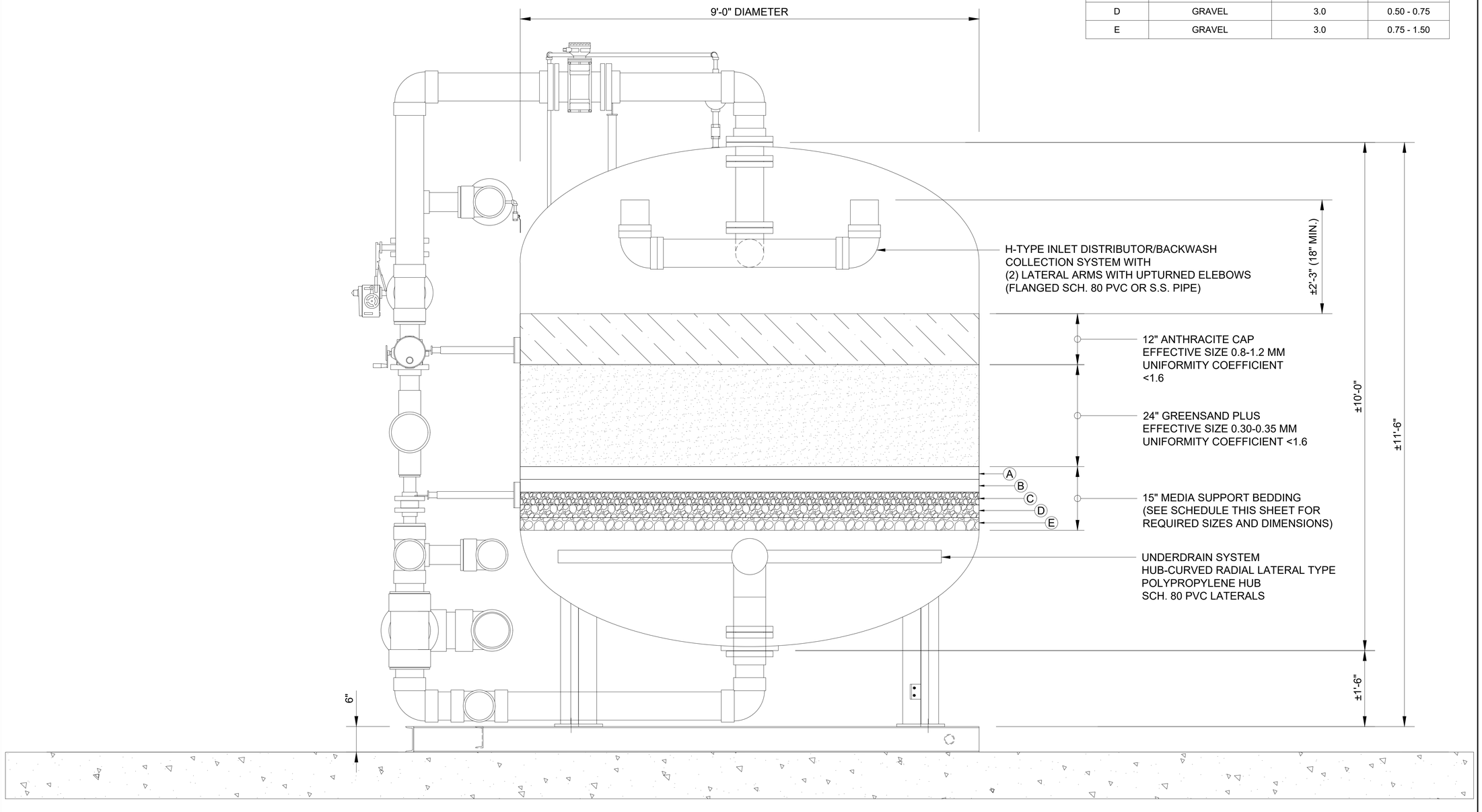
7/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BACKWASH DISCHARGE DETAIL

SHEET NO.
C-022
SHEET 33 OF 92

MEDIA SUPPORT BEDDING SCHEDULE			
LAYER I.D.	DESCRIPTION	LAYER THICKNESS (INCHES)	EFFECTIVE SIZE (INCHES)
A	TORPEDO SAND	3.0	0.030 - 0.078
B	GRAVEL	3.0	0.125 - 0.25
C	GRAVEL	3.0	0.25 - 0.50
D	GRAVEL	3.0	0.50 - 0.75
E	GRAVEL	3.0	0.75 - 1.50



1 C-023 TYPICAL FILTER CROSS SECTION DETAIL
SCALE: NTS

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
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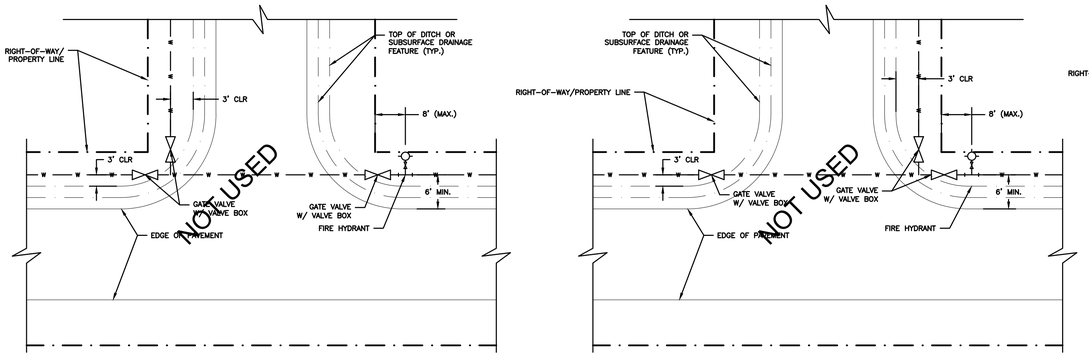
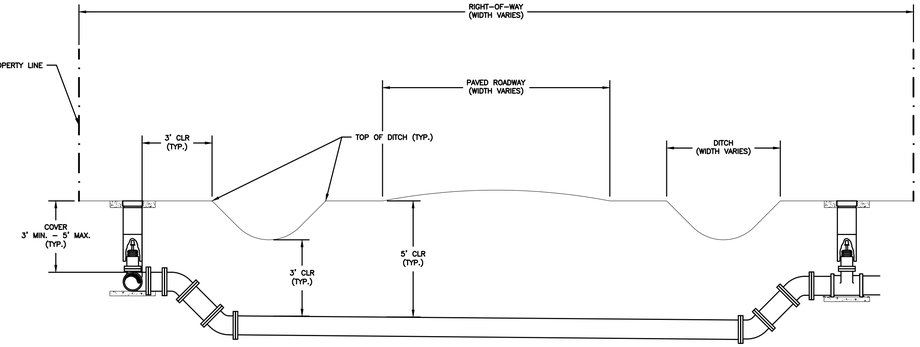
FILTER CROSS SECTION DETAIL

SHEET NO.
C-023
SHEET 34 OF 92

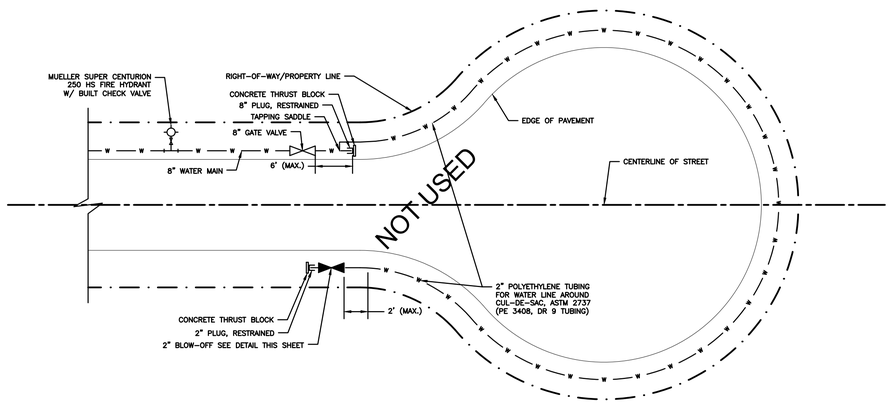


TYPICAL FIRE HYDRANT AND VALVE LOCATIONS AT INTERSECTIONS
(NOT TO SCALE)



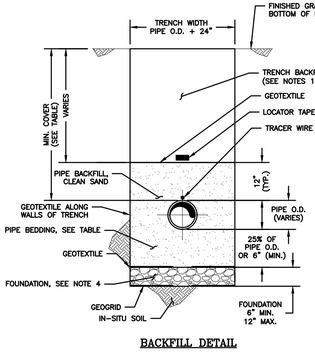
NOTES:
1. REFER TO TAMMANY UTILITIES STANDARD DETAILS REGARDING LAYOUT OF WATER MAIN OFFSETS.
2. REFER TO TAMMANY UTILITIES STANDARD NOTES FOR REQUIREMENT ON LOCATION OF WATER MAIN AND VALVES.

TYPICAL UTILITY CROSS SECTION
(WATER MAINS AND VALVES)
(NOT TO SCALE)



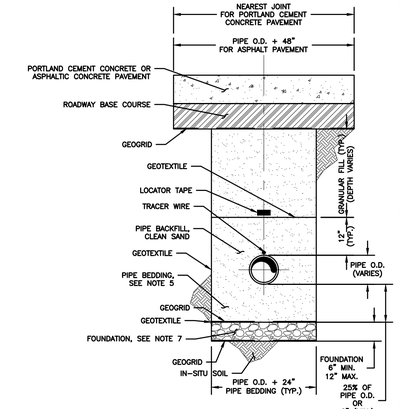
CUL-DE-SAC DETAIL
(NOT TO SCALE)

COVER AND BEDDING REQUIREMENTS			
PIPE DIAMETER (IN.)	MINIMUM COVER (IN.)	BEDDING DEPTH (IN.)	BEDDING MATERIAL TYPE
12" AND SMALLER"	36"	25% PIPE O.D. OR 6" MIN.	CLEAN SAND
14" AND LARGER	48"	25% PIPE O.D. OR 6" MIN.	CLEAN SAND



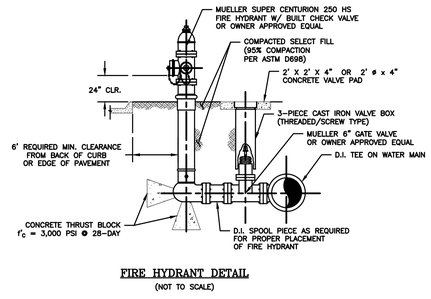
BACKFILL DETAIL
(NOT TO SCALE)

BACKFILL DETAIL NOTES:
1. BACKFILLING OF TRENCHES FOR UNPAVED AREAS SHALL BE COMPLETED USING GRANULAR BACKFILL. SELECT FILL SHALL BE A SILTY OR CLAYEY SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-2-4. IN-SITU SOILS USED AS SELECT FILL SHALL MEET AASHTO GROUP CLASSIFICATION A-2-4 AND SHALL BE FREE OF LARGE DEBRIS, LARGE ROCKS, ROOTS, AND OTHER DELETERIOUS MATERIALS. SELECT FILL SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
2. BACKFILLING OF TRENCHES FOR PAVED AREAS SHALL BE COMPLETED USING GRANULAR BACKFILL. GRANULAR BACKFILL SHALL BE CLEAN SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-3. GRANULAR BACKFILL SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT. GRANULAR BACKFILL SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
3. BEDDING MATERIALS FOR WATER LINES SHALL BE A CLEAN SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-3. ALL BEDDING MATERIALS SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT. SANDY BEDDING MATERIALS SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
4. A CRUSHED No. 57 LIMESTONE FOUNDATION SHALL BE USED TO STABILIZE SOFT AND/OR WET BOTTOM OF EXCAVATION. A MINIMUM OF 6 INCHES OF SOFT AND/OR WET NATIVE MATERIAL SHALL BE REMOVED PRIOR TO PLACING THE CRUSHED LIMESTONE FOUNDATION. CRUSHED No. 57 LIMESTONE SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT.CRUSHED LIMESTONE FOUNDATION SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D4253.
5. THE PLACEMENT OF GEOGRID SHALL BE AS SHOWN ON THE DETAIL. ALL GEOGRID SHALL BE A BIAXIAL GEOGRID SUCH AS TENSAR BX1200, SYNTEC SBX12 OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL BE A MINIMUM OF 24 INCHES.
6. THE PLACEMENT OF GEOTEXTILE FABRIC SHALL BE AS SHOWN ON THE DETAIL. GEOTEXTILE FABRIC SHALL BE MIRAFI 500X, PROPEX GEOTEX 200ST OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL



UNDER PAVEMENT
TRENCH DETAIL
(NOT TO SCALE)

UNDER PAVEMENT TRENCH DETAIL NOTES:
1. ROADS, CURBS, DRIVEWAY APRONS AND SIDEWALKS TO BE IMPACTED BY EXCAVATION FOR SEWER OR WATER LINE REPAIRS SHALL BE REMOVED AND REPLACED TO NEAREST JOINT. WHEN THE SEWER OR WATER LINE WILL BE REPAIR UNDER ASPHALT PAVEMENT, THE ASPHALTIC CONCRETE PAVEMENT SHALL BE SAW CUT BEFORE TEARING OUT PAVEMENT.
2. ASPHALTIC CONCRETE PAVEMENT, BASE COURSE AND PORTLAND CEMENT CONCRETE PAVEMENT SHALL COMPLY WITH THE MOST RECENT VERSION OF THE STANDARD PLANS AND SPECIFICATIONS PROMULGATED BY THE LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT.
3. PORTLAND CEMENT CONCRETE PAVEMENT USED FOR ROADWAYS SHALL HAVE A MINIMUM 3-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
4. GRANULAR BACKFILL SHALL BE CLEAN SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-3. GRANULAR BACKFILL SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT. GRANULAR BACKFILL SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
5. BEDDING MATERIALS FOR WATER LINES SHALL BE A CLEAN SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-3. ALL BEDDING MATERIALS SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT. SANDY BEDDING MATERIALS SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
6. A CRUSHED No. 57 LIMESTONE FOUNDATION SHALL BE USED TO STABILIZE SOFT AND/OR WET BOTTOM OF EXCAVATION. A MINIMUM OF 6 INCHES OF SOFT AND/OR WET NATIVE MATERIAL SHALL BE REMOVED PRIOR TO PLACING THE CRUSHED LIMESTONE FOUNDATION. CRUSHED No. 57 LIMESTONE SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT. CRUSHED LIMESTONE FOUNDATION SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D4253.
7. THE PLACEMENT OF GEOGRID SHALL BE AS SHOWN ON THE DETAIL. ALL GEOGRID SHALL BE A BIAXIAL GEOGRID SUCH AS TENSAR BX1200, SYNTEC SBX12 OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL BE A MINIMUM OF 24 INCHES.
8. THE PLACEMENT OF GEOTEXTILE FABRIC SHALL BE AS SHOWN ON THE DETAIL. GEOTEXTILE FABRIC SHALL BE MIRAFI 500X, PROPEX GEOTEX 200ST OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL BE A MINIMUM OF 24 INCHES.
9. CONCRETE THRUST BLOCK SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI.



FIRE HYDRANT DETAIL
(NOT TO SCALE)

FIRE HYDRANT NOTES:
1. FIRE HYDRANTS SHALL BE MUELLER SUPER CENTURION 250 HS WITH BUILT-IN CHECK VALVE MEETING AWWA C-502.
2. SELECT FILL SHALL BE A SILTY OR CLAYEY SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-2-4. IN-SITU SOILS USED AS SELECT FILL SHALL MEET AASHTO GROUP CLASSIFICATION A-2-4 AND SHALL BE FREE OF LARGE DEBRIS, LARGE ROCKS, ROOTS, AND OTHER DELETERIOUS MATERIALS. SELECT FILL SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
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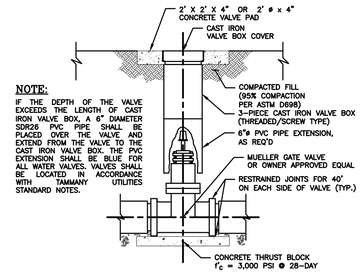
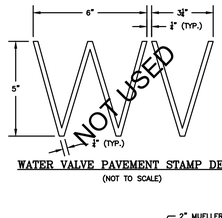
4. THE PLACEMENT OF GEOGRID SHALL BE AS SHOWN ON THE TRENCH DETAILS. ALL GEOGRID SHALL BE A BIAXIAL GEOGRID SUCH AS TENSAR BX1200, SYNTEC SBX12 OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL BE A MINIMUM OF 24 INCHES.
5. THE PLACEMENT OF GEOTEXTILE FABRIC SHALL BE AS SHOWN ON THE TRENCH DETAILS. GEOTEXTILE FABRIC SHALL BE MIRAFI 500X, PROPEX GEOTEXT 200ST OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL BE A MINIMUM OF 24 INCHES.
6. CONCRETE THRUST BLOCK SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI.

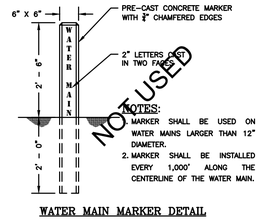


NOTE:
IF THE DEPTH OF THE VALVE EXCEEDS THE LENGTH OF CAST IRON VALVE BOX, A 6" DIAMETER SDR26 PVC PIPE SHALL BE PLACED OVER THE VALVE AND EXTEND FROM THE VALVE TO THE CAST IRON VALVE BOX. THE PVC EXTENSION SHALL BE BLUE FOR ALL WATER VALVES. VALVES SHALL BE LOCATED IN ACCORDANCE WITH TAMMANY UTILITIES STANDARD NOTES.

VALVE BOX FOR
NON-TRAFFIC AREAS
(NOT TO SCALE)

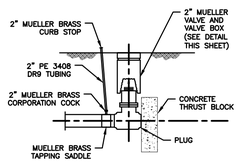


WATER VALVE PAVEMENT STAMP DETAIL
(NOT TO SCALE)

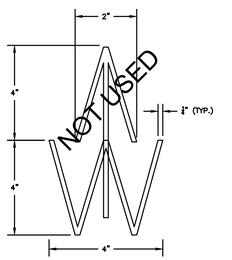


NOTES:
1. MARKER SHALL BE USED ON WATER MAINS LARGER THAN 12" DIAMETER.
2. MARKER SHALL BE INSTALLED EVERY 1,000' ALONG THE CENTERLINE OF THE WATER MAIN.

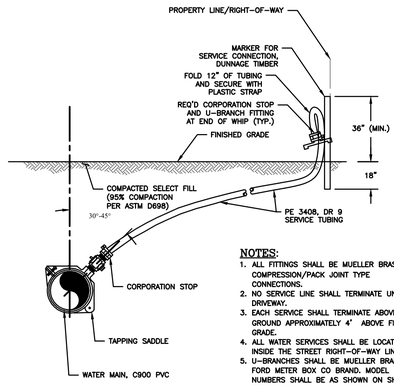
WATER MAIN MARKER DETAIL
(NOT TO SCALE)



BLOW VALVE DETAIL
(NOT TO SCALE)

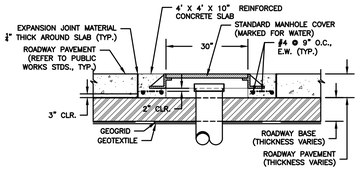


WATER SERVICE PAVEMENT STAMP DETAIL
(NOT TO SCALE)



NOTES:
1. ALL FITTINGS SHALL BE MUELLER BRASS WITH COMPRESSION/PACK JOINT TYPE CONNECTIONS.
2. NO SERVICE LINE SHALL TERMINATE UNDER A DRIVEWAY.
3. EACH SERVICE SHALL TERMINATE ABOVE GROUND APPROXIMATELY 4" ABOVE FINAL GRADE.
4. ALL WATER SERVICES SHALL BE LOCATED INSIDE THE STREET RIGHT-OF-WAY LINE.
5. U-BRANCHES SHALL BE MUELLER BRAND OR FORD METER BOX CO BRAND. MODEL NUMBERS SHALL BE AS SHOWN ON SHEET 503.
6. CORPORATIONS STOPS AND U-BRANCHES SHALL BE INSTALLED AT THE END OF ALL WATER SERVICES.

WATER SERVICE CONNECTION DETAIL
(NOT TO SCALE)



WATER VALVE BOX MANHOLE
COVER FOR TRAFFIC AREAS
(NOT TO SCALE)

ST. TAMMANY PARISH GOVERNMENT
DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

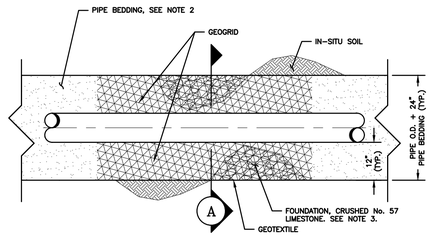
DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY:
SHEET SIZE: ANSI D
SCALE: AS NOTED

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

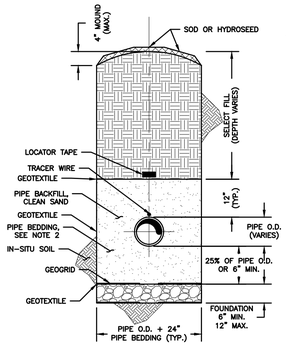
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

WATER STANDARD DETAILS

SHEET NO.
C-501
SHEET 35 OF 92



PLAN
(NOT TO SCALE)

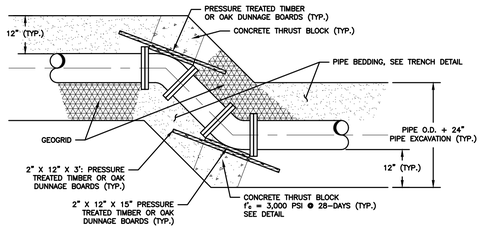


SECTION A
(NOT TO SCALE)

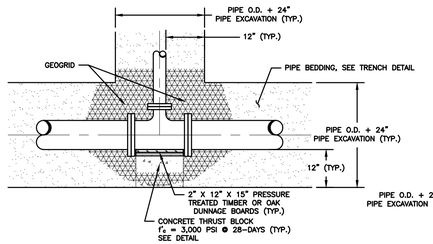
TRENCH DETAIL
(NOT TO SCALE)

TRENCH DETAIL NOTES:

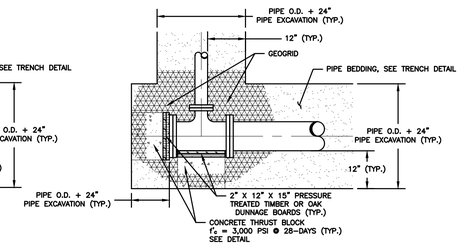
1. SELECT FILL SHALL BE A SILTY OR CLAYEY SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-2-4. IN-SITU SOILS USED AS SELECT FILL SHALL MEET AASHTO GROUP CLASSIFICATION A-2-4 AND SHALL BE FREE OF LARGE DEBRIS, LARGE ROCKS, ROOTS, AND OTHER DELETERIOUS MATERIALS. SELECT FILL SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
2. BEDDING MATERIALS FOR WATER LINES SHALL BE A CLEAN SAND COMPLYING WITH AASHTO GROUP CLASSIFICATION A-3. ALL BEDDING MATERIALS SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT. SANDY BEDDING MATERIALS SHALL HAVE MINIMUM COMPACTION OF 95% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D698.
3. A CRUSHED No. 57 LIMESTONE FOUNDATION SHALL BE USED TO STABILIZE SOFT AND/OR WET BOTTOM OF EXCAVATION. A MINIMUM OF 6 INCHES OF SOFT AND/OR WET NATIVE MATERIAL SHALL BE REMOVED PRIOR TO PLACING THE CRUSHED LIMESTONE FOUNDATION. CRUSHED No. 57 LIMESTONE SHALL BE PLACED IN LOOSE LIFTS NOT EXCEEDING A THICKNESS OF EIGHT INCHES (8") PER LIFT. CRUSHED LIMESTONE FOUNDATION SHALL HAVE MINIMUM COMPACTION OF 90% OF THE MAXIMUM DRY UNIT WEIGHT AS DETERMINED BY ASTM D4253.
4. THE PLACEMENT OF GEOGRID SHALL BE AS SHOWN ON THE DETAIL. ALL GEOGRID SHALL BE A BIAXIAL GEOGRID SUCH AS TENSAR BX1200, SYNTEC SBX12 OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL BE A MINIMUM OF 24 INCHES.
5. THE PLACEMENT OF GEOTEXTILE FABRIC SHALL BE AS SHOWN ON THE DETAIL. GEOTEXTILE FABRIC SHALL BE MIRAFI 500X, PROPEX GEOTEX 200ST OR APPROVED EQUAL. TRANSVERSE AND LONGITUDINAL OVERLAP SHALL BE A MINIMUM OF 24 INCHES.
6. CONCRETE THRUST BLOCK SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI.



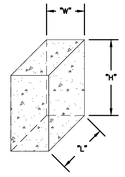
THRUST BLOCK DETAILS FOR BENDS
(NOT TO SCALE)



THRUST BLOCK DETAILS FOR TEES
(NOT TO SCALE)

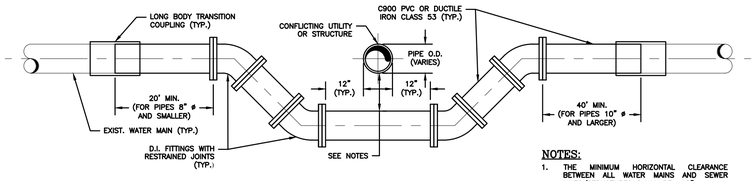


THRUST BLOCK DETAILS FOR TEES AND PLUGS
(NOT TO SCALE)



MINIMUM THRUST BLOCK SIZES BY FITTING TYPE			
FITTING TYPE	DIMENSION "W"	DIMENSION "H"	DIMENSION "L"
11.25°	6" MIN. OR 3 "D" / 2	2 "D" + PIPE O.D.	"D" MIN.
22.5°	6" MIN. OR 3 "D" / 2	2 "D" + PIPE O.D.	"D" MIN.
45°	6" MIN. OR 3 "D" / 2	2 "D" + PIPE O.D.	2 "D" MIN.
90°	6" + 2 "D"	2 "D" + PIPE O.D.	3 "D" MIN.
TEE	6" MIN. OR 3 "D" / 2	2 "D" + PIPE O.D.	2 "D" MIN.
WYE	6" MIN. OR 3 "D" / 2	2 "D" + PIPE O.D.	2 "D" MIN.
PLUG	6" MIN. OR 3 "D" / 2	3 "D"	3 "D"

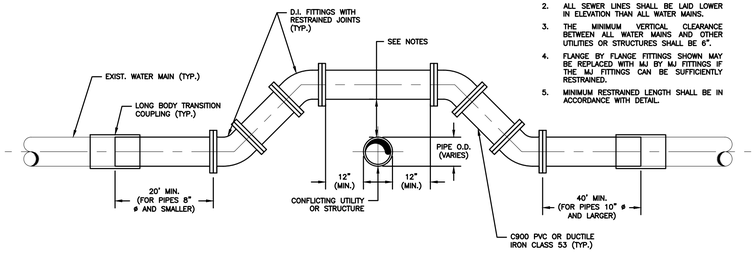
NOTE:
D = NOMINAL PIPE DIAMETER



WATER MAIN HORIZONTAL OFFSET DETAIL
(PLAN VIEW)
(NOT TO SCALE)

NOTES:

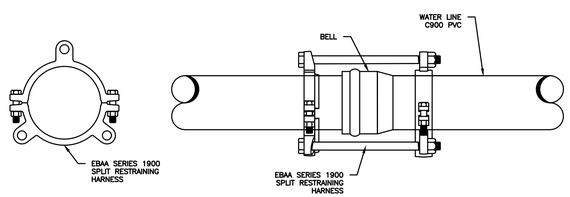
1. THE MINIMUM HORIZONTAL CLEARANCE BETWEEN ALL WATER MAINS AND SEWER LINES/STRUCTURES SHALL BE 18".
2. ALL SEWER LINES SHALL BE LAID LOWER IN ELEVATION THAN ALL WATER MAINS.
3. THE MINIMUM HORIZONTAL CLEARANCE BETWEEN ALL WATER MAINS AND OTHER UTILITIES OR STRUCTURES SHALL BE 6'.
4. FLANGE BY FLANGE FITTINGS SHOWN MAY BE REPLACED WITH MJ BY MJ FITTINGS IF THE MJ FITTINGS CAN BE SUFFICIENTLY RESTRAINED.
5. MINIMUM RESTRAINED LENGTH SHALL BE IN ACCORDANCE WITH DETAIL.



WATER MAIN VERTICAL OFFSET DETAIL
(PROFILE VIEW)
(NOT TO SCALE)

NOTES:

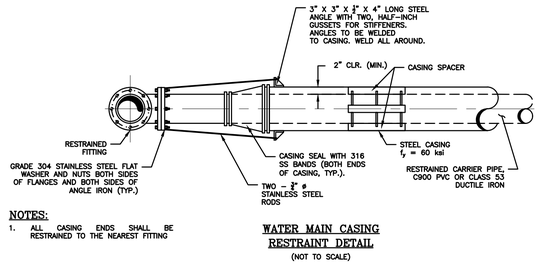
1. THE MINIMUM VERTICAL CLEARANCE BETWEEN ALL WATER MAINS AND SEWER LINES/STRUCTURES SHALL BE 18".
2. ALL SEWER LINES SHALL BE LAID LOWER IN ELEVATION THAN ALL WATER MAINS.
3. THE MINIMUM VERTICAL CLEARANCE BETWEEN ALL WATER MAINS AND OTHER UTILITIES OR STRUCTURES SHALL BE 6'.
4. FLANGE BY FLANGE FITTINGS SHOWN MAY BE REPLACED WITH MJ BY MJ FITTINGS IF THE MJ FITTINGS CAN BE SUFFICIENTLY RESTRAINED.
5. MINIMUM RESTRAINED LENGTH SHALL BE IN ACCORDANCE WITH DETAIL.



RESTRAINT NOTES:

1. THE FOURTH JOINT OF ALL PIPE WITH A BELL AND SPIGOT DESIGN SHALL BE RESTRAINED USING A SPLIT RESTRAINING HARNESS SUCH AS EBAA SERIES 1900 OR OWNER APPROVED EQUAL.
2. PIPE GASKETS SHALL CONFORM TO AWWA C111.

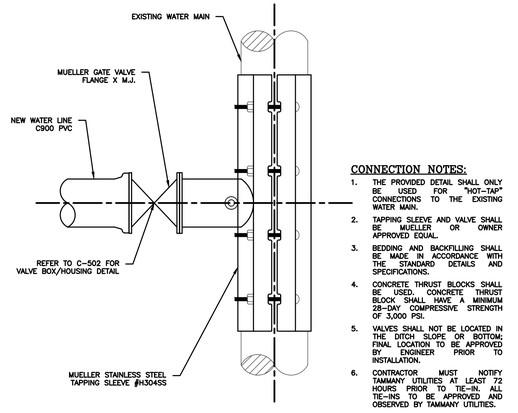
WATER MAIN JOINT RESTRAINING DETAIL
(NOT TO SCALE)



NOTES:

1. ALL CASING ENDS SHALL BE RESTRAINED TO THE NEAREST FITTING

WATER MAIN CASING RESTRAINT DETAIL
(NOT TO SCALE)



CONNECTION NOTES:

1. THE PROVIDED DETAIL SHALL ONLY BE USED FOR "HOT-TAP" CONNECTIONS TO THE EXISTING WATER MAIN.
2. TAPPING SLEEVE AND VALVE SHALL BE MUELLER OR OWNER APPROVED EQUAL.
3. BEDDING AND BACKFILLING SHALL BE MADE IN ACCORDANCE WITH THE STANDARD DETAILS AND SPECIFICATIONS.
4. CONCRETE THRUST BLOCKS SHALL BE USED. CONCRETE THRUST BLOCK SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,000 PSI.
5. VALVES SHALL NOT BE LOCATED IN THE DITCH SLOPE OR BOTTOM; FINAL LOCATION TO BE APPROVED BY ENGINEER PRIOR TO INSTALLATION.
6. CONTRACTOR MUST NOTIFY TAMMANY UTILITIES AT LEAST 72 HOURS PRIOR TO TIE-IN. ALL TIE-INS TO BE APPROVED AND OBSERVED BY TAMMANY UTILITIES.

NEW WATER MAIN CONNECTION TO EXISTING WATER MAIN DETAIL
(NOT TO SCALE)

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY:
DRAWN BY:
CHECKED BY:
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY:
SHEET SIZE: ANSI D
SCALE: AS NOTED

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

WATER STANDARD DETAILS

SHEET NO.
C-502
SHEET 36 OF 92

STRUCTURAL GENERAL NOTES:

1. CODE

A. ALL CONSTRUCTION SHALL CONFORM WITH THE PROVISIONS OF THE I.B.C. 2021 AND ASCE 7-22 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES.

2. DESIGN LOADING

A. THE DEAD LOAD FOR THE FRAMING IS AS FOLLOWS:

1st CONCRETE FLOOR

CONCRETE MAT SLAB NORMAL WT. - 250 PSF

1st FLOOR MISC. LOAD

ELECTRICAL/LIGHTING _____ 3 PSF
ROOF (POLY.) _____ 15 PSF
MISCELLANEOUS _____10 PSF

TOTAL _____28 PSF

PLAZA - ONE WAY SLAB

8" CONC. CMU NORMAL WT. _____120 PSF

SEISMIC DESIGN CATEGORY _____ B
SITE CLASS _____ D
BASIC SEISMIC FORCE RESISTING SYSTEM_____ STEEL, SPECIAL CONCENTRICALLY BRACED FRAMES

ASCE 7-22 - EFFECTIVE SEISMIC WEIGHT, ACCORDING TO AR7 12.7.2, SHALL INCLUDE A MINIMUM OF 25% (OR 250 PSF) OF FLOOR LOAD.

RISK CATEGORY III & IV FOR FRONT PLAZA BUILDING

RESPONSE MODIFICATION COEFFICIENT _____ R=3.5
DESIGN BASE SHEAR _____ 145K
ANALYSIS PROCEDURE _____ EQUIVALENT LATERAL FORCE PROCEDURE

2A-1 WIND LOAD CRITERIA

BASIC WIND PRESSURE_____ 138 MPH
Ka = 0.85, Kzt = 1.66, Ke = 0.90, Kd = 0.85
Gcpi = ±0.55, EXPOSURE = B

BUILDING IS LOCATED IN FLOOD ZONE AE
BASE FLOOD ELEVATION (BFE) = 24.00 FEET NAVD 88
DESIGN FLOOD ELEVATION (BFE) = 26.00 FEET NAVD 88
LOWEST FLOOR ELEVATION = 26.00 FEET NAVD 88

THE CONTRACTOR IS CAUTIONED AS TO NOT STORE ANY CONSTRUCTION MATERIALS OR UNDERTAKE ANY CONSTRUCTION OPERATION WHICH WILL EXCEED THE DESIGN LIVE LOAD CAPACITIES NOTED.

B. THE STRUCTURE HAS BEEN DESIGNED FOR THE DEAD AND LIVE LOADS INDICATED ABOVE. ANY INCREASE OF LOADS DUE TO CHANGE IN USAGE OR CONSTRUCTION MATERIALS, ETC. SHALL HAVE THE WRITTEN APPROVAL OF THE ENGINEER.
C. THE STABILITY OF THE STRUCTURE IS DEPENDENT UPON THE DIAPHRAGM ACTION OF THE FLOOR AND ROOF. THE CONTRACTOR IS COMPLETELY RESPONSIBLE FOR THE METHODS OF CONSTRUCTION AND SHALL PROVIDE ALL GUYS, BRACING AND SHORING REQUIRED TO ACCOMMODATE ALL INTERIM LOADING CONDITIONS THROUGHOUT THE CONSTRUCTION PHASE.
D. WEIGHT OF EQUIPMENT SHOWN ON THE STRUCTURAL DRAWINGS HAVE BEEN CONSIDERED IN THE DESIGN OF THIS FRAMING. ANY ADDITIONAL EQUIPMENT NOT SHOWN ON THE STRUCTURAL DRAWINGS AND EXCEEDING 500 POUNDS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR APPROVAL PRIOR TO INSTALLING.

2. GENERAL

A. THE CONTRACTOR IS ADVISED THAT ALL PLANS, DIMENSIONS AND DETAILS DEPICT FIELD CONDITIONS; AS SHOWN. MINOR VARIATIONS ARE TO BE EXPECTED AND ANY DEVIATIONS FROM THE CONTRACT DOCUMENTS SHALL BE APPROVED BY THE ENGINEER IN WRITING PRIOR TO PROCEEDING.
B. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SATISFY HIMSELF AS TO THE LOCATION OF ANY UTILITIES IN THE IMMEDIATE VICINITY OF CONSTRUCTION SO AS TO PREVENT DAMAGE TO THEM. SHOULD ANY DAMAGE TO SUCH UTILITIES OCCUR, THE CONTRACTOR SHALL BE REQUIRED TO REPAIR SUCH DAMAGE AT HIS OWN EXPENSE AND TO THE SATISFACTION OF THE OWNER.
C. SHOP DRAWINGS FOR ALL STRUCTURAL ELEMENTS SHOWN ON THE CONTRACT DOCUMENTS MUST BE SUBMITTED BY THE GENERAL CONTRACTOR WITH CERTIFIED PLANS BY A REGISTERED ENGINEER IN LOUISIANA. IF THE CONTRACTOR OR OWNER FAILS TO OBTAIN SN ENGINEER'S REVIEW OF THE SHOP DRAWINGS, THE ENGINEER WILL NOT BE RESPONSIBLE FOR THE STRUCTURAL CERTIFICATION AND DESIGN OF THE PROJECT. SHOP DRAWINGS ARE REVIEWED BY THE ENGINEER AS A CONVENIENCE TO THE GENERAL CONTRACTOR AND ARE NOT A CONTRACT DOCUMENT.
D. LOADS GREATER THAN THE DESIGN LIVE LOADS SHALL NOT BE PLACED ON THE STRUCTURE. CONTRACTOR SHALL SUPPORT ADJACENT STRUCTURES, UTILITIES AND EXCAVATIONS; AS REQUIRED. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL TEMPORARY FORMWORK, SHEETING, SHORING AND UNDERPINNING SEALED BY A PROFESSIONAL ENGINEER AS A PART OF THE CONTRACTORS WORK.
E. THE CONTRACTOR SHALL BE RESPONSIBLE TO DETERMINE ALLOWABLE CONSTRUCTION LOADS AND TO PROVIDE DESIGN AND CONSTRUCTION OF FALSEWORK, FORMWORK, STAGINGS, BRACING, SHEETING, SHORING AND UNDERPINNING, AS NECESSARY, TO PREVENT ANY LATERAL OR VERTICAL MOVEMENTS TO AND TO INSURE THE STRUCTURAL INTEGRITY OF EXISTING BUILDINGS OR NEW CONSTRUCTION, SIDEWALKS, UTILITIES, ETC. SHALL BE DESIGNED BY S PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF LOUISIANA ENGAGED BY THE CONTRACTOR. DETAILED SIGNED AND SEALED SHOP DRAWINGS SHALL BE PREPARED INDICATING ALL WORK TO BE PERFORMED. SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS.

F. AT THE TIME OF SHOP DRAWING SUBMISSION, THE GENERAL CONTRACTOR SHALL INFORM THE ENGINEER, IN WRITING, OF ANY DEVIATIONS OR OMISSIONS FROM THE CONTRACT DOCUMENTS.

G. CONSULT CIVIL, MECHANICAL AND ELECTRICAL DRAWINGS FOR VERIFICATION OF LOCATION AND DIMENSION OF CHASES, INSERTS, OPENINGS, SLEEVES, WASHERS, DRIPS, REVEALS, DEPRESSIONS AND OTHER PROJECT REQUIREMENTS.

H. THE STRUCTURAL CONTRACT DOCUMENTS ARE NOT TO BE REPRODUCED FOR USE AS SHOP DRAWINGS.

I. CONTRACTOR IS REQUIRED TO PROVIDE SHEETING, SHORING AND BRACING AS NECESSARY TO MAINTAIN STABILITY OF EXCAVATION AND ADJACENT PROPERTY.

3. FOUNDATION

A. TOP OF ALL EXTERIOR FOOTINGS/CONCRETE SHAFTS SHALL BE A MINIMUM OF 1'-0" BELOW FINISH GRADE UNLESS NOTED OTHERWISE ON THE DRAWINGS. SEE SITE PLAN FOR EXISTING AND FINISHED GRADES.
B. TOP OF ALL MAT FOOTINGS SHALL BE 24" ABOVE EXISTING GRADE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
C. ALL EXCAVATION, BACKFILLING AND FILLING OPERATIONS BENEATH THE BUILDING SLAB AND FOUNDATIONS, AND ALL COMPACTION TESTS AND INSPECTION, SHALL BE DONE UNDER THE DIRECTION AND SUPERVISION OF A REGISTERED GEOTECHNICAL ENGINEER RETAINED BY THE CONTRACTOR. ALL SOIL EQUIPMENT AND PROCEDURES SHALL BE APPROVED BY THE GEOTECH ENGINEER PRIOR TO ALL EARTHWORK OPERATIONS.
D. ALL FILL UNDER FOUNDATIONS SHALL BE COMPACTED TO A DRY DENSITY OF 100 PERCENT OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D 698. OVEREXCAVATION REQUIRED AT COLUMN FOOTINGS CAN BE BACKFILLED USING PENDOT 2A STONE COMPACTED OR FLOWABLE FILL WITH A MIN. 28 DAY COMPRESSIVE STRENGTH OF 300 PSF.
E. MAT FOUNATIONS AND SLAB ON GRADE SHALL BEAR ON GROUND 2' THICK SELECTED FILL, COMPACTED IN 9" LAYERS TO 95% PROCTOR DENSITY AT OPTIMUM MOISTURE.

TYPICAL FOUNDATION BEARING SHALL BE PREPARED PER THE FOLLOWING GEOTECHNICAL RECOMMENDATIONS:

BEARING MATERIAL	OVEREXCAVATION/REPLACEMENT REQUIREMENT	
	MAT FOUNDATION	CONTINUOUS WALL FOOTING
IN-SITU FILL OR NATURAL SOILS	1/3B	1B
COMPACTED STRUCTURAL FILL (2)	1/4B	1/2B

B = FOOTING WIDTH
1 FIELD VERIFIED BY GEOTECHNICAL ENGINEER OF RECORD
2 MAY BE REDUCED AFTER FIELD INSPECTION BY ENGINEER OF RECORD

4. CAST-IN-PLACE CONCRETE

A. ALL CONCRETE WORK SHALL CONFORM TO ALL PROVISIONS OF THE "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" (ACI 301-20), AND TO THE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318-19) AND ACI 350-20.

B. ADDITIONALLY, THE CONCRETE SHALL CONFORM TO ALL PROVISIONS OF THE LATEST EDITIONS OF THE FOLLOWING PUBLICATIONS:

1. ACI 305R RECOMMENDED PRACTICE FOR HOT WEATHER CONCRETING.
2. ACI 306R RECOMMENDED PRACTICE FOR COLD WEATHER CONCRETING.
3. ACI 347 RECOMMENDED PRACTICE FOR CONCRETE FORMWORK.

C. ALL CONCRETE, UNLESS NOTED OTHERWISE, SHALL BE STONE AGGREGATE CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.

D. ALL CONCRETE MIX DESIGNS AND ADMIXTURES SHALL BE APPROVED BY THE ENGINEER 30 DAYS PRIOR TO INITIATION OF FIRST POUR.

E.

1. ALL CONCRETE SLAB AND BEAM FACES SHALL HAVE ½" THICK CHAMFERS UNLESS NOTED.
2. ALL REINFORCING BARS SHALL CONFORM TO ASTM A-615 GRADE 60. ALL WELDED WIRE FABRIC SHALL BE IN SHEETS AND SHALL BE SUPPORTED ON CHAIRS.

F. ALL CONCRETE SHALL BE SAMPLED AND TESTED AS REQUIRED BY SPECIFICATIONS.

G. MINIMUM BAR LAPS SHALL BE 36 BAR DIAMETERS WITH A MINIMUM LAP OF 24"; UNLESS NOTED.

H. PROVIDE WATER STOPS IN ALL CONSTRUCTION AND CONTROL JOINTS IN CONCRETE BELOW GRADE AS PER THE ARCHITECTURAL DRAWINGS.

I. CONSTRUCTION JOINTS IN SLABS SHALL BE LOCATED MIDWAY BETWEEN SUPPORTS EXCEPT THAT WHERE AN INTERSECTING MEMBER OCCURS AT MID-SPAN, THE JOINT SHALL BE OFFSET TWICE THE WIDTH OF THE INTERSECTING MEMBER. BEFORE FRESH CONCRETE IS POURED AGAINST CONCRETE IN PLACE, THE CONTACT SURFACES OF CONCRETE IN PLACE SHALL BE THOROUGHLY CLEANED AND TREATED WITH BONDING AGENT.

J. CONTRACTOR SHALL COORDINATE WITH ALL RELATED TRADES FOR DETAILING, FABRICATION AND ERECTION PRIOR TO SUBMITTING SHOP DRAWINGS FOR APPROVAL.

K. NO OPENINGS SHALL BE MADE IN STRUCTURAL MEMBERS UNLESS SHOWN ON STRUCTURAL DRAWINGS OF APPROVED BY STRUCTURAL ENGINEER. NO CONDUITS MAY BE PLACED IN CONCRETE SLAB WHICH HAS AN OUTSIDE DIAMETER LARGER THAN ⅓ THE TOTAL SLAB THICKNESS.

L. ALL STRUCTURAL WORK SHALL BE COORDINATED WITH STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING, ETC. REQUIREMENTS. G.C. TO PROVIDE APPROPRIATE NUMBER OF COPIES OF COORDINATED DRAWINGS SHOWING ALL SLEEVES, CONDUIT BOXES, DUCT OPENINGS, ETC. AS REQUIRED FOR ALL TRADES FOR ALL TRADES FOR STRUCTURAL ENGINEERS APPROVAL.

5. STRUCTURAL AND MISCELLANEOUS STEEL

A. ALL STRUCTURAL AND MISCELLANEOUS STEEL SHALL CONFORM TO THE THIRTEENTH EDITION OF THE AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" AND ALL OF IT'S SUPPLEMENTS AND TO THE AISC "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES". STRUCTURAL STEEL DESIGN BASED ON LRFD PROCEDURE.

B. THE STRUCTURAL STEEL ERECTOR WILL BE RESPONSIBLE FOR PROVIDING ADEQUATE TEMPORARY BRACING DURING CONSTRUCTION TO PREVENT COLLAPSE DURING CONSTRUCTION.

C. ALL STRUCTURAL STEEL BEAMS AND COLUMNS SHALL CONFORM TO ASTM A500 OR A501 FY=46 KSI UNLESS NOTED OTHERWISE. ALL ANGLES, CHANNELS AND MISCELLANEOUS STEEL SHALL CONFORM TO ASTM A-36, FY=36 KSI.

D. ALL STEEL PIPE SHALL CONFORM TO ASTM A-501, FY=36KSI OR ASTM A-53 TYPE "E" OR "S" GRADE B, FY=35KSI.

E. ALL WELDED CONNECTIONS SHALL BE DONE WITH E70XX ELECTRODES WITH $\frac{3}{16}$" MINIMUM MATERIAL. ALL BOLTED CONNECTIONS SHALL USE ¾" DIA. ASTM A325N HIGH STRENGTH BOLTS MINIMUM. ALL BEAM CONNECTIONS SHALL DEVELOP THE GREATER SHEAR VALUE OF ONE HALF OF IT'S TOTAL UNIFORM LOAD CAPACITY IN ACCORDANCE WITH THE AISC SPECIFICATIONS FOR FRAMED BEAM CONNECTIONS, TABLE 3-6, OR THE END REACTION LISTED. IF SHOP WELDED, FURNISH IN ACCORDANCE WITH TABLE 10-3. MINIMUM THICKNESS OF CLIP ANGLES OF $\frac{5}{16}$". NO CONNECTIONS SHALL BE MADE USING LESS THAN TWO BOLTS. ALL ANCHOR BOLTS SHALL BE ASTM A-307 U.N.O. ALL CONNECTIONS SHALL BE DEVELOPED BY THE CONTRACTOR UNLESS COMPLETELY DETAILED ON CONTRACT DRAWINGS.

THE STRUCTURAL STEEL FABRICATOR SHALL PROVIDE CERTIFICATION BY A PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF LOUISIANA, THAT THE CONNECTION DESIGN IS IN ACCORDANCE WITH ALL APPLICABLE CODES AND SPECIFICATIONS.

F. END CONNECTIONS OF COMPOSITE FLOOR BEAMS SHALL DEVELOP IN SHEAR, THE END REACTIONS INDICATED ON THE DRAWINGS BY THE STEEL FABRICATOR.

G. SHOP AND FIELD WELDS SHALL BE MADE BY APPROVED CERTIFIED WELDERS AND SHALL CONFORM TO THE AMERICAN WELDING SOCIETY CODE FOR BUILDINGS AWS D1.1. WELDS SHALL DEVELOP THE FULL STRENGTH OF MATERIALS BEING WELDED, UNLESS OTHERWISE NOTED.

H. ALL EXPANSION BOLTS SHALL BE HILTI KWIK BOLT IN EXPANSION ANCHORS, 3" MINIMUM EMBEDMENT LENGTH AS MANUFACTURED BY HILTI OR APPROVED EQUIVALENT, U.N.O. ALL EXPANSION BOLTS SHALL BE SET IN CONCRETE OR 100% SOLID FILLED MASONRY.

I. NO OPENINGS IN BEAMS SHALL BE PERMITTED WITHOUT THE WRITTEN PERMISSION OF THE ENGINEER.

J. THE USE OF A GAS TORCH IN THE FIELD FOR CUTTING HOLES OR FOR CORRECTING FABRICATION ERRORS WILL NOT BE PERMITTED ON STRUCTURAL FRAMING MEMBERS EXCEPT WITH THE WRITTEN APPROVAL OF THE ARCHITECT FOR EACH SPECIFIC CONDITION.

K. STRUCTURAL STEEL NOT REQUIRED TO BE FIREPROOFED SHALL BE SHOP PAINTED WITH AN APPROVED CORROSION RESISTANT PRIMER. STEEL SHALL BE PAINTED IN STRICT ACCORDANCE WITH THE AISC SPECIFICATIONS AND MANUFACTURER'S RECOMMENDATIONS. PRIOR TO PAINTING, ALL STEEL SURFACES SHALL BE PREPARED IN ACCORDANCE WITH SSPC-SP3. ALL PAINTS SHALL BE APPROVED BY THE ENGINEER PRIOR TO THEIR USE.

L. INSPECTION AND TESTING SHALL BE PERFORMED AS REQUIRED BY SPECIFICATIONS.

6. STEEL DECKING: TYPE B DECK GRADE 50 STEEL

A. ALL STEEL DECKING SHALL BE DESIGNED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST EDITION OF THE "SPECIFICATION OF THE STEEL DECK INSTITUTE". ALL DECKING SHALL BE THREE SPAN CONTINUOUS.

B - 36[20] 1½ DEEP - 36" WIDE
STRUCTURAL PROPERTIES
a. SPECIFIC GRAVITY 1.2
b. TENSILE STRENGTH: 45ksi
c. TENSILE MODULUS: 0.229 IN^3/FT
d. FLEXURAL STRENGTH 50 KSI ASTM 653-SS W/GALVANIZED COATING
e. SECTION MODULUS 0.213 IN^3
f. GAGE 20

FASTEN ALL DECK ROOF TO FRAMING WITH POINT FASTENING Zim HEX SCREWS IN 36/5 PATTERN WITH NARROW PROFILE CAPS FOR SIDELAPS.

B. PROVIDE STEEL HEADER FRAMES FOR SUPPORT OF DECKING FOR ALL OPENINGS GREATER THAN 10" SQUARE.

C. PROVIDE STEEL LEDGER ANGLES AT STEEL COLUMNS AS REQUIRED FOR THE SUPPORT OF THE DECKING.

D. BRIDGING: DIAGONAL

E. PANEL ENDS BUTTED OR 2" MIN. END LAPPED.

F. WELDING: 5/8" VISIBLE DIAMETER ARC SPOT WELD OR #10 SCREWS IN 36/5 PATTERN.

ELEVATION NOTES:

1.) FINISHED FLOOR (F.F.) ELEVATION OF FILTER BUILDING, ELECTRICAL ROOM AND STAIR LANDING IS 26.00 FEET N.A.V.D. 88 DATUM.

2.) BUILDING T.O.C. AND T.O.S. ELEVATIONS SHOWN ON SHEETS S-005 THROUGH S-010 REFER TO LOCAL F.F. REFERENCE DATUM. CONVERT TO N.A.V.D. 88 DATUM AS FOLLOWS:
N.A.V.D. 88 ELEVATION = LOCAL REFERENCE EL. +12.00 FEET.

PRE-ENGINEERED METAL BUILDING WITH LOUISIANA PROFESSIONAL ENGINEER STAMP IS ACCEPTABLE PROVIDED THE DESIGN CONFORMS TO THE GENERAL NOTES ON THIS SHEET.

7. CMU BLOCK CONSTRUCTION

MORTAR TYPE: MORS FOR SEISMIC CATEGORY _____.

MODULUS OF RUPTURE FOR MORTAR TYPE MORS SHALL BE:
200 PSI FOR BED JOINTS IN RUNNING BOND

NORMAL TO BED: 100 PSI
NET COMPRESSIVE STRENGTH (MASONRY): 2,150 PSI

COMPRESSIVE VERIFICATION FOR LABORATORY PREPARED MORTAR:
M_2500 PSI
WATER RETENTION 75%
AIR CONTENT 12%

GROUT: COARSE
PART OF VOLUME OF PORTLAND CEMENT: 1
HYDRATED LIME: 0-1/10, AGGREGATE IN LOOSE CONDITION
STRENGTH: 5000 PSI
2.5 TO 3 TIMES THE SUM OF VOLUME OF THE CEMENTITIOUS MATERIALS

WIDTH OF UNIT	FACE SHELL THICKNESS	WEB MINIMUM
8 INCH	1 ¼ INCH	1 INCH

PORTLAND CEMENT: ASTM C150-529
QUICK LIME: ASTM C5
AGGREGATES: ASTM C144
WATER: ASTM C270-05
ADMIXTURES: AGENTS FOR AIR ENTRAINMENT, WATER RETENTION OR WORKABILITY, ADMIXTURES CONTAINING CHLORIDES ARE NOT ALLOWED.

8. ALUMINUM SIDING

a.) PREPAINTED ALUMINUM (22 GUAGE) INSTALLED ON Z PURLINS WITH APPLIED SIDE LAP SEALANT. SHEET STEEL (GALVANIZED G90 COATING) ALUMINUM - ZINC COATED TO [AZ55].

b.) WALL INSULATION [ASTM C665] SEMI RIGID GLASS FIBER TYPE FACED WITH REINFORCED FOIL [UL FLAME SPREAD CLASSIFICATION OF 25, WHERE EXPOSED , THERMAL RESISTANCE 20R.

STATE OF LOUISIANA
MADHAV M. KARKI
LIC. NO. 41428
REGISTERED
PROFESSIONAL ENGINEER
07/15/24
CIVIL ENGINEERING

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

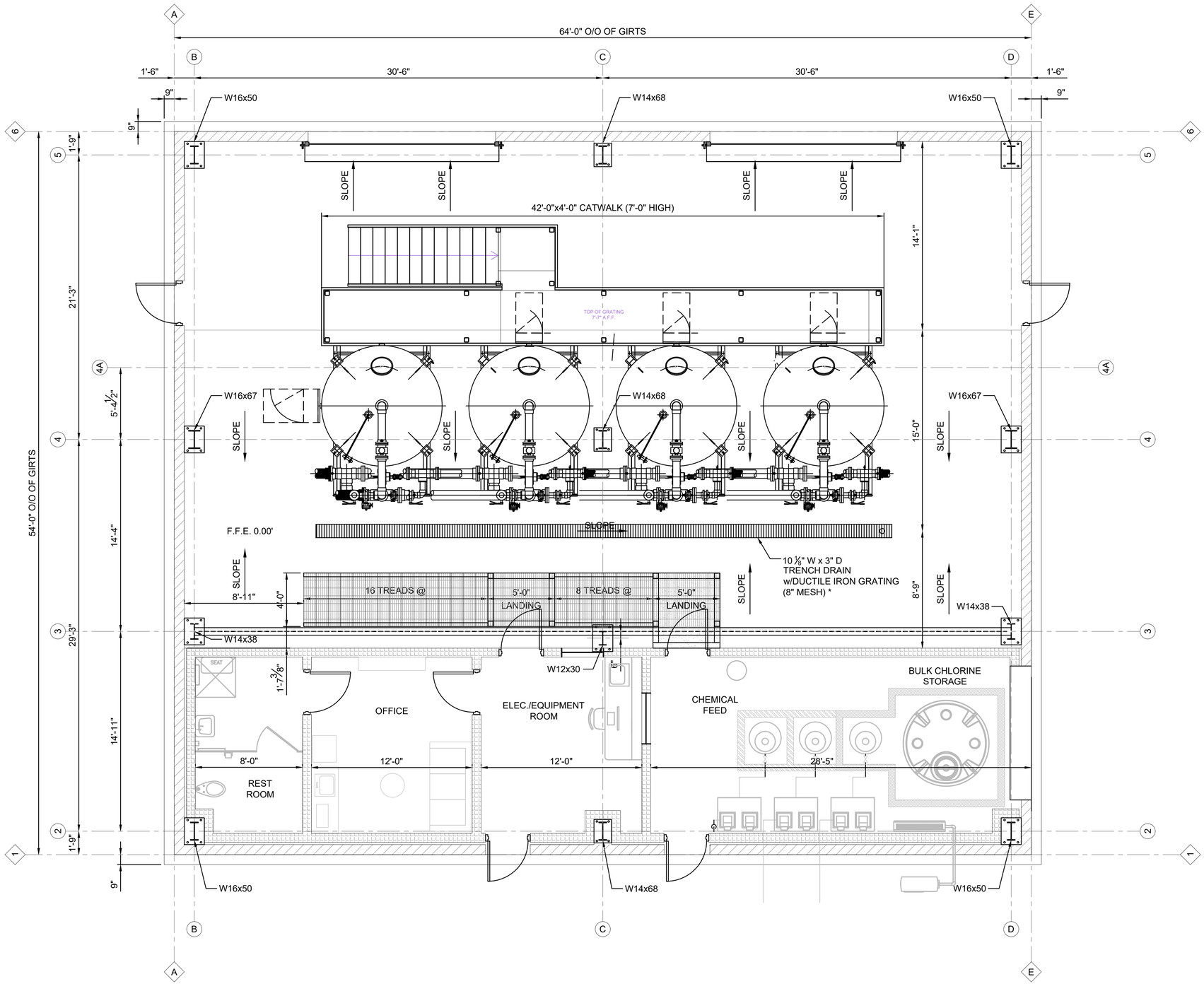
DESIGNED BY: MK
DRAWN BY: PF
CHECKED BY: MH
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
7/15/24

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

GENERAL NOTES

SHEET NO.
S-001
SHEET 37 OF 92



FOUNDATION PLAN

SCALE: 1/4"=1'-0"

* VODALAND OR APPROVED EQUAL

MADAN M. KARKI
LIC. NO. 44706
PROFESSIONAL ENGINEER
07/15/24
CIVIL ENGINEERING

MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FOUNDATION PLAN

SHEET NO.
S-002
SHEET 38 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\S-002 - Diversified_Foundation Plan.dwg - 7/15/2024 4:08 PM
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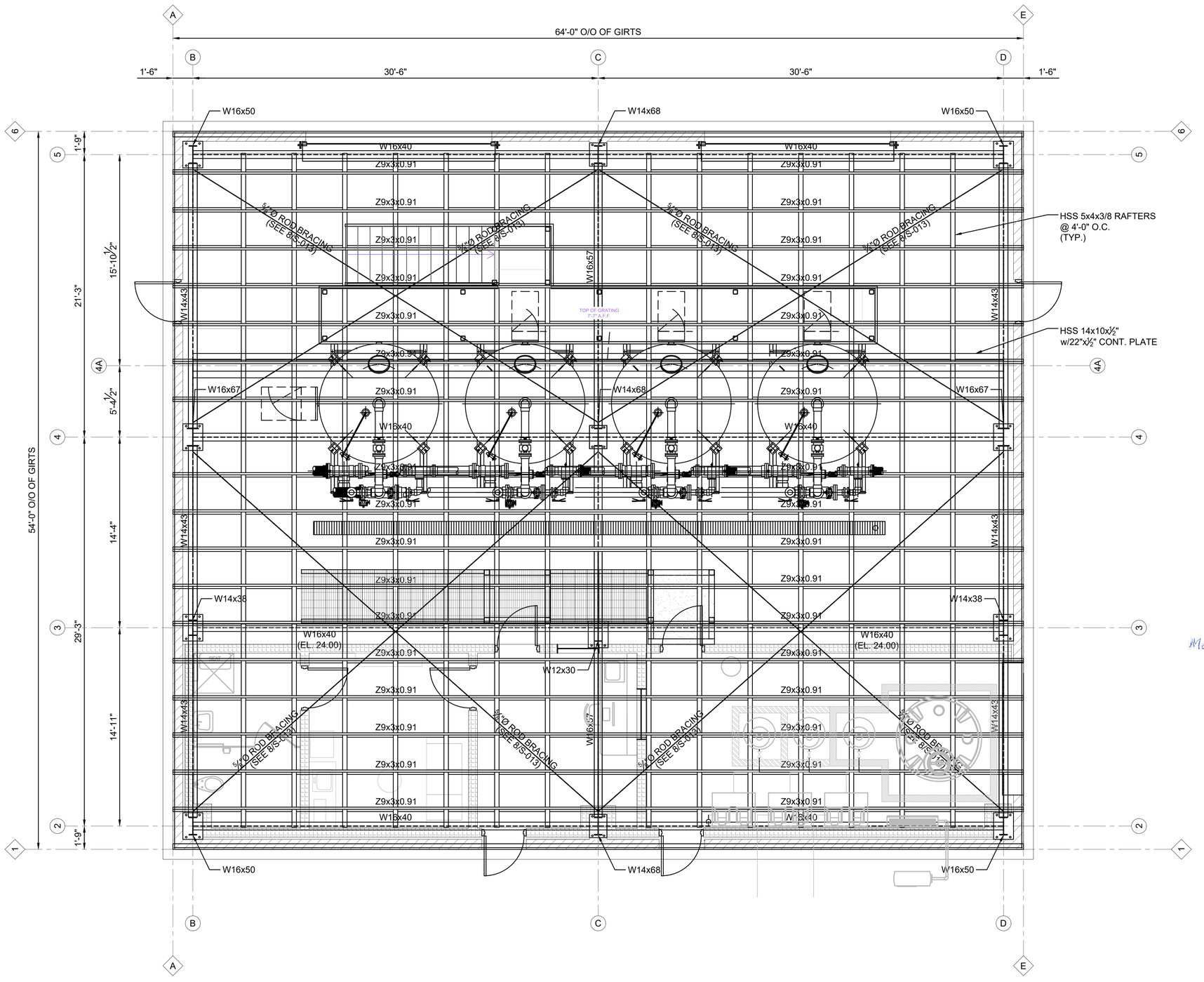

ROOF FRAMING PLAN
SCALE: 1/4"=1'-0"

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ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

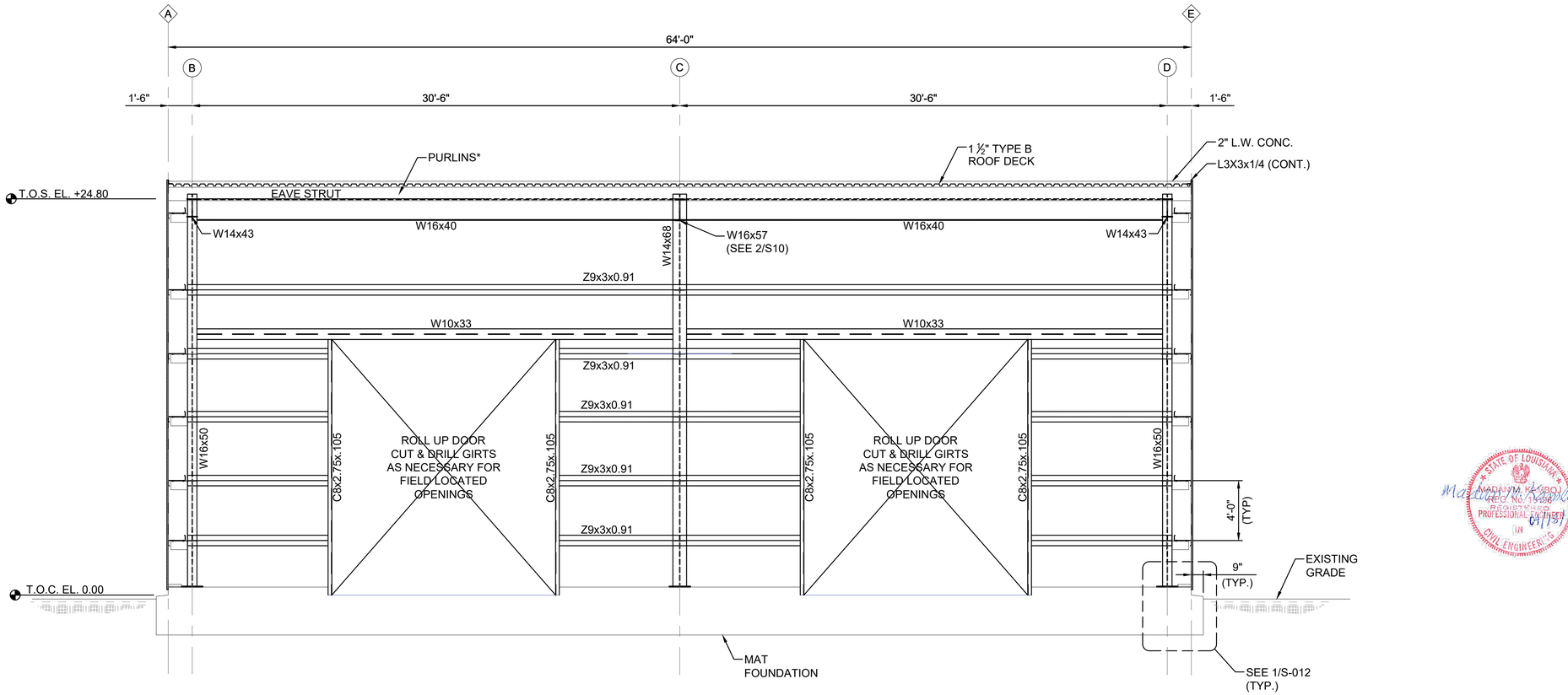
STATE OF LOUISIANA
MATTHEW P. HAIN
License No. 44796
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
7/15/24

STATE OF LOUISIANA
MADALYN M. KABOU
REGISTERED
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
07/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

ROOF FRAMING PLAN

SHEET NO.
S-003
SHEET 39 OF 92



NORTH ELEVATION

SCALE: 1/4" = 1'-0"

* PURLINS - Z9x3x0.91
** RAFTERS - HSS5x4x3/8 WELDED TO PURLINS

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	1/4" = 1'-0"

STATE OF LOUISIANA
MADHAVA K. KAVURI
REG. No. 41206
REGISTERED
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
07/15/24

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
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7/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

STRUCTURAL BUILDING ELEVATION

SHEET NO.
S-005
SHEET 40 OF 92

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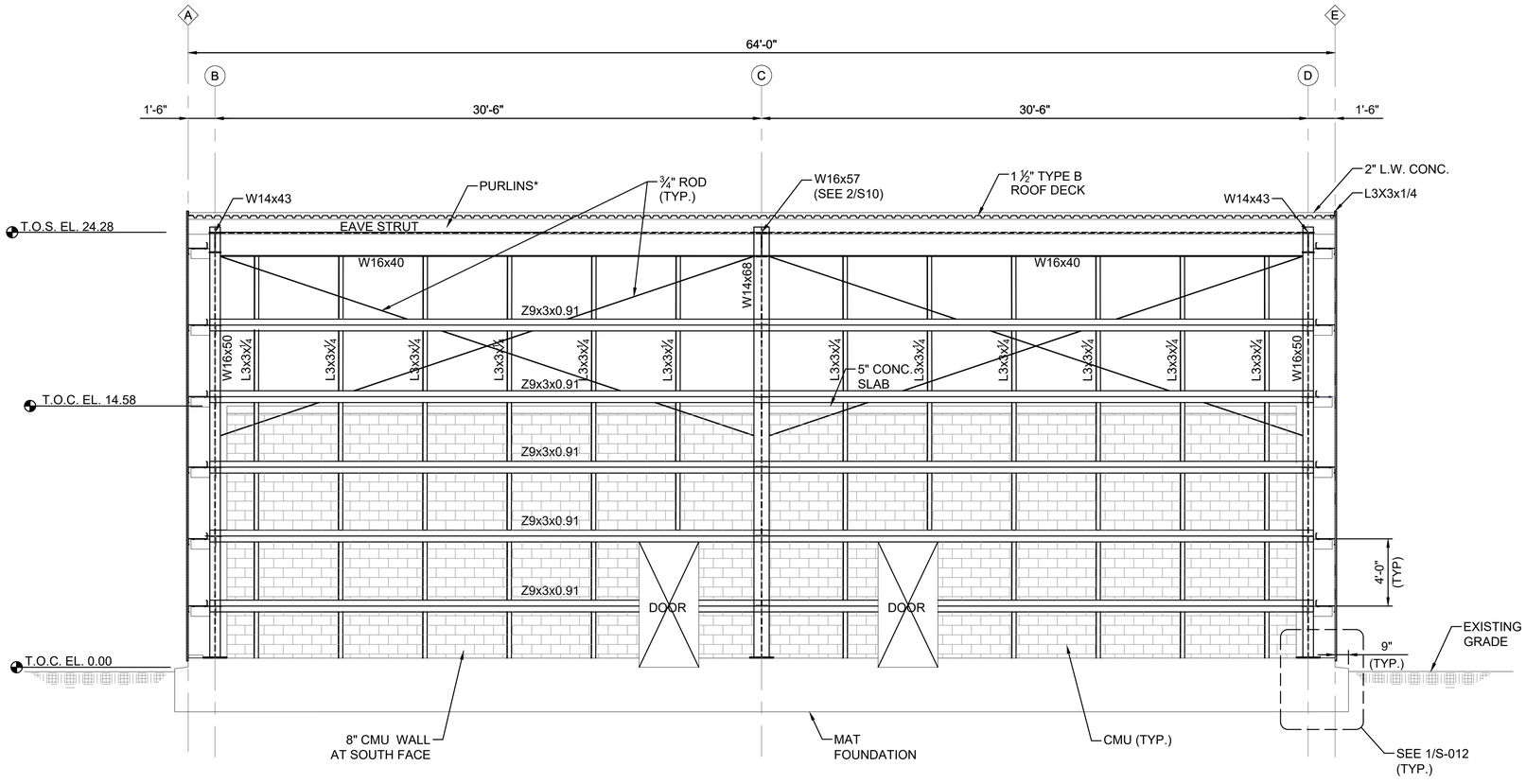

SOUTH ELEVATION

SCALE: 1/4"=1'-0"

* PURLINS - Z9x3x0.91
** RAFTERS - HSS5x4x3/8 WELDED TO PURLINS

STATE OF LOUISIANA
MADHAV M. KAPOOR
LIC. NO. 34208
REGISTERED
PROFESSIONAL ENGINEER
04/19/24
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STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH
GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	1/4" = 1'-0"

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

STRUCTURAL BUILDING ELEVATION

SHEET NO.
S-006
SHEET 41 OF 92

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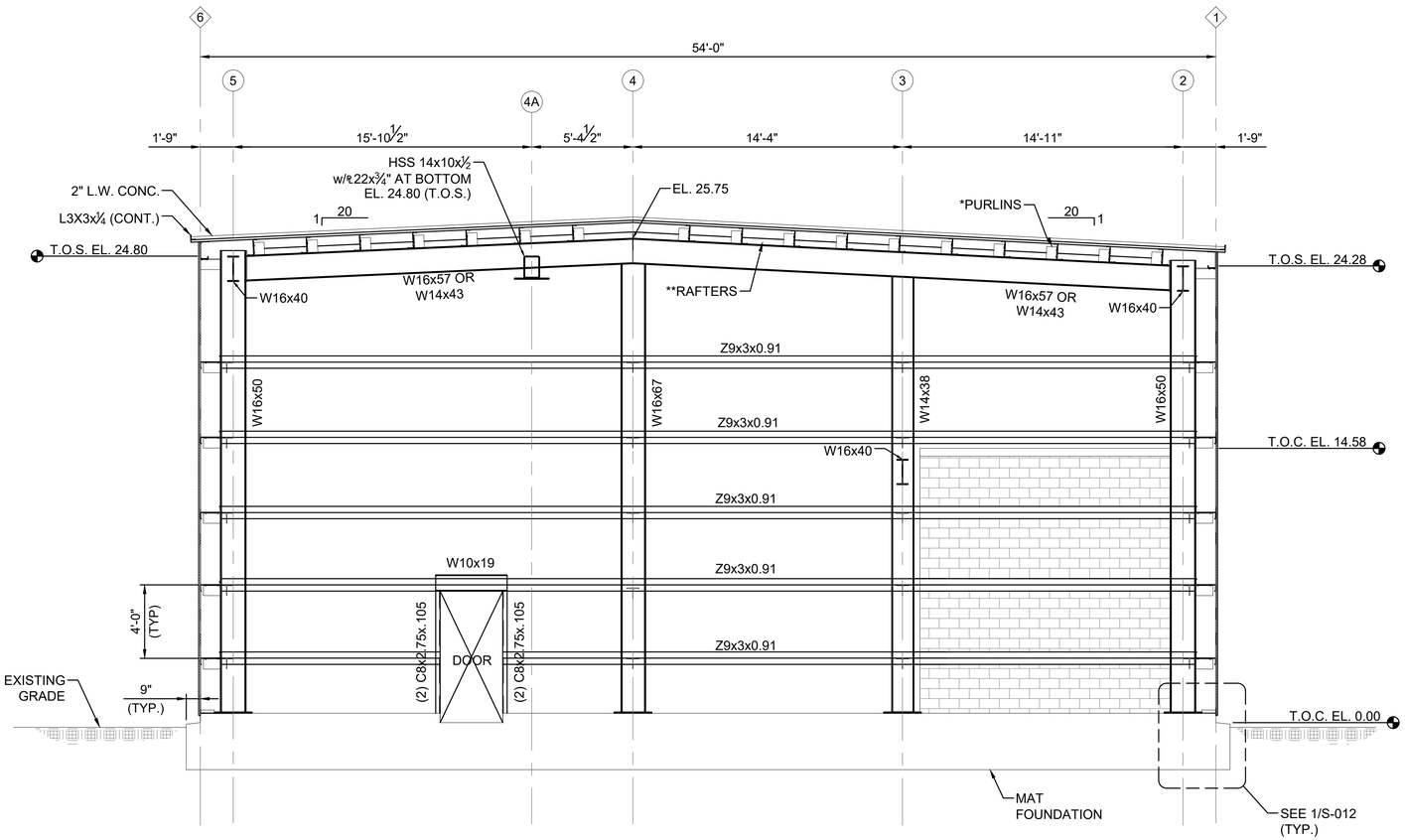

WEST ELEVATION

SCALE: 1/4"=1'-0"

* PURLINS - Z9x3x0.91
** RAFTERS - HSS5x4x3/8 WELDED TO PURLINS

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	1/4" = 1'-0"

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

STATE OF LOUISIANA
REG. No. 44796
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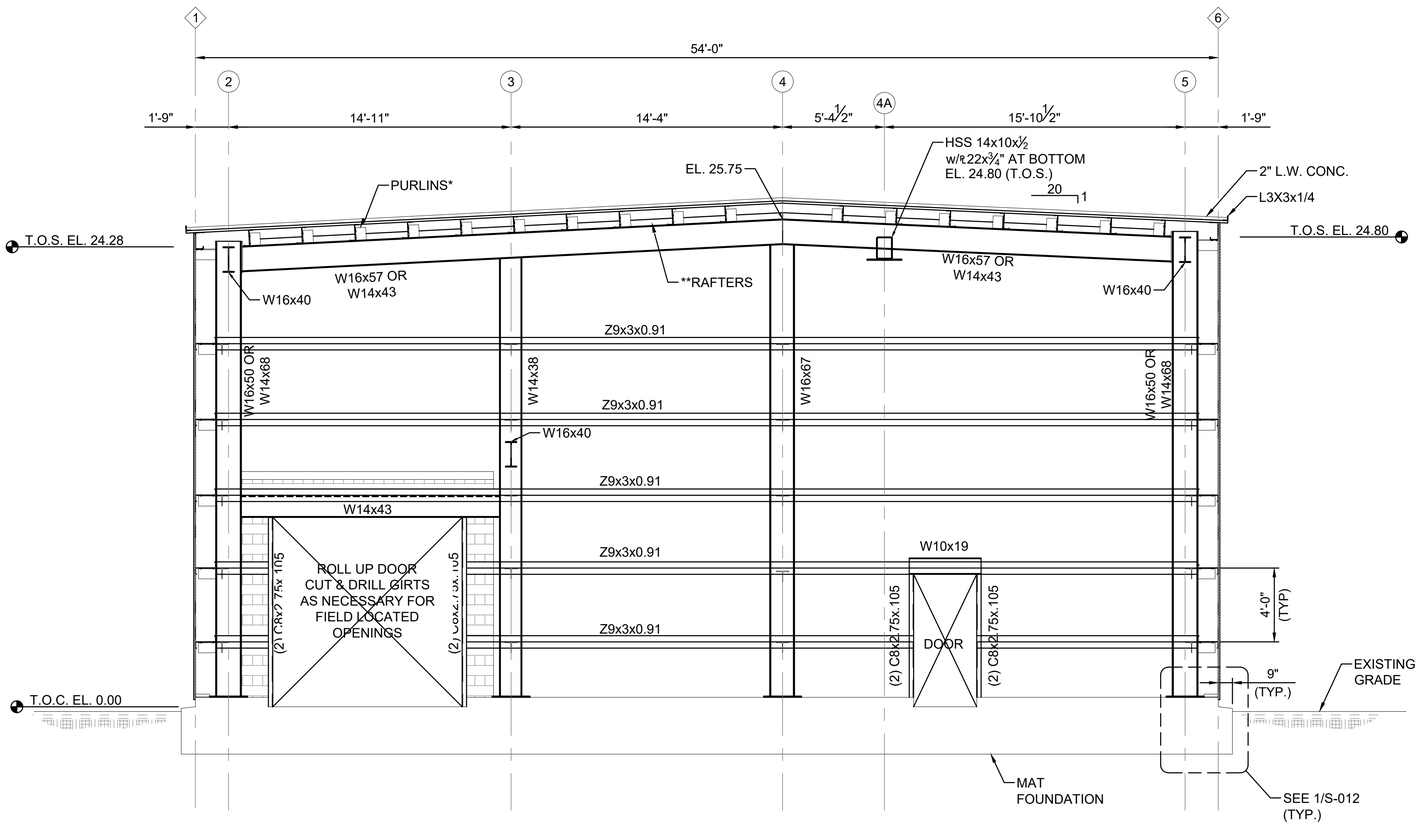
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

STRUCTURAL BUILDING ELEVATION

SHEET NO.
S-007
SHEET 42 OF 92



EAST ELEVATION

SCALE: 1/4"=1'-0"

* PURLINS - Z9x3x0.91
** RAFTERS - HSS5x4x3/8 WELDED TO PURLINS

MADISON K. KABOU
REG. No. 41438
PROJECT STAFF
PROFESSIONAL ENGINEER
IN
07/15/24

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH
GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE: 1/4" = 1'-0"

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

STRUCTURAL BUILDING ELEVATION

SHEET NO.
S-008
SHEET 43 OF 92

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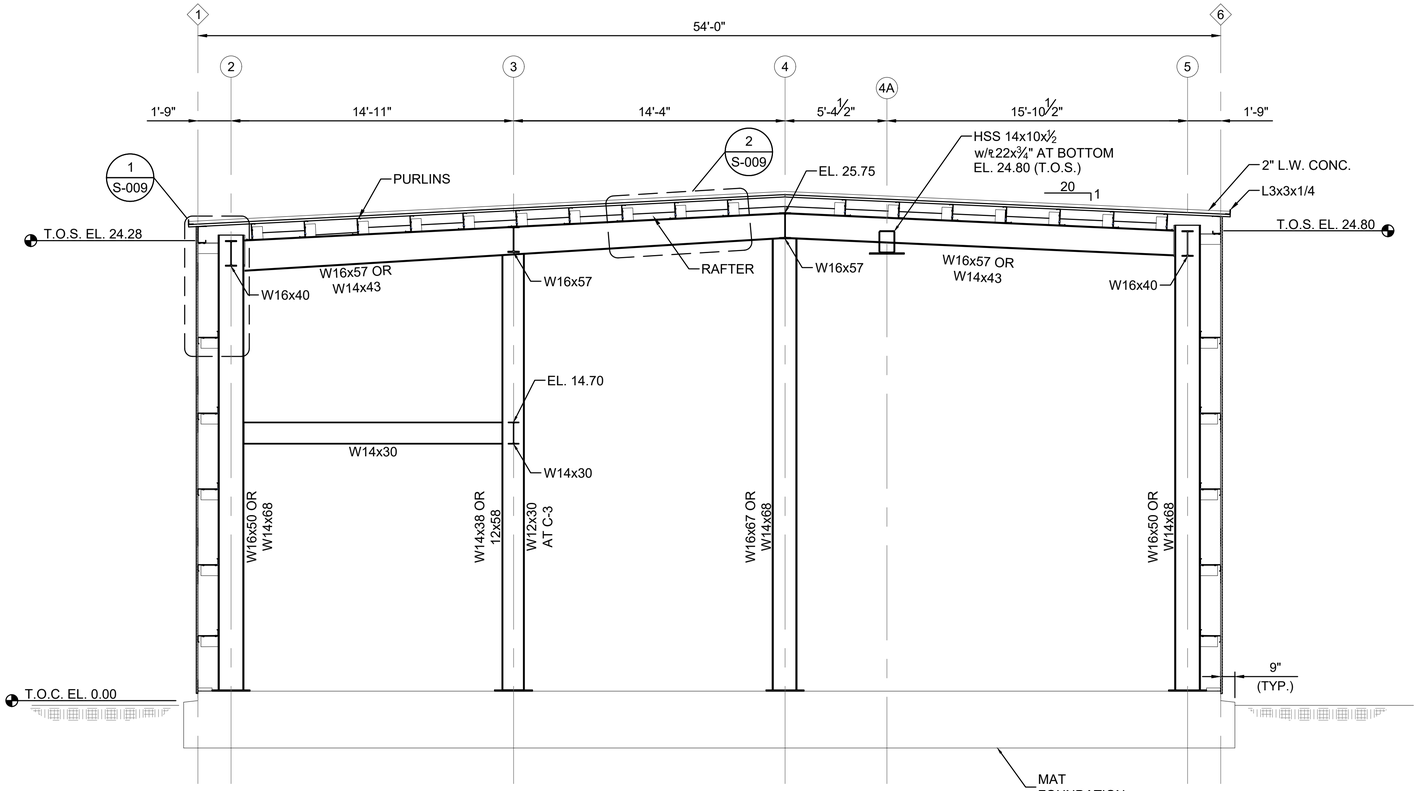
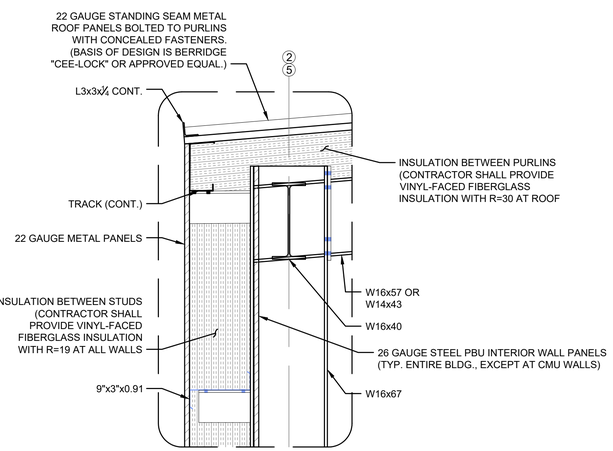
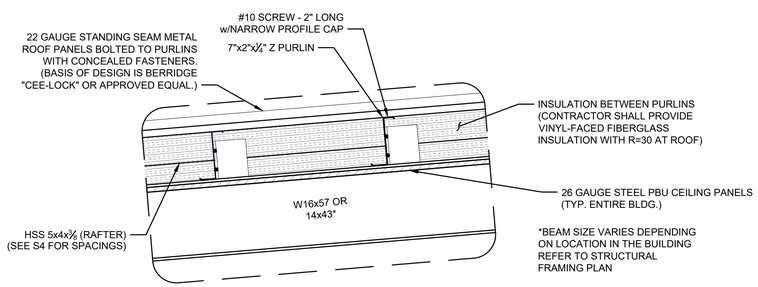


B S-009 **BUILDING FRAMING SECTION (AT COL. B)**
SCALE: 1/4"=1'-0"



1 S-009 **DETAIL**
SCALE: 3/4"=1'-0"



2 S-009 **TYPICAL ROOF DETAIL**
SCALE: 3/4"=1'-0"

STATE OF LOUISIANA
MADHVM KARBOJ
Reg. No. 41916
REGISTERED PROFESSIONAL ENGINEER
07/31/24
CIVIL ENGINEERING

STATE OF LOUISIANA
MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
7/15/24
CIVIL ENGINEERING

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

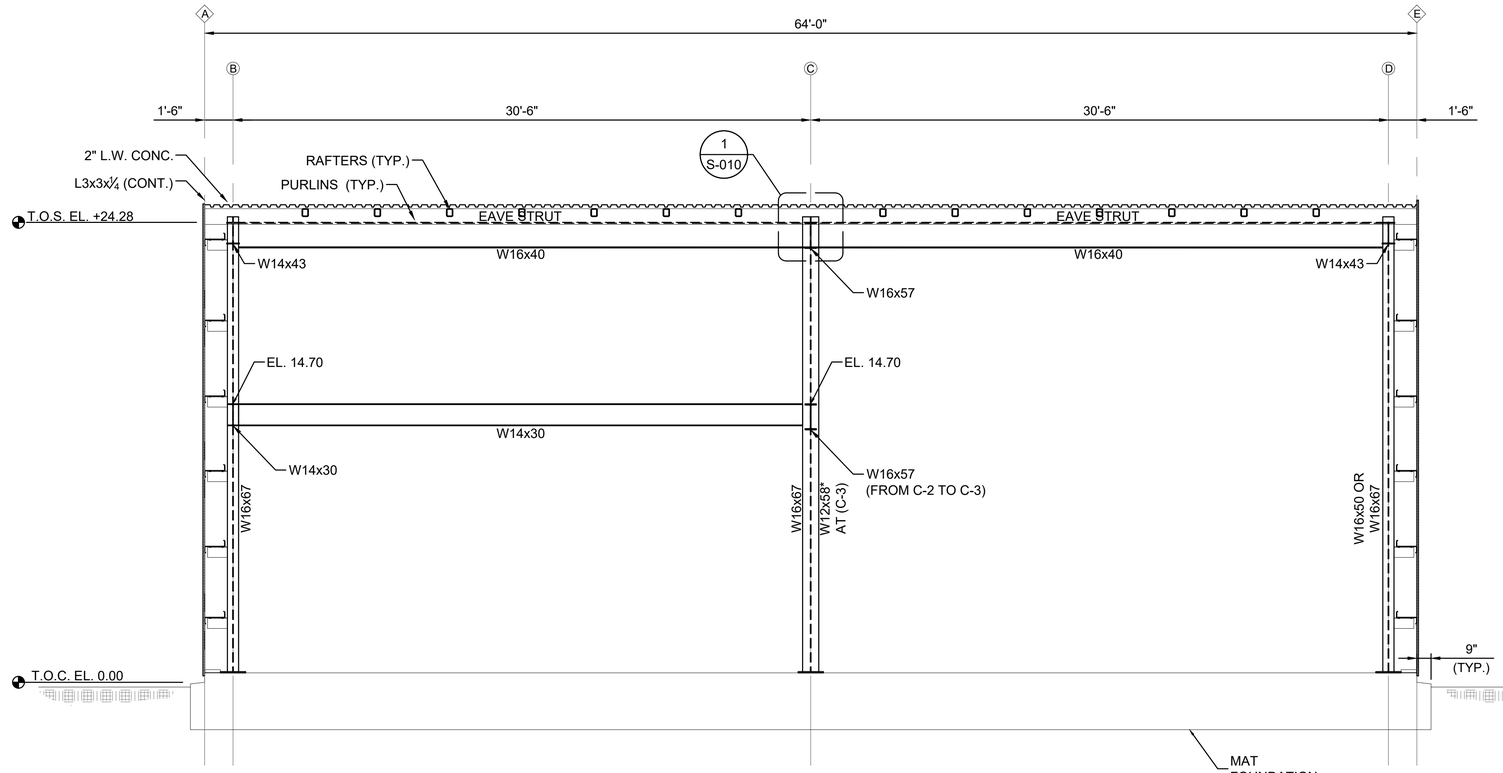
DESIGNED BY:	MK
DRAWN BY:	PF
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	1/4" = 1'-0"

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

STRUCTURAL BUILDING SECTION

SHEET NO.
S-009
SHEET 43 OF 92

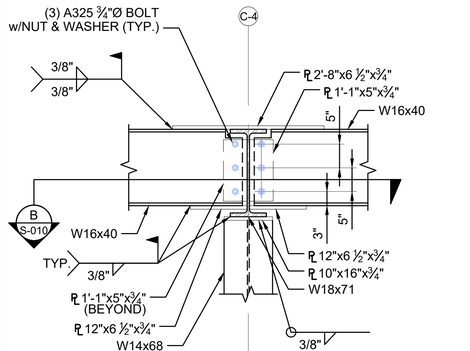
DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\S-009-S-010 - Diversified_Structural Building Sections.dwg - 7/15/2024 4:14 PM User: Phil Plot Date: Mon Jul-15-2024 - 05:36PM



LONGITUDINAL BUILDING SECTION (AT COL. 2)

A / S-010

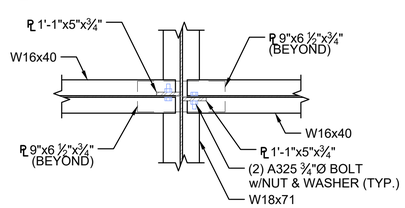
SCALE: 1/4"=1'-0"



DETAIL - BEAM CONNECTION @ W16x57 & W16x40

1 / S-010

SCALE: 3/4"=1'-0"



SECTION - BEAM CONNECTION W16x57 & W16x40

B / S-010

SCALE: 3/4"=1'-0"

* TO ELEVATION 11.33 ONLY.

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\S-009-S-010 - Diversified_Structural Building Sections.dwg - 7/15/2024 6:37 PM

Plot Date: Mon Jul-15-2024 - 06:41PM

User: Phil

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

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DRAWN BY:	PF
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	1/4" = 1'-0"

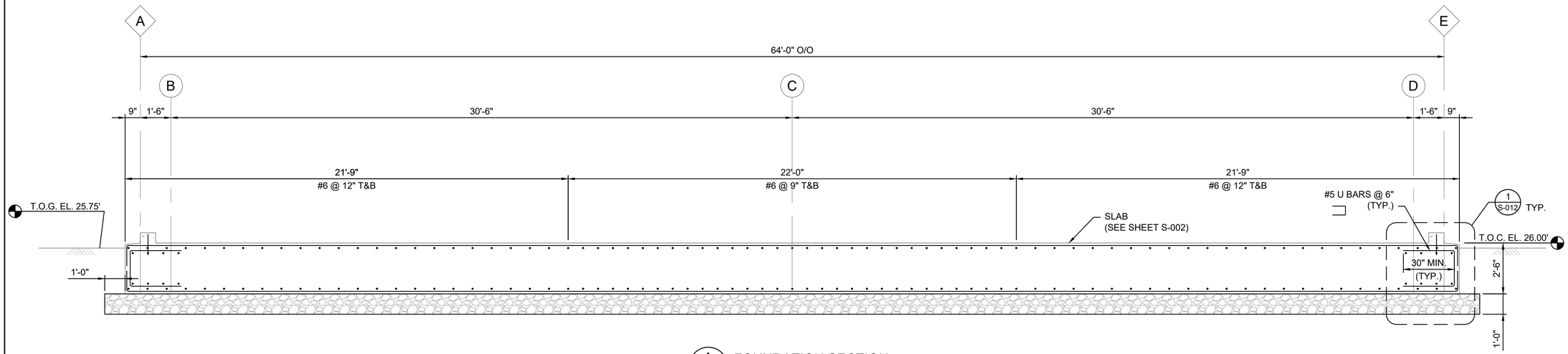
STATE OF LOUISIANA
MADAVIA M. HARRIS
BBEC No. 47994
REGISTERED
PROFESSIONAL
CIVIL ENGINEER
7/15/24

STATE OF LOUISIANA
MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

STRUCTURAL BUILDING SECTION

SHEET NO.
S-010
SHEET 45 OF 92



A S-011 FOUNDATION SECTION

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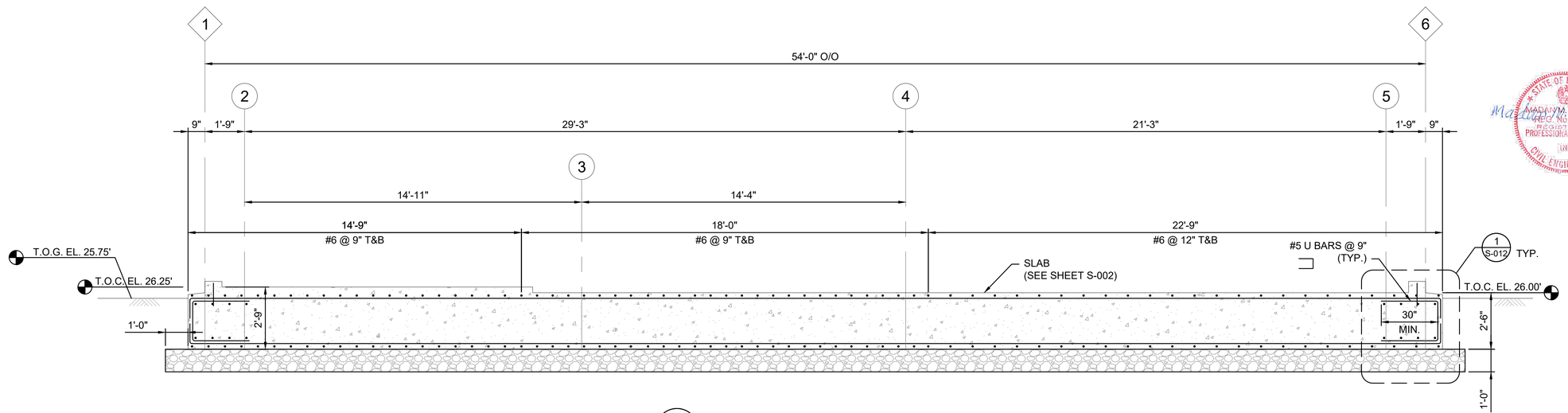


B S-011 FOUNDATION SECTION

SCALE: 3/8"=1'-0"

MADHAVI M. KAMBOJ
REG. No. 41286
REGISTERED
PROFESSIONAL ENGINEER
04/15/24
IN
CIVIL ENGINEERING

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

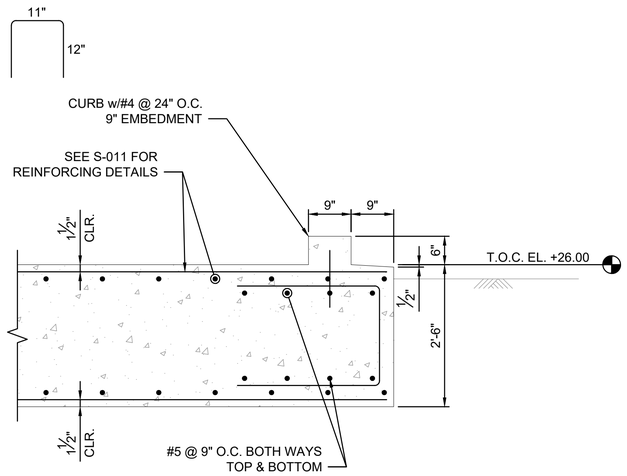
DESIGNED BY:	MK
DRAWN BY:	PF
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

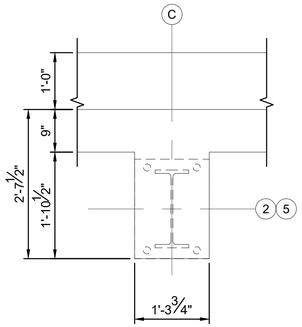
FOUNDATION SECTIONS

SHEET NO.
S-011
SHEET 46 OF 92

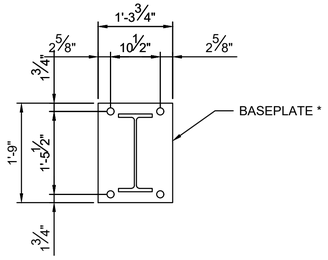
DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\S-011 - Diversified_Foundation Sections.dwg - 7/15/2024 4:17 PM User: Phil Plot Date: Mon Jul-15-2024 - 05:37PM



1 S-012 **TYPICAL BEAM AT CONCRETE MAT**
SCALE: 3/4"=1'-0"

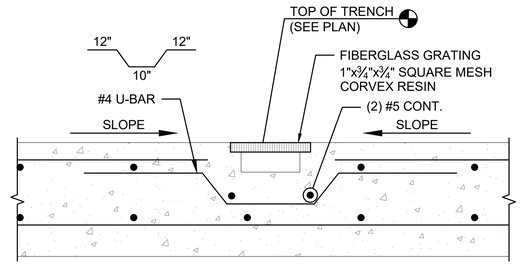


3 S-012 **W14x68 PEDESTAL**
SCALE: 3/4"=1'-0"

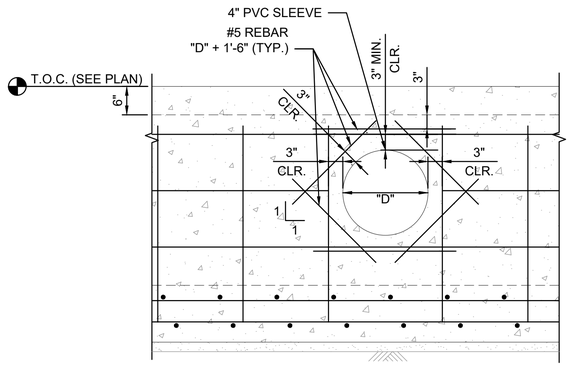


4 S-012 **W14x68 BASEPLATE DETAIL ***
SCALE: 3/4"=1'-0"

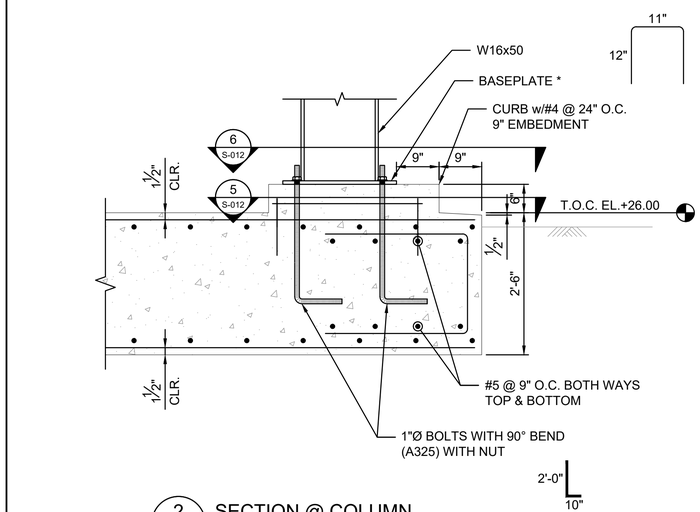
* ALL BASE PLATES 1" - GRADE FY: 50 KSI



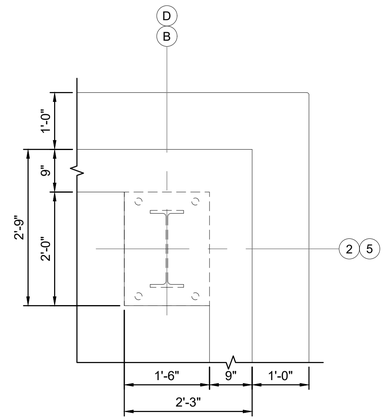
7 S-012 **TRENCH DETAIL**
SCALE: 1 1/2"=1'-0"



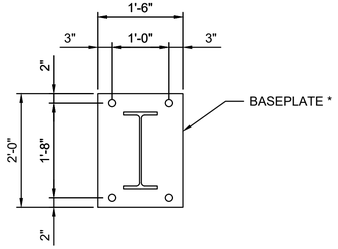
8 S-012 **TYPICAL GRADE BEAM PIPE SLEEVE (WHERE REQ'D)**
SCALE: 3/4"=1'-0"



2 S-012 **SECTION @ COLUMN**
SCALE: 3/4"=1'-0"

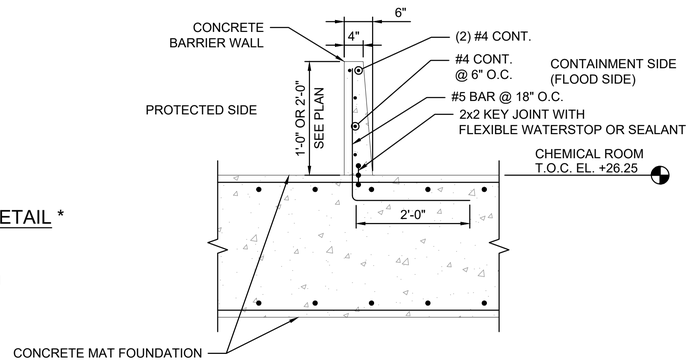


5 S-012 **W16x50 CORNER PEDESTAL**
SCALE: 3/4"=1'-0"



6 S-012 **W16x50 BASEPLATE DETAIL ***
SCALE: 3/4"=1'-0"

* ALL BASE PLATES 1" - GRADE FY: 50 KSI



9 S-012 **SECTION - TYPICAL CONCRETE CONTAINMENT DIKE**
SCALE: 3/4"=1'-0"

STATE OF LOUISIANA
MADHYM KAMBOJ
LIC. No. 41498
PROFESSIONAL ENGINEER
07/15/24
CIVIL ENGINEERING

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
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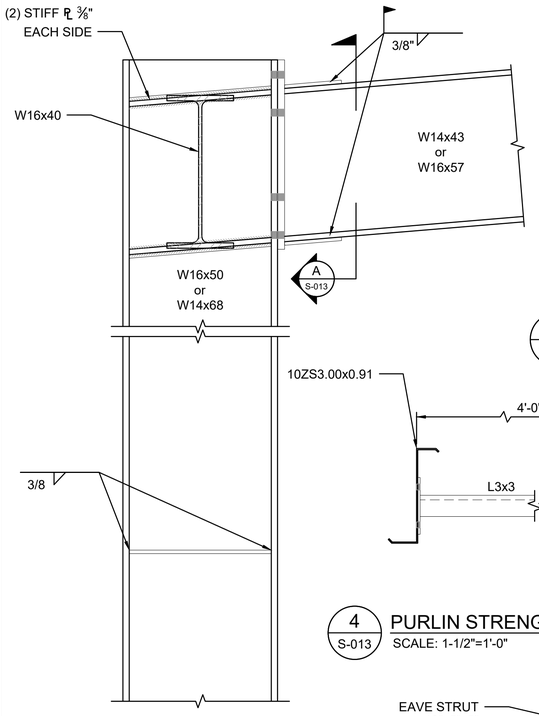
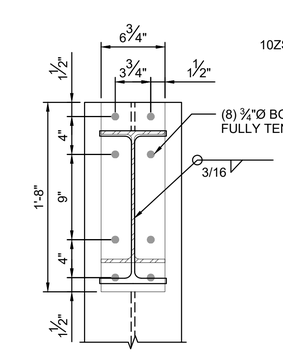
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FOUNDATION DETAILS

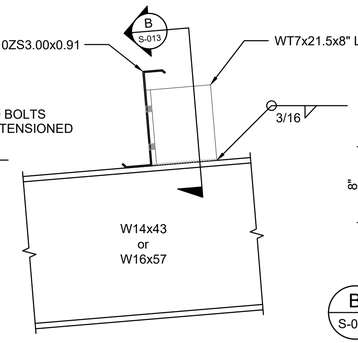
SHEET NO.
S-012
SHEET 47 OF 92



1 S-013 CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"

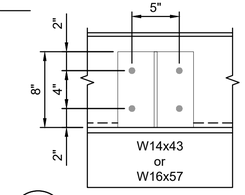


A S-013 SECTION
SCALE: 1-1/2"=1'-0"

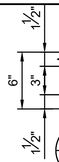


NOTE: LAP Z PURLINS 1'-0" OVER INTERIOR SUPPORT.

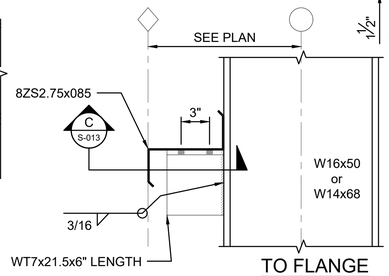
2 S-013 PURLIN CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



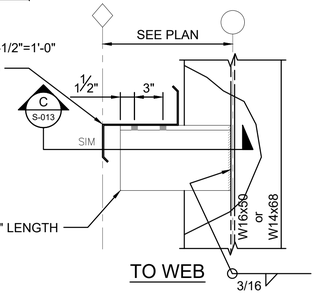
B S-013 SECTION
SCALE: 1-1/2"=1'-0"



3 S-013 PLAN
SCALE: 1-1/2"=1'-0"

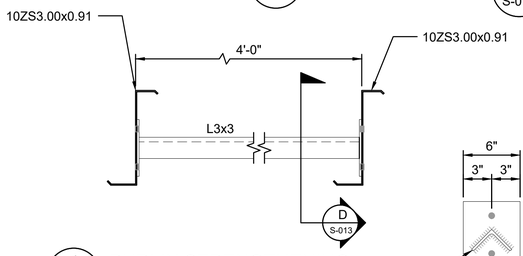


TO FLANGE



TO WEB

3 S-013 GIRT CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



4 S-013 PURLIN STRENGTHENING
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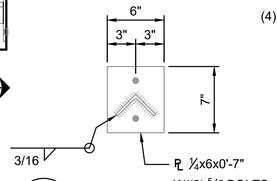
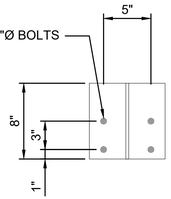
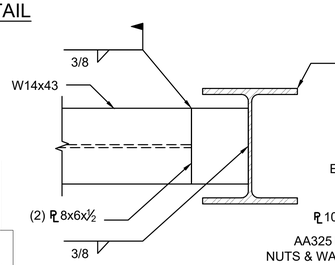


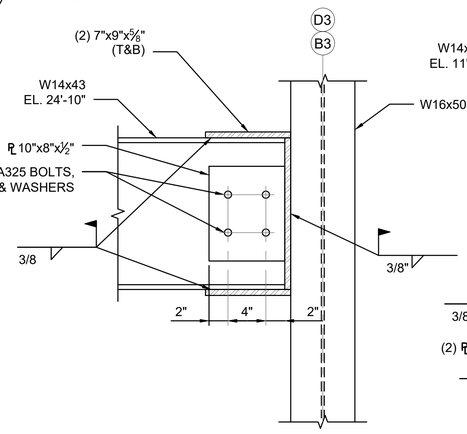
D S-013 SECTION
SCALE: 1-1/2"=1'-0"



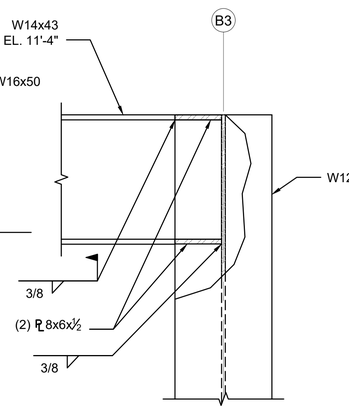
E S-013 SECTION
SCALE: 1-1/2"=1'-0"



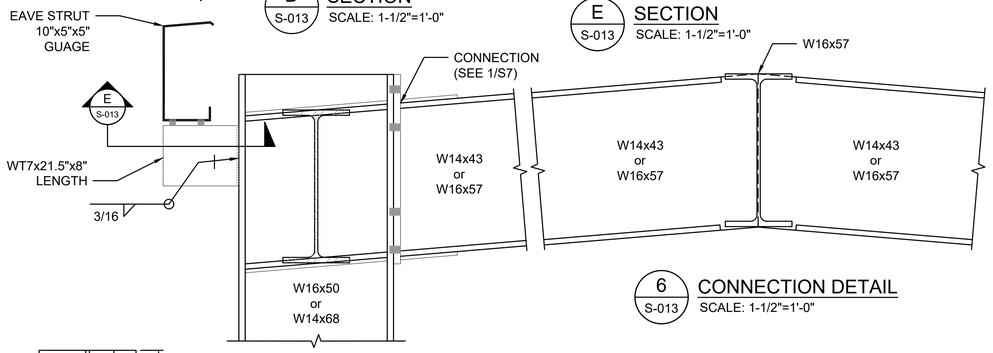
12 S-013 CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



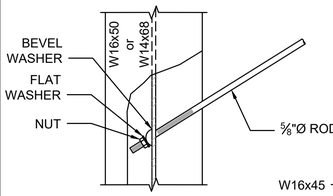
13 S-013 CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



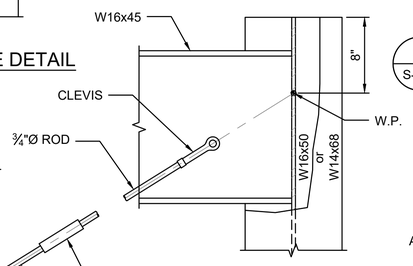
14 S-013 CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



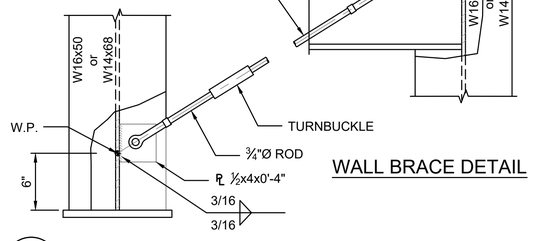
6 S-013 CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



ROOF BRACE DETAIL



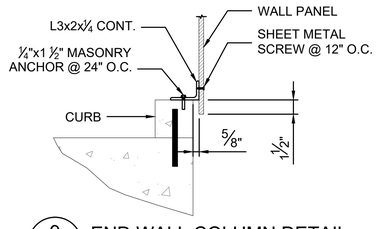
5 S-013 EAVE STRUT CONNECTION DETAIL
SCALE: 1-1/2"=1'-0"



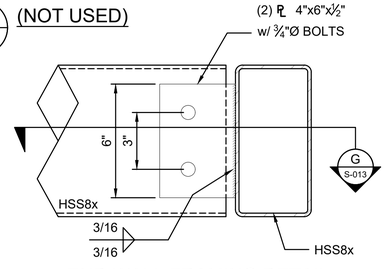
WALL BRACE DETAIL

8 S-013 ROD BRACE DETAIL
SCALE: 1-1/2"=1'-0"

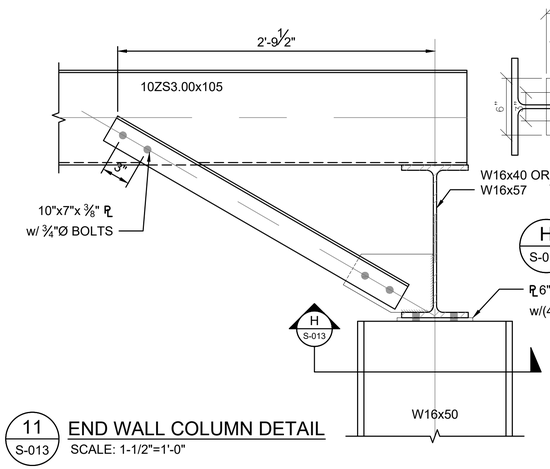
G S-013 (NOT USED)



9 S-013 END WALL COLUMN DETAIL
SCALE: 1-1/2"=1'-0"



10 S-013 END WALL FRAMING DETAIL AT OVERHEAD DOOR
SCALE: 1-1/2"=1'-0"



H S-013 SECTION
SCALE: 1-1/2"=1'-0"

11 S-013 END WALL COLUMN DETAIL
SCALE: 1-1/2"=1'-0"

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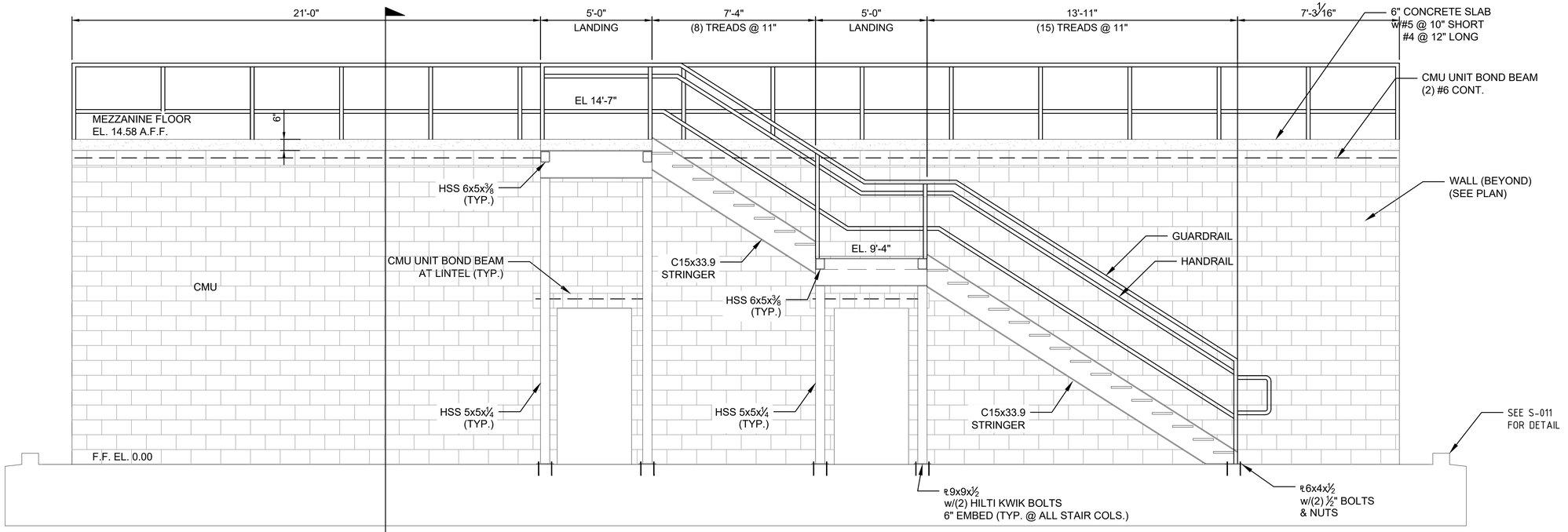
STATE OF LOUISIANA
MATTHEW P. MAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

CONNECTION DETAILS

STATE OF LOUISIANA
MADHAV M. KHADKA
License No. 41428
REGISTERED PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

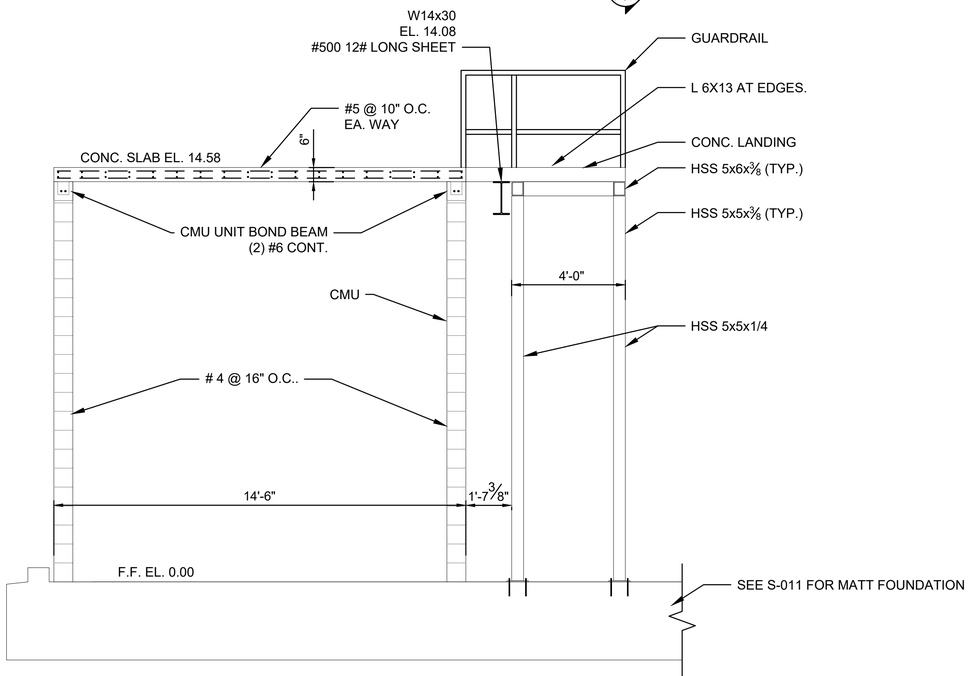
SHEET NO.
S-013
SHEET 48 OF 92



A S-014

CMU NORTH WALL ELEVATION (LOOKING SOUTH) AND STAIR DETAIL

SCALE: 3/8" = 1'-0"



A S-014

TYPICAL SECTION TITLE

SCALE: 3/8"=1'-0"

* ONE ON EACH SIDE OF STAIRS.

8" CMU

NOTES:
1. ALL CMU BLOCKS TO BE GROUT FILLED (THIS AREA), FOR CHEMICAL FEED & BULK CONCRETE CHAMBERS.

2. ALTERNATE BLOCK FILLED IN REST OF OFFICE/EQUIPMENTS ROOM AREAS.

ST. TAMMANY PARISH GOVERNMENT

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STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

STATE OF LOUISIANA
MADISYN K. ROBOTHAM
REG. No. 41428
REGISTERED PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
07/15/2024

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
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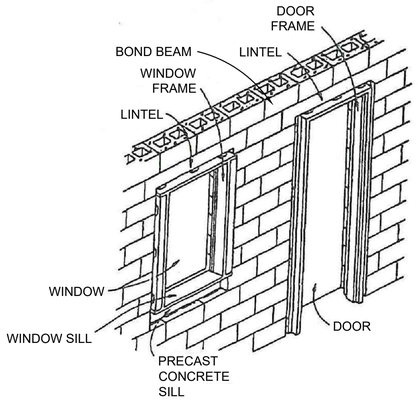
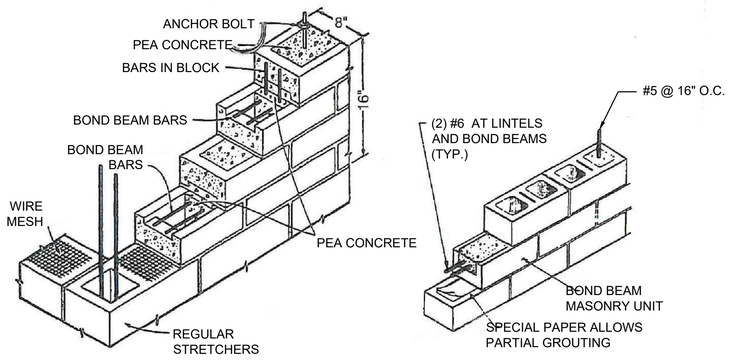
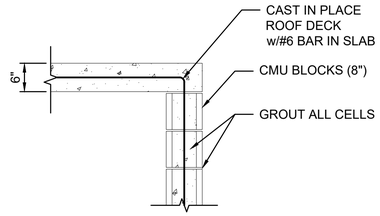
CMU WALL NORTH ELEVATION

SHEET NO.
S-014
SHEET 49 OF 90

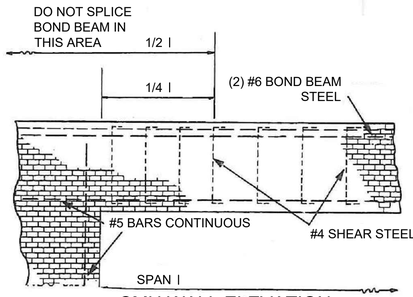




BOND BEAM DETAILS
SCALE: NONE

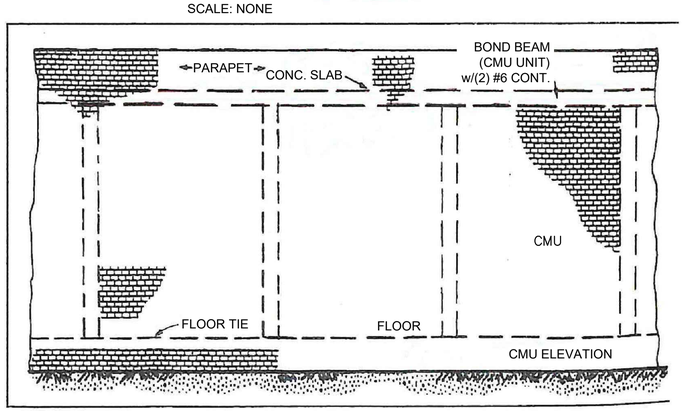


A S-014 EXTERIOR/INTERIOR CMU WALL AT SLAB
SCALE: 1"=1'-0"

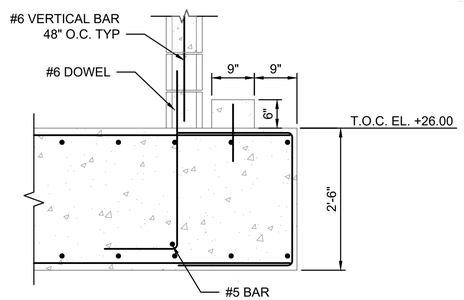


l = CLEAR LENGTH TO NEXT DOOR

CMU WALL ELEVATION
SCALE: NONE



*8" CMU, ALL GROUT FILLED UNLESS OTHERWISE NOTED ON THE PLANS.



B S-014 CMU AT MAT
SCALE: 1"=1'-0"

NOTES:
1. ALL CMU BLOCKS TO BE GROUT FILLED (THIS AREA), FOR CHEMICAL FEED & BULK CONCRETE CHAMBERS.

2. ALTERNATE BLOCK FILLED IN REST OF OFFICE/EQUIPMENTS ROOM AREAS.

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MATTHEW P. RAHN License No. 44796 PROFESSIONAL ENGINEER 7/15/24 CIVIL ENGINEERING

DIVERSIFIED WATER WELL
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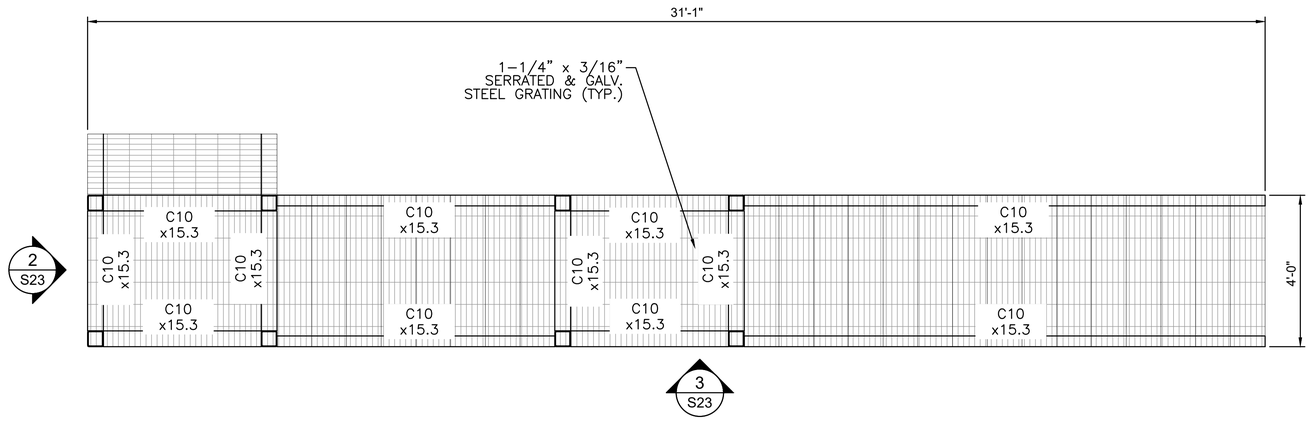
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

CMU DETAILS

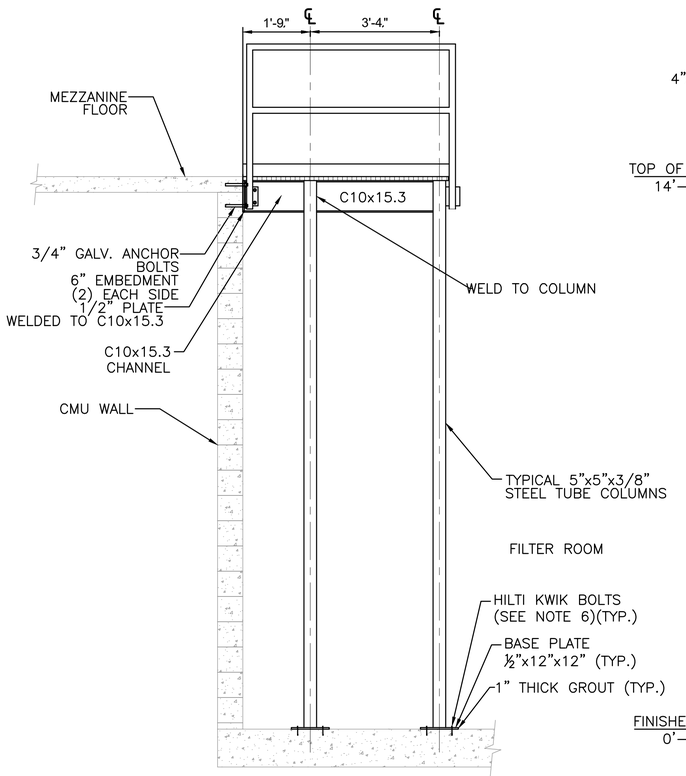
SHEET NO.
S-015
SHEET 50 OF 90

STRUCTURAL PLATFORM GENERAL NOTES

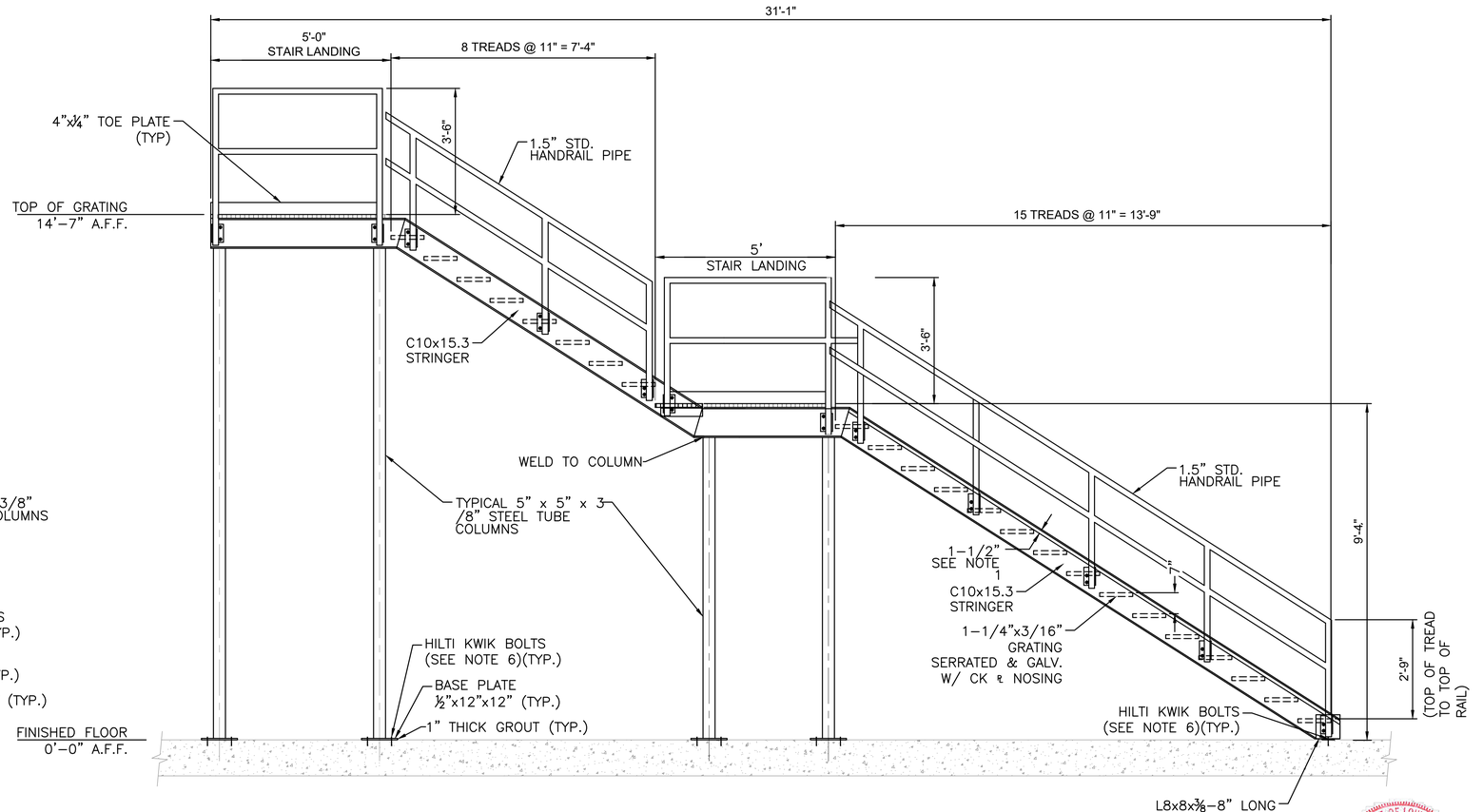
1. FIELD VERIFY ALL DIMENSIONS AND PROCESS SHOP DRAWINGS BEFORE FABRICATION.
2. ALL STEEL CONSTRUCTION TO BE HOT DIPPED GALVANIZED.
3. ALL GRATING SHALL BE 1 ¼" X $\frac{3}{16}$" SERRATED & GALVANIZED. PROVIDE HOLD CLIPS AS PER MANUFACTURER'S SPECIFICATION WITH A MINIMUM OF 4–CLIPS PER SECTION.
4. STEEL FABRICATION & ERECTION SHALL BE PER AISC MANUAL OF STEEL CONSTRUCTION, 14TH EDITION.
5. ALL WELDING SHALL BE PER AMERICAN WELDING SOCIETY D1.1.
6. ALL ANCHOR BOLTS TO BE ¾–INCH GALVANIZED WITH HILTI HIT –HY 200 SAFE SET SYSTEM OR APPROVED EQUAL.
7. ALL STAIR TREADS TO BE GRATING 1 ¼" X $\frac{3}{16}$" SERRATED, GALVANIZED WITH CK PLATE NOSING.
8. ALL HANDRAIL SHALL BE GALVANIZED 1 ½" STANDARD PIPE (1.90 OD) WITH ¼" X 4" TOE PLATE.



1 S-016 **PLAN - FILTER MAINTENANCE PLATFORM**
SCALE: 1/2"=1'-0"



2 S-016 **EAST ELEVATION - STAIRS TO MEZZANINE**
SCALE: 1/2"=1'-0"



3 S-016 **ELEVATION - STAIRS TO MEZZANINE**
SCALE: 1/2"=1'-0"

NOTE 1: PROVIDE 1–1/2" FROM FORWARD EDGE OF TREAD TO TOP OF C10x15.3 STRINGER.

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MK
DRAWN BY: PW
CHECKED BY: MH
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE: AS NOTED

MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

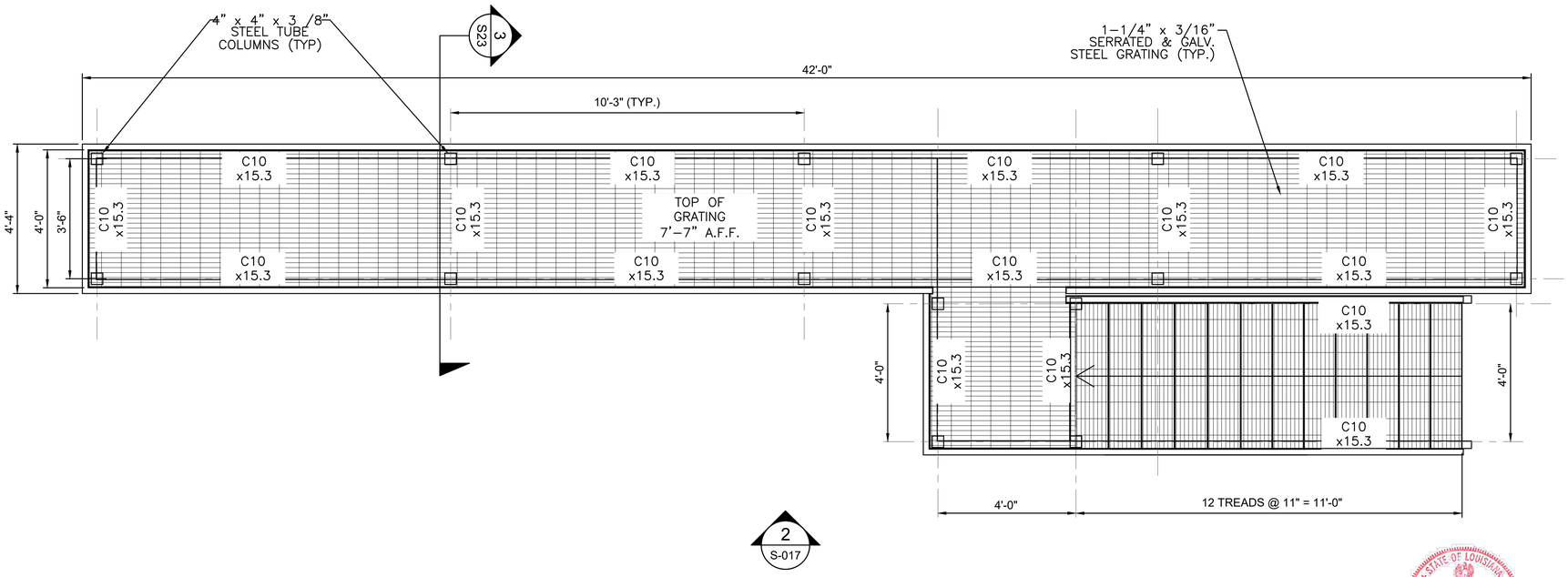
STAIR PLAN AND ELEVATION

MADELYN M. KABOLI
LICENSE No. 41808
REGISTERED PROFESSIONAL ENGINEER
07/18/2024
CIVIL ENGINEERING

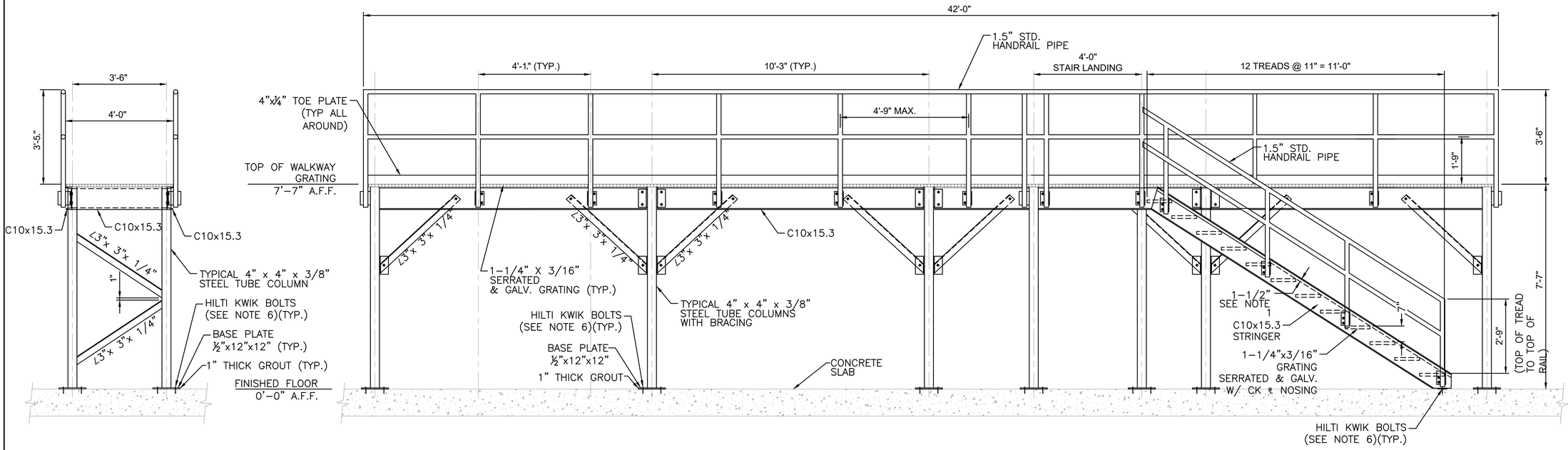
SHEET NO.
S–016
SHEET 51 OF 92

STRUCTURAL PLATFORM GENERAL NOTES

1. FIELD VERIFY ALL DIMENSIONS AND PROCESS SHOP DRAWINGS BEFORE FABRICATION.
2. ALL STEEL CONSTRUCTION TO BE HOT DIPPED GALVANIZED.
3. ALL GRATING SHALL BE 1 ¼" X 3/16" SERRATED & GALVANIZED. PROVIDE HOLD CLIPS AS PER MANUFACTURER'S SPECIFICATION WITH A MINIMUM OF 4–CLIPS PER SECTION.
4. STEEL FABRICATION & ERECTION SHALL BE PER AISC MANUAL OF STEEL CONSTRUCTION, 14TH EDITION.
5. ALL WELDING SHALL BE PER AMERICAN WELDING SOCIETY D1.1.
6. ALL ANCHOR BOLTS TO BE ¾–INCH GALVANIZED WITH HILTI HIT –HY 200 SAFE SET SYSTEM OR APPROVED EQUAL.
7. ALL STAIR TREADS TO BE GRATING 1 ¼" X 3/16" SERRATED, GALVANIZED WITH CK PLATE NOSING.
8. ALL HANDRAIL SHALL BE GALVANIZED 1 ½" STANDARD PIPE (1.90 OD) WITH ¼" X 4" TOE PLATE.



1 S-017 PLAN - FILTER MAINTENANCE PLATFORM
SCALE: 1/2"=1'-0"



3 S-017 SECTION - FILTER MAINTENANCE PLATFORM
SCALE: 1/2"=1'-0"

2 S-017 ELEVATION - FILTER MAINTENANCE PLATFORM
SCALE: 1/2"=1'-0"

NOTE 1: PROVIDE 1–1/2" FROM FORWARD EDGE OF TREAD TO TOP OF C10x15.3 STRINGER.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MK
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SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA — MADHYM KHRO — No. 41428 — REGISTERED PROFESSIONAL ENGINEER — CIVIL ENGINEERING — 04/15/2024

STATE OF LOUISIANA — MATTHEW P. HAHN — License No. 44796 — PROFESSIONAL ENGINEER — CIVIL ENGINEERING — 7/15/24

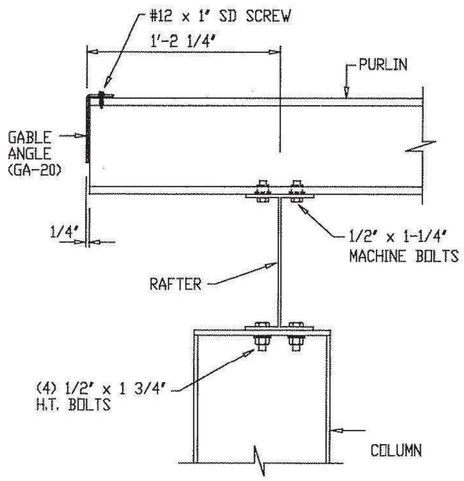
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

SHEET NO.
S–017
SHEET 52 OF 92

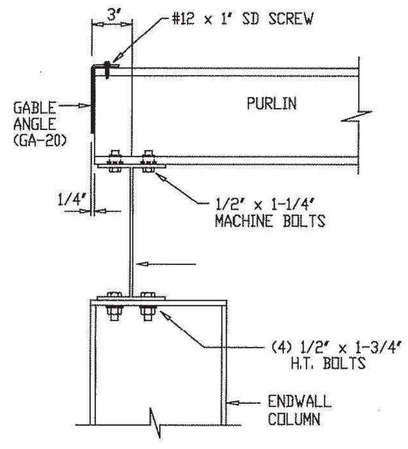
END FRAME DETAILS

(BUILT-UP)

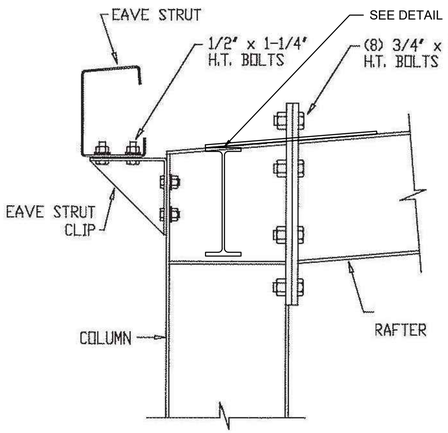
PAGE NO.: S-1-3



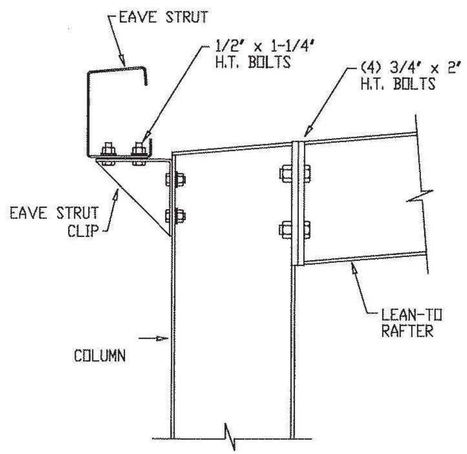
PURLIN TO RAFTER (BY-PASS GIRTS) S-1-3A



PURLIN TO RAFTER (FLUSH GIRTS) S-1-3B



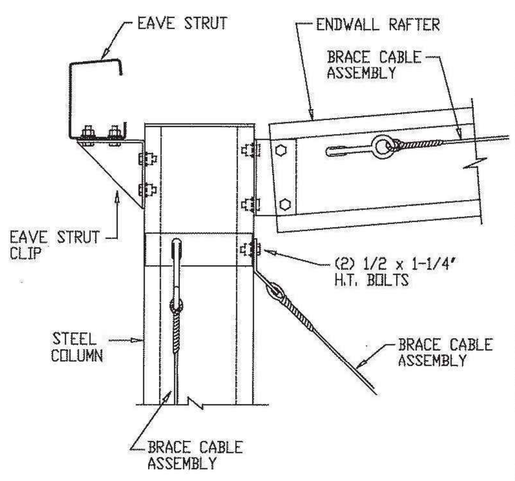
CORNER COLUMN TO RAFTER S-1-3C



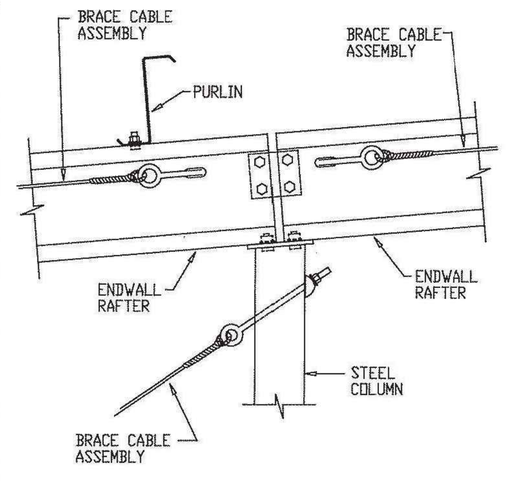
LEAN-TO COLUMN TO RAFTER S-1-3D

BRACING SYSTEM DETAILS

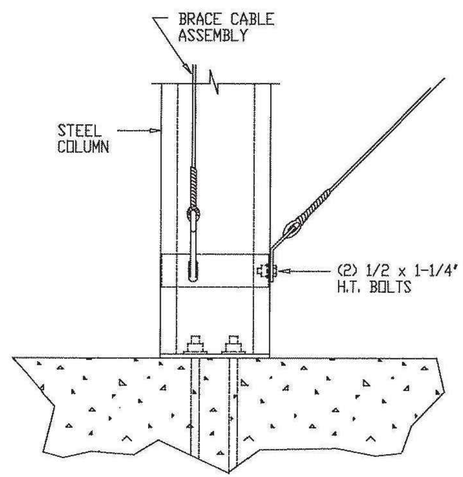
(BRACE CABLES AT COLD FORMED END FRAME)



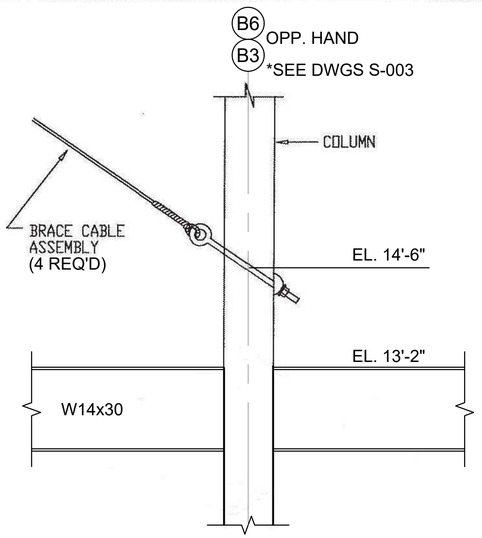
CORNER COLUMN AT RAFTER



ENDWALL COLUMN AT MANDREL BEAM



CORNER COLUMN AT BASE



ENDWALL COLUMN AT BASE

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

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PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

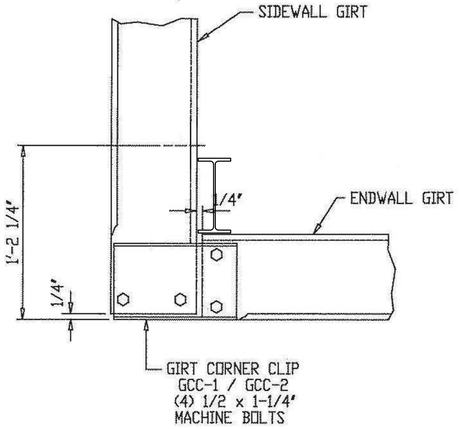
TYPICAL STRUCTURAL DETAILS

SHEET NO.
S-018
SHEET 53 OF 92

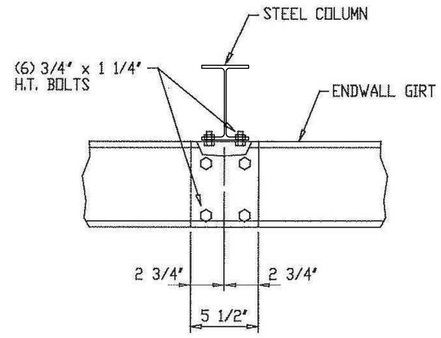
STATE OF LOUISIANA
MARIANNE K. BRO
REGISTERED PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
07/15/24

PURLIN AND GIRT CONNECTIONS (BY-PASS)

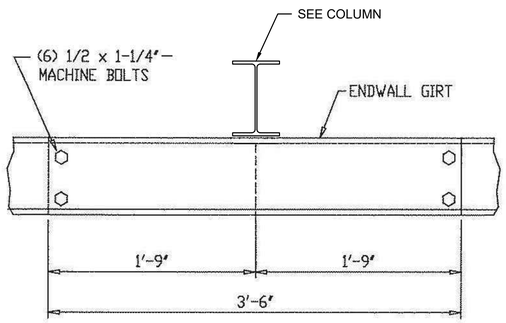
PAGE NO.: S-3-2



AT CORNER COLUMN — S-3-2A



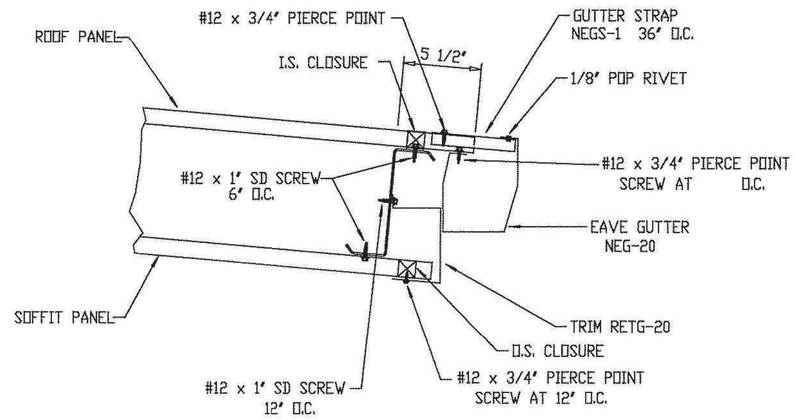
SHORT LAP AT ENDWALL COLUMN — S-3-2B



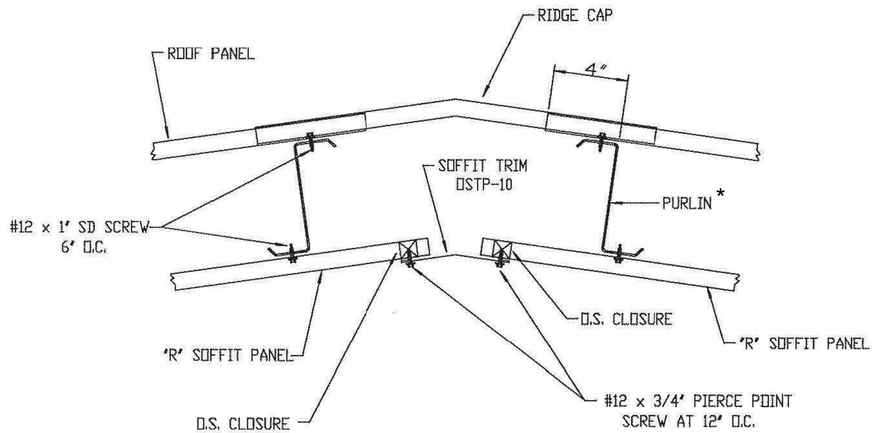
LONG LAP AT ENDWALL COLUMN — S-3-2C

ROOF EXTENSION & CANOPY DETAILS (SHEETING AND TRIM)

PAGE NO.: S-7-2



ENDWALL ROOF EXTENSION AT EAVE — S-7-2A



* Z9x3x0.91

ENDWALL ROOF EXTENSION AT RIDGE — S-7-2B

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA — MATTHEW P. HAHN — License No. 44796 — PROFESSIONAL ENGINEER — 7/15/24 — CIVIL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

TYPICAL STRUCTURAL DETAILS

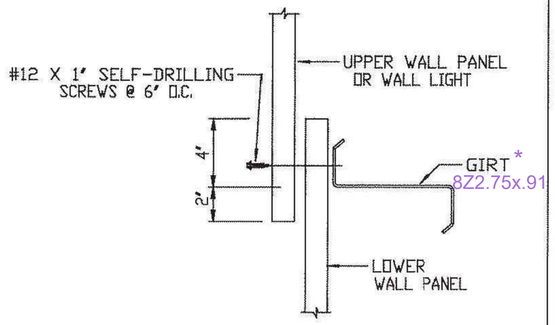
SHEET NO.
S-019
SHEET 54 OF 92

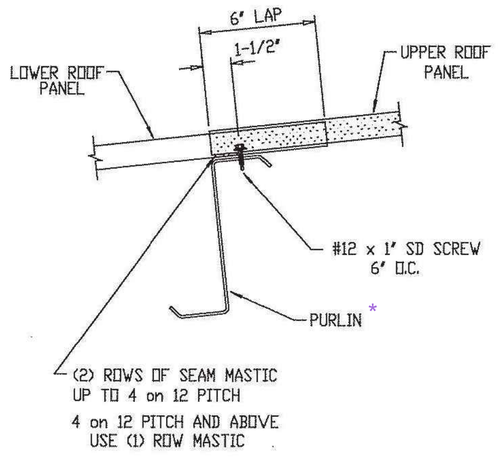
STATE OF LOUISIANA — MADISYN M. KAMBOUR — License No. 39228 — PROFESSIONAL ENGINEER — 07/15/24 — CIVIL ENGINEERING

ROOF & WALL SHEETING DETAILS

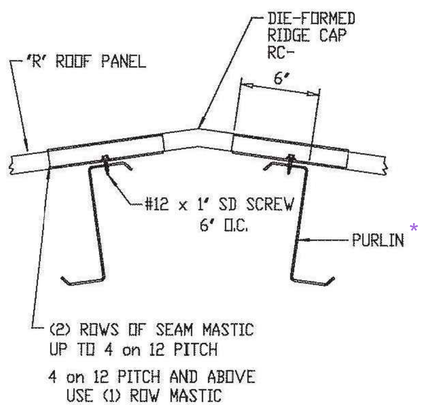
(PANEL LAPS)

PAGE NO. S-8-5





WALL	S-8-5A	ROOF	S-8-5B



* Z9x3x0.91

ROOF RIDGE	S-8-5C		

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE:	ANSI D
SCALE:	

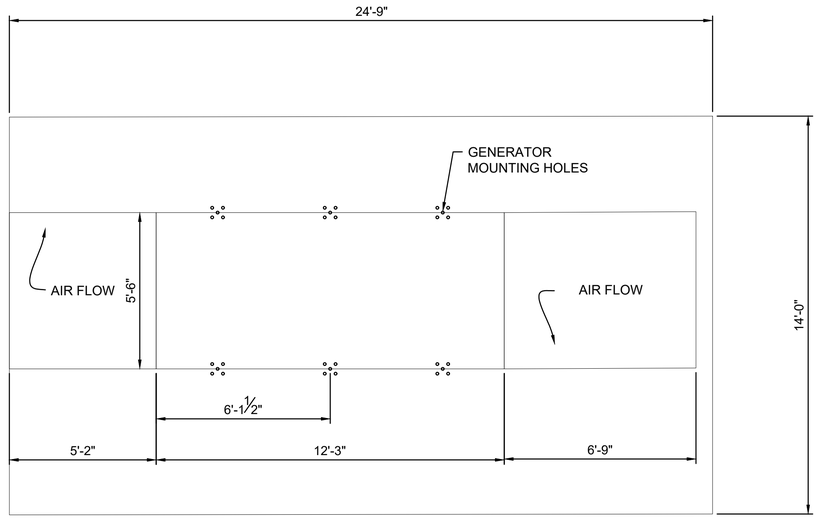
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

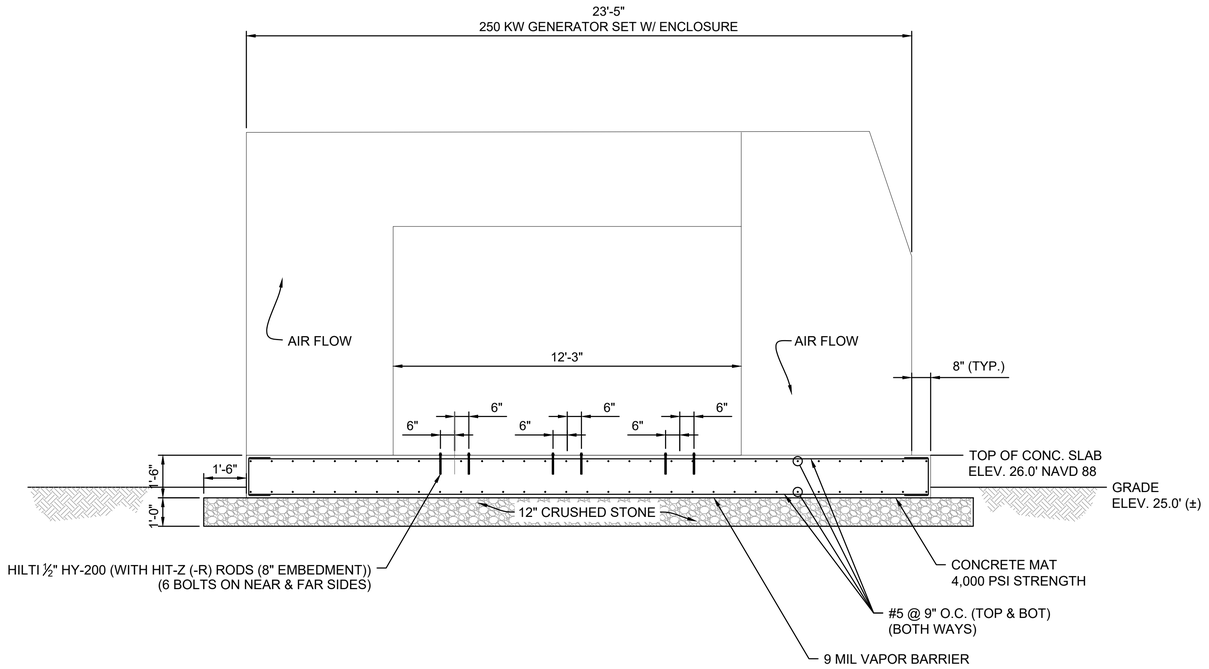
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

TYPICAL STRUCTURAL DETAILS

MADAIYM. KABOU
License No. 40268
REGISTERED
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
07/15/24

SHEET NO.
S-020
SHEET 55 OF 92





GENERATOR FOUNDATION

SCALE: 1/4"=1'-0"

STATE OF LOUISIANA
MADANY M. KHOURY
LIC. NO. 41288
REGISTERED PROFESSIONAL ENGINEER
CIVIL ENGINEERING
07/15/24

STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
7/15/24

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH
GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

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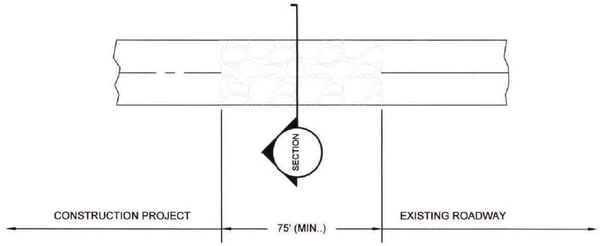
DRAWN BY:	AH
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

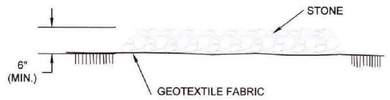
GENERATOR FOUNDATION PLAN

SHEET NO.
S-021
SHEET 56 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\S-021 - Diversified_Generator Foundation Plan.dwg - 7/15/2024 4:40 PM User: Phil Plot Date: Mon Jul-15-2024 - 05:44PM



PLAN



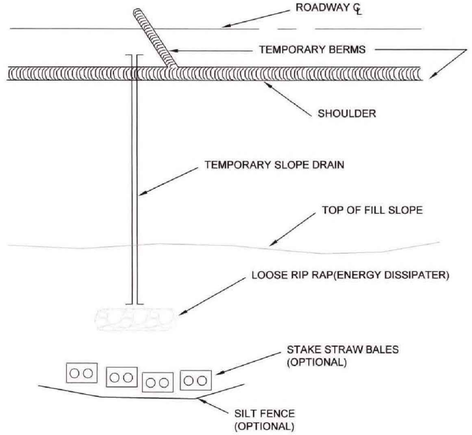
SECTION

A TEMPORARY STONE CONSTRUCTION ENTRANCE

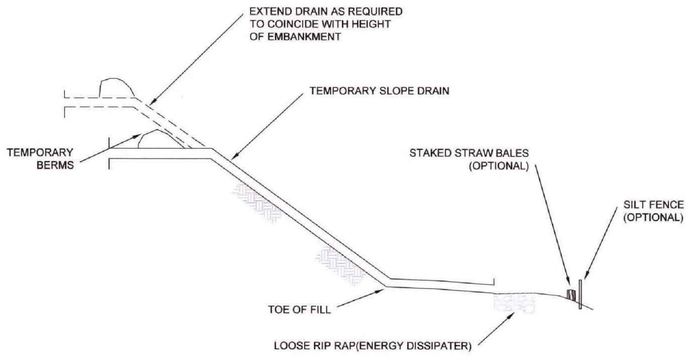
NOTES:
TEMPORARY STONE CONSTRUCTION ENTRANCE AND/OR WASH RACK

A STONE STABILIZED PAD LOCATED AT POINTS OF VEHICULAR INGRESS AND EGRESS ON THE CONSTRUCTION SITE TO REDUCE THE AMOUNT OF MUD TRANSPORTED ONTO PUBLIC ROADS. IF THE VEHICLE TRAVELING OVER THE GRAVEL PAD IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF THE MUD, THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLE ENTERS A PUBLIC THEN THE TIRES MUST BE WASHED BEFORE THE VEHICLE ENTERS A PUBLIC ROAD. A FEW BASIC DESIGN GUIDELINES FOR THE USE OF A STONE CONSTRUCTION ENTRANCE AND/OR WASH RACKS ARE:

1. THE STONE LAYER MUST BE AT LEAST 6 INCHES THICK.
2. THE STONE SHALL CONFORM TO SECTION 711(02)(CLASS 2LB.) OF THE LADOTD STANDARD SPECIFICATION.
3. THE LENGTH OF THE PAD MUST BE AT LEAST 75 FEET AND IT MUST EXTEND THE FULL WIDTH OF THE VEHICULAR INGRESS AND EGRESS.
4. GEOTEXTILE FABRIC UNDERLINER IS REQUIRED. THE GEOTEXTILE FABRIC SHALL BE IN ACCORDANCE WITH SECTION 1019 (TYPE D) OF THE LADOTD STANDARD SPECIFICATIONS.
5. IF A WASH ROCK IS NECESSARY, PROVISIONS MUST BE MADE TO INTERCEPT THE WASH WATER AND TRAP THE SEDIMENT BEFORE IT IS CARRIED OFF-SITE.



PLAN



ELEVATION

C TEMPORARY SLOPE DRAIN

SCALE: N.T.S.

NOTES:
A TEMPORARY SLOPE DRAIN IS A DEVICE USED TO CARRY WATER FROM THE CONSTRUCTION WORK AREA TO A LOWER ELEVATION. SLOPE DRAINS MAY BE PLASTIC SHEETS, METAL OR PLASTIC PIPE, STONE GUTTERS, FIBER MATS, OR CONCRETE OR ASPHALT DITCHES. A FEW BASIC DESIGN GUIDELINES FOR THE USE OF A TEMPORARY SLOPE DRAINS ARE:

1. THE SPACING OF THE SLOPE DRAINS VARIES WITH THE ROAD GRADE.
   FOR GRADES: 0.0% - 2.0% USE 500' SPACING
   2.1% - 5.0% USE 200' SPACING
   GREATER THAN 5.0% USE 100' SPACING

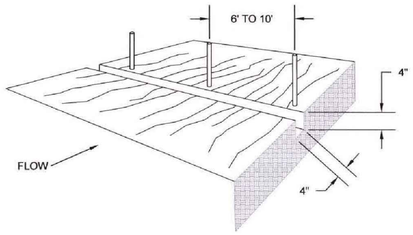
2. SLOPE DRAIN MATERIAL: SMOOTH PIPE - 8" MINIMUM
   CORRUGATED PIPE - 12" MINIMUM
   PLASTIC SHEETING - 4' WIDE MINIMUM
   - 3MILS THICK MINIMUM -

3. PLASTIC SHEETING CAN BE STAKED DOWN OR WEIGHTED WITH ROCKS OR LOGS. THE AREA UNDER THE SHEETING SHOULD BE SHAPED TO PROVIDE AN ADEQUATE CHANNEL.

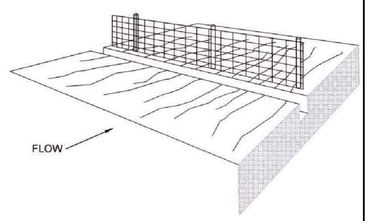
4. THE OUTLET END SHOULD BE PROTECTED OR HAVE SOME MEANS OF DISSIPATING ENERGY. THE FLOW SHOULD BE DIRECTED THROUGH A SEDIMENT TRAP SUCH AS A FENCE OR HAY BALES.

5. TO INSURE PROPER OPERATIONS, TEMPORARY SLOPE DRAINS SHOULD BE INSPECTED REGULARLY AND AFTER EACH STORM, FOR CLOGGING OR DISPLACEMENT. EROSION AT THE OUTLET SHOULD BE CHECKED.

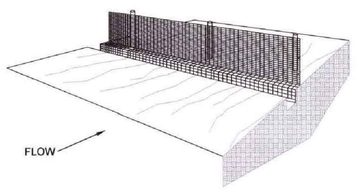
1. SET POSTS AND EXCAVATE A 4" X 4" TRENCH UPSLOPE ALONG THE LINE OF POSTS.



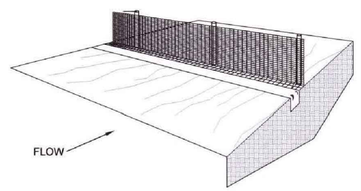
2. STAPLE WIRE FENCING TO THE POSTS.



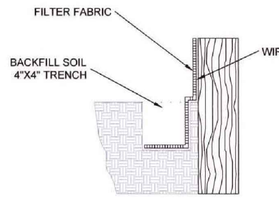
3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.



4. BACKFILL AND COMPACT EXCAVATED SOIL.



EXTENSION OF FABRIC INTO THE TRENCH



D

SCALE: N.T.S.

(WIRE SUPPORTED SILT FENCE IS SHOWN. SELF SUPPORTED SILT FENCE WILL BE CONSTRUCTED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.)

NOTES:
SILT FENCE IS A TEMPORARY SEDIMENT BARRIER CONSISTING OF A FILTER FABRIC SUPPORTED BY POSTS AND STRETCHED ACROSS AN AREA TO INTERCEPT AND DETAIN SMALL AMOUNTS OF SEDIMENT. THE SILT FENCING SHALL BE IN ACCORDANCE WITH SECTION 204 OF THE LADOTD STANDARD SPECIFICATIONS. A FEW BASIC GUIDELINES FOR THE USE OF SILT FENCING ARE:

1. USE WHERE EROSION WOULD OCCUR IN THE FORM OF SHEET AND RILL EROSION.
2. USE WHERE THE MAXIMUM DRAINAGE AREA BEHIND THE SILT FENCE IS 1/4 ACRE PER 100 FEET OF SILT FENCE LENGTH.
3. USE WHERE THE MAXIMUM SLOPE LENGTH BEHIND THE BARRIER IS 100 FEET.
4. USE WHERE THE MAXIMUM GRADIENT BEHIND THE BARRIER IS 2:1.
5. DO NOT USE SILT FENCES IN LIVE STREAMS OR IN DITCHES OR SWALES WHERE FLOWS EXCEED ONE CUBIC FOOT PER SECOND.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY: MK
DRAWN BY: PF
CHECKED BY: MH
SUBMITTED BY: BBEC, LLC
PROJECT No.: TU23000181
ISSUE DATE: 04/15/2024
APPROVED BY: JAB
SHEET SIZE: ANSI D
SCALE:

STATE OF LOUISIANA
MATTHEW P. MAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

STATE OF LOUISIANA
MARVIN M. KABOU
REGISTERED
PROFESSIONAL ENGINEER
07/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

EROSION CONTROL

SHEET NO.
S-022
SHEET 57 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\S-022 - Diversified_Erosion Control.dwg - 7/15/2024 4:43 PM User: Phil Plot Date: Mon Jul-15-2024 - 05:45PM

ARCHITECTURAL SPECIFICATIONS

DIVISION 5 - METALS

05 52 00 - METAL RAILING
1. STEEL TUBING: ASTM A 500 (COLD FORMED) OR ASTM A 513, TYPE 5 (MANDREL DRAWN).
2. FASTENERS: STAINLESS STEEL OR HOT-DIP GALVANIZED FASTENERS. SELECT FASTENERS FOR TYPE, GRADE, AND CLASS REQUIRED.
3. BRACKETS, FLANGES, FITTINGS, & ANCHORS: PROVIDE WALL BRACKETS, END CLOSURES, FLANGES, MISCELLANEOUS FITTINGS, & ANCHORS FOR INTERCONNECTING COMPONENTS & FOR ATTACHING TO OTHER WORK. FURNISH INSERTS & OTHER ANCHORAGE DEVICES FOR CONNECTING TO CONCRETE OR MASONRY WORK.
4. FABRICATE COMPLETE WELDED ASSEMBLIES IN SHOP TO MAXIMUM EXTENT TO AVOID FIELD WELDING. PROVIDE RETURNS AT ENDS OF HANDRAILS, UNLESS OTHERWISE INDICATED. CLOSE ENDS OF RETURNS. WELD ALL AROUND AT CONNECTIONS, INCLUDING AT FITTINGS. HOT-DIP GALVANIZE ASSEMBLIES AFTER FABRICATION, REMOVE BURRS & GRIND SMOOTH WELDS.

DIVISION 7 - THERMAL & MOISTURE PROTECTION

07 41 00 - METAL ROOF PANELS
1. ROOF PANELS: STANDING SEAM METAL ROOF (SSMR) SYSTEM, WITH CONCEALED FASTENERS, R-PANEL, J-SEAM TYPE, WITH FLOATING CLIPS MEETING REQUIREMENTS OF INDCATED WIND UPLIFT. 22 GAGE PANEL THICKNESS. FABRICATE PANELS IN CONTINUOUS SHEETS EXTENDING FROM EAVE TO RIDGE OR HIGH POINT. GALVALUME FINISH.
2. INTERIOR CEILING PANELS: EXPOSED FASTENER STEEL PBU PANELS, 26 GAGE MINIMUM THICKNESS. MANUFACTURER'S STANDARD FINISH. COLOR SELECTED BY OWNER.

07 42 00 - METAL WALL PANELS
1. EXTERIOR WALL PANELS: ROLL-FORMED METAL PANELS, 22 GAGE MINIMUM THICKNESS. MANUFACTURER'S STANDARD FINISH. COLOR SELECTED BY OWNER.
2. INTERIOR WALL PANELS: EXPOSED FASTENER STEEL PBU PANELS, 26 GAGE MINIMUM THICKNESS. MANUFACTURER'S STANDARD FINISH. COLOR SELECTED BY OWNER.

07 90 00 - SEALANTS
1. BUILDING EXTERIOR WALL OPENINGS, JOINTS & PENETRATIONS: ONE COMPONENT GUNGRADE URETHANE, MASTERSEAL NP-1 BY MASTERBUILDERS-BASF, OR EQUAL.
2. INTERIOR WALLS - GYPSUM BOARD JOINTS: ACRYLIC-LATEX TYPE, PAINTABLE. SONOLAC BY MASTERBUILDERS-BASF, OR EQUAL.
3. MASTIC SEALANT UNDER THRESHOLDS: MULTI-PURPOSE SEALANT BY MASTERBUILDERS-BASF, OR EQUAL.
4. ACCESSORIES: PRIMERS, BOND BREAKERS, FOAM BACKER RODS, FILLERS, ETC., AS RECOMMENDED BY SEALANT MANUFACTURER.

DIVISION 8 - OPENINGS

08 11 13 - HOLLOW METAL DOORS & FRAMES
1. HOLLOW METAL DOORS & FRAMES; COMPLY WITH PERTINENT REQUIREMENTS OF ANSI/SDI 250.8.
2. MANUFACTURERS: PRODUCTS BY BENCHMARK, CECO, CURRIES, REPUBLIC, STEELCRAFT, OR APPROVED EQUAL.
3. DOORS - FLUSH HOLLOW METAL : LEVEL 2 & PHYSICAL PERFORMANCE LEVEL B (HEAVY DUTY), MODEL 2 (SEAMLESS); 0.042-INCH (18 GAGE) - (1.0-MM-) THICK FACES; 1-3/4-INCH- (44.4-MM-) THICK DOORS.
4. FRAMES: 2 INCH X 5-3/4-INCH WIDE X 16 GAGE, UNLESS INDICATED OTHERWISE.
5. CONTINUOUSLY WELDED MITERED CORNERS FOR EXTERIOR FRAMES
6. FABRICATE EXTERIOR UNITS FROM METALLIC-COATED ASTM A 653/A 653M, COMMERCIAL STEEL (CS), TYPE B, G90 GALVANIZED COATING; STRETCHER-LEVELED STANDARD OF FLATNESS. STEEL SHEET.

08 33 23 - OVERHEAD COILING DOOR
1. MANUFACTURED ASSEMBLY CONSISTING OF ROLL-UP DOOR WITH SLATS, JAMB GUIDES, AND OVERHEAD HOUSING. ASSEMBLY RATED FOR WIND SPEED INDICATED IN STRUCTURAL DRAWINGS.
2. GALVANIZED STEEL CONSTRUCTION.
3. MOTORIZED OPERATION.
4. SLIDE BOLT LOCK INSIDE.
5. SHOP PAINTED STEEL FINISH. POWDER-COATED FINISH.
6. COLOR AS SELECTED FROM MANUFACTURER'S FULL RANGE.
7. PRODUCTS BY CLOPAY, CORNELL, OVERHEAD DOOR CO., WAYNE DALTON, OR APPROVED EQUAL.

08 71 00 - DOOR HARDWARE
1. PROVIDE COMPLETE SETS OF HARDWARE FOR EACH DOOR. DEVELOP & SUBMIT HARDWARE SETS FOR APPROVAL. HARDWARE ITEMS IN COMPLIANCE WITH APPLICABLE CODES.
2. HARDWARE FINISH: STAINLESS STEEL
3. HINGES: 4-1/2" X 4-1/2" X 0.180 GAGE METAL MINIMUM, FULL MORTISE, HEAVY DUTY, 5-KNUCKLE TYPE, STAINLESS STEEL PINS. NON-REMOVABLE PINS FOR EXTERIOR DOORS. BALL BEARING TYPE FOR DOORS WITH CLOSERS. ANSI A156.1. T4A-T4B SERIES BY MCKINNEY, FBB 199 BY STANLEY, BB1168, DOORS BY HAGER, OR EQUAL
4. 3 HINGES PER DOOR.
5. LOCKSETS: ANSI A156.13, SERIES 1000, GRADE 1. HEAVY-DUTY MORTISE LOCKSET WITH ESCUTCHEON PLATE TRIM & MATCHING STRIKE PLATES. PROTECTION PLATE OVERLAPPING STRIKE ON EXTERIOR SIDE OF EXTERIOR DOORS.
6. STAMPED STEEL CASE WITH STEEL OR BRASS PARTS. PLASTIC PARTS NOT PERMITTED.
7. LEVER TYPE HANDLES: ARC P LEVER DESIGN BY SARGENT, OR APPROVED EQUAL. LOCKSET FUNCTIONS: F04 ENTRY
8. KEYING - KEY CORES: REMOVABLE & INTERCHANGEABLE 6-PIN KEY CORES. MEET WITH OWNER FOR KEYING REQUIREMENTS.
9. KEYS: NICKEL SILVER. TURN OVER KEYS TO OWNER AS FOLLOWS:
   BUILDING MASTER KEY: 2
   CHANGE KEYS PER CYLINDER: 2 EACH
10. CLOSERS: GRADE 1, PT1, C02000 SERIES, SURFACE MOUNTED MODERN TYPE CONFORMING TO ANSI A156.4. HEAVY DUTY STOP ARMS. THRU BOLT MOUNTING TO 4040 SERIES BY LCN, D4450 SERIES BY STANLEY. EN351 SERIES BY SARGENT, 4400 SERIES BY YALE, OR EQUAL. PROVIDE ONE FOR EACH DOOR.
11. KICKPLATES: 12 INCHES HIGH X 18 GAGE THICK, STAINLESS STEEL. WIDTH AS REQUIRED FOR EACH DOOR.
12. LOCK PROTECTORS: 18 GAGE STAINLESS STEEL. LP3 BY GLYNN JOHNSON, OR APPROVED EQUAL. PROVIDE AT EXTERIOR DOORS.
13. WEATHERSTRIPPING: CONTINUOUS BULB SEAL MADE OF VINYL, POLYPROPYLENE OR SILICONE WITH ALUMINUM RETAINER FASTENED TO DOOR FRAME. MODEL 807 BY REESE, 160 BY NATIONAL, 303 BY PEMKO, OR EQUAL. PROVIDE AT EXTERIOR DOORS.
14. THRESHOLDS: CAST ALUMINUM TYPE. PRODUCT BY WOOSTER OR HAGER. PROVIDE AT EXTERIOR DOORS. SET ON FULL BED OF SEALANT.
15. DOOR BOTTOM SWEEP: CONT. ALUMINUM RETAINER DRIP, WITH REPLACEABLE VINYL SWEEP. SURFACE MOUNT TO BOTTOM OF DOOR. 3452-C PEMKO; OR EQUIVALENT PRODUCTS BY HAGER, NATIONAL, REESE, OR ZERO. PROVIDE AT EXTERIOR DOORS.
16. RAIN GUARD: OVERHEAD ALUMINUM RAIN DRIP DIVERTER. SURFACE MOUNT TO HEAD FRAME OF DOOR. PEMKO 346-C; OR EQUIVALENT PRODUCTS BY HAGER, NATIONAL, REESE, OR ZERO. PROVIDE AT EXTERIOR DOORS.

DIVISION 9 - FINISHES

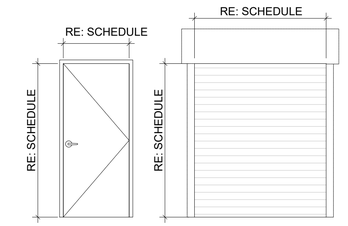
09 90 00 - PAINT
1. PAINT EXPOSED SURFACES IN THE PROJECT & AS LISTED IN PAINT SCHEDULE BELOW.
2. COLORS: TO BE SELECTED BY OWNER .
3. MANUFACTURERS: BASIS-OF-DESIGN - SHERWIN-WILLIAMS. OTHER MANUFACTURERS - BENJAMIN MOORE, PITTSBURG, PRATT & LAMBERT.
4. PAINT SCHEDULE:
   EXTERIOR ZINC-COATED/GALV. METALS: STEEL RAILINGS, METAL DOORS & FRAMES:
   a. PRIMER: SHERWIN-WILLIAMS; GALVITE HS PAINT B50WZ3
   b. 2 FINISH COATS: SHERWIN-WILLIAMS; PRO INDUSTRIAL URETHANE ALKYD ENAMEL, B54W150
5. PREPARATION: CLEAN ALL SURFACES TO REMOVE LOOSE DIRT, GREASE, RUST. PRIME NEW SURFACES. TOUCH-UP PRIMER ON FACTORY-PRIMED SURFACES.
6. FINISH EXTERIOR DOORS ON TOPS, BOTTOMS, & SIDE EDGES THE SAME AS EXTERIOR FACES.

DIVISION 10 - SPECIALTIES

10 44 00 - FIRE EXTINGUISHER
1. FIRE EXTINGUISHERS: UL RATED, ENAMELED STEEL CONTAINERS. MULTI-PURPOSE: 5 LBS. (2 KG), 2A-30B:C. PRODUCTS: MP5 BY LARSEN, COSMIC 5E BY J.L. INDUSTRIES, OR APPROVED EQUAL.
2. MOUNTING BRACKETS: MANUFACTURER'S STANDARD GALVANIZED STEEL BRACKET, OF PROPER SIZE FOR CAPACITY OF EXTINGUISHER. MOUNT WITH MANUFACTURER'S RECOMMENDED FASTENERS FOR TYPE SUBSTRATE INDICATED.

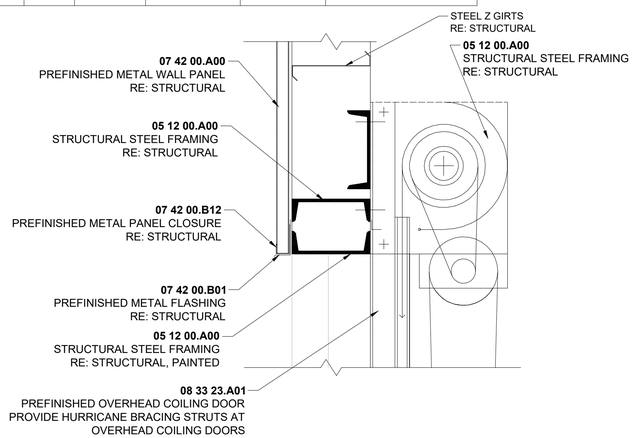
DOOR SCHEDULE

ROOM NAME	DOOR NUMBER	DOOR TYPE	FIRE RATING	DOOR					REMARKS
				WIDTH	HEIGHT	THICKNESS	MATERIAL	FINISH	
FILTER ROOM	101A	C1	-	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR
FILTER ROOM	101B	C1	-	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR
FILTER ROOM	101C	G1	-	14'-0"	16'-0"	0'-0 1/2"	STEEL	PREFINISHED	OVERHEAD COILING DOOR
FILTER ROOM	101D	G1	-	14'-0"	16'-0"	0'-0 1/2"	STEEL	PREFINISHED	OVERHEAD COILING DOOR
CHEMICAL STORAGE	102A	C1	3 HR	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR
CHEMICAL STORAGE	102B	C1	3 HR	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR
CHEMICAL STORAGE	102C	G1	3 HR	10'-0"	16'-0"	0'-0 1/2"	STEEL	PREFINISHED	OVERHEAD COILING DOOR
OFFICE 1	103A	C1	-	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR
OFFICE 1	103B	C1	-	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR
OFFICE 1	103C	C1	-	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR
RESTROOM	105A	C1	-	3'-0"	7'-0"	0'-1 3/4"	HOLLOW METAL	PAINTED	PERSONNEL ENTRY DOOR

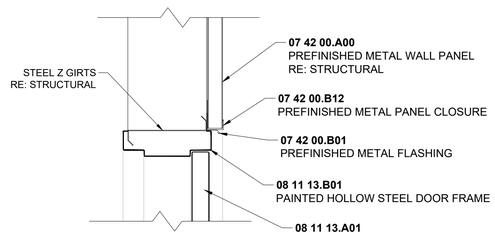


TYPE C1
FLUSH PANEL
STEEL DOOR
RE: SPEC SECTION 08 11 13

TYPE G1
OVERHEAD COILING
DOOR
RE: SPEC SECTION 08 33 23

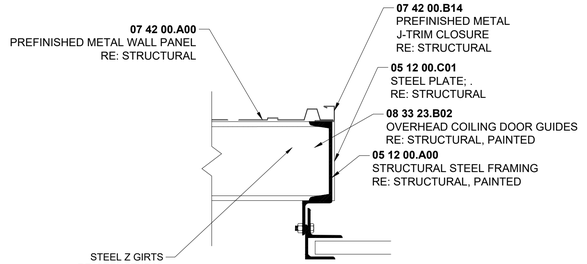


1 A-001 DOOR TYPES & SCHEDULE
SCALE: N.T.S.

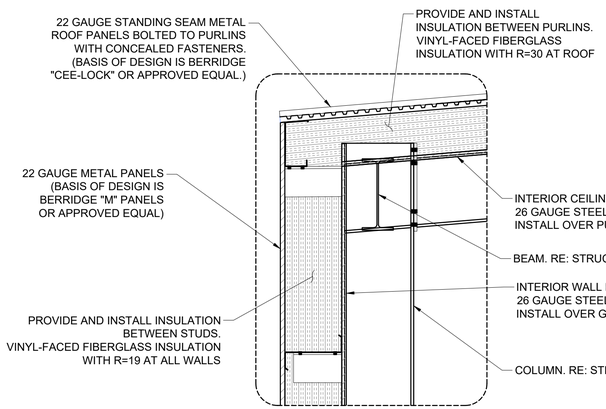


3 A-001 HEAD DETAIL - H.M. DOOR
SCALE: 1-1/2" = 1'-0"

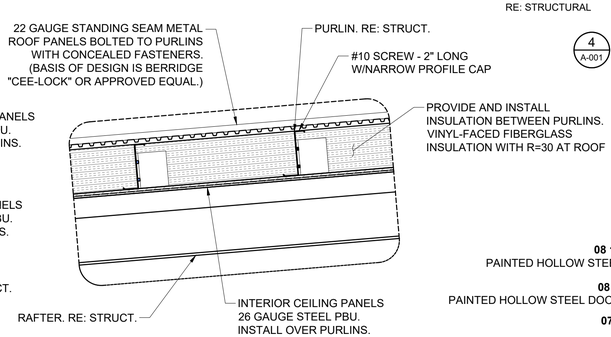
2 A-001 HEAD DETAIL - OVERHEAD COILING DOOR
SCALE: 1-1/2" = 1'-0"



4 A-001 JAMB DETAIL - OVERHEAD COILING DOOR
SCALE: 1-1/2" = 1'-0"



7 A-001 TYPICAL WALL PANELING & INSULATION DETAIL
SCALE: N.T.S.



6 A-001 TYPICAL ROOF PANELING & INSULATION DETAIL
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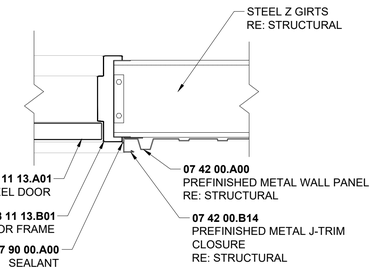

5 A-001 JAMB DETAIL - H.M. DOOR
SCALE: 1-1/2" = 1'-0"

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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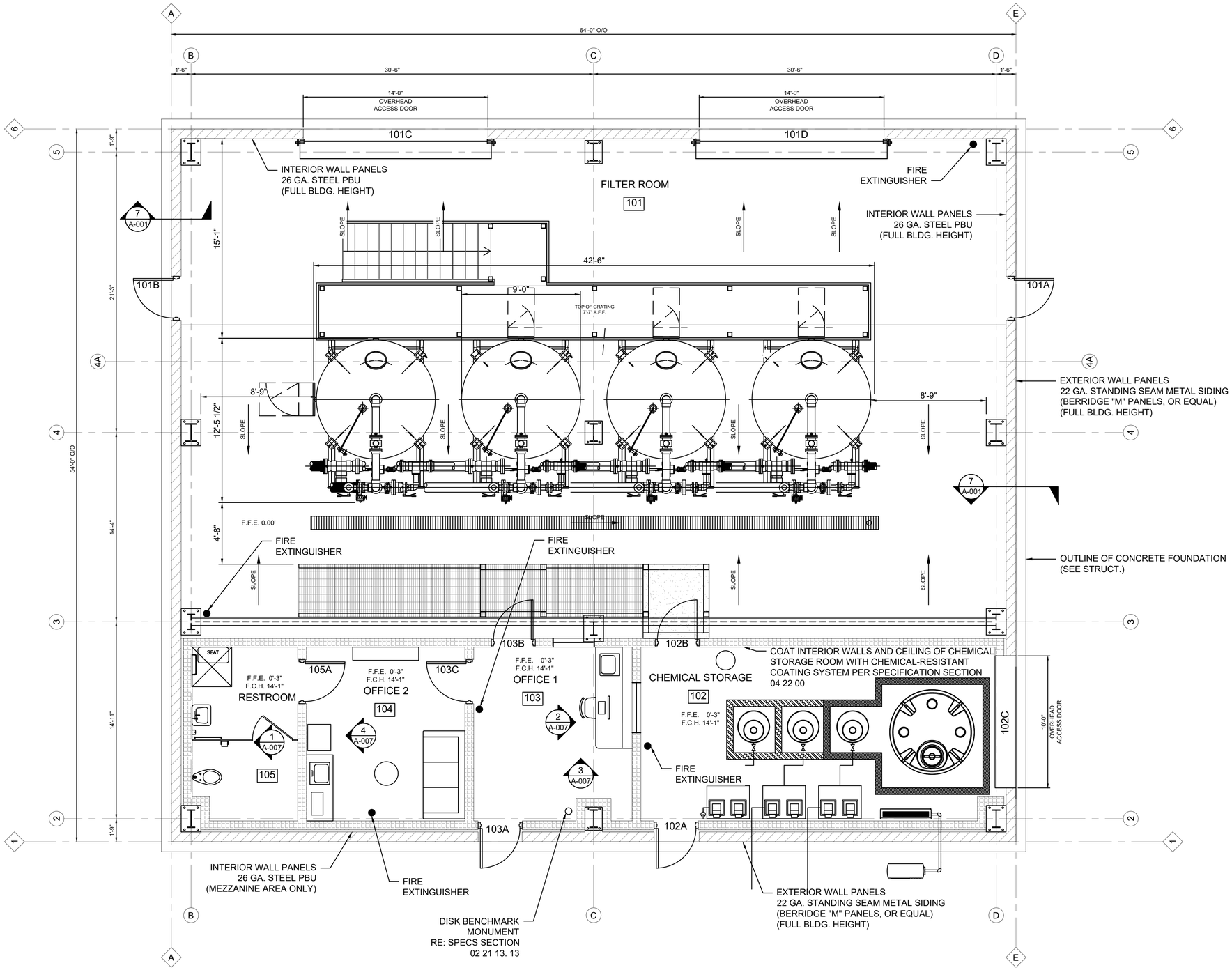
CHECKED BY:	JAB
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	AS NOTED

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

ARCHITECTURALGENERAL NOTES

SHEET NO.
A–001
SHEET 58 OF 92



DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
FLOOR PLAN

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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STATE OF LOUISIANA
MATTHEW P. RAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FLOOR PLAN

SHEET NO.
A-002
SHEET 59 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\A-002 - Diversified_Floor Plan.dwg - 7/15/2024 1:40 PM
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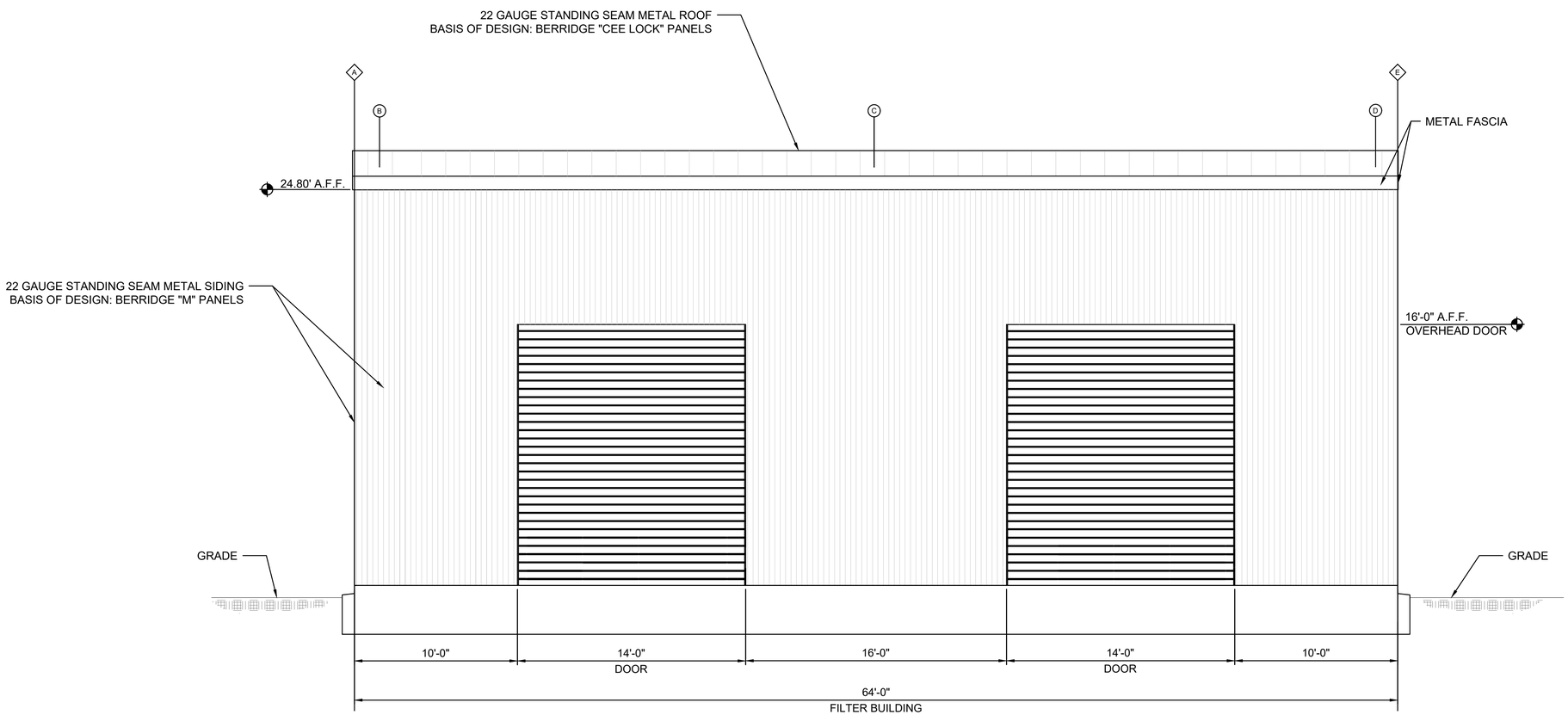

NOTES:

1. REQUIRED WATER & SEWER PIPING, AND UTILITIES NOT SHOWN. REFER TO CIVIL DRAWINGS.

EXTERIOR NORTH ELEVATION
SCALE: 1/4" = 1'-0"

ST. TAMMANY PARISH GOVERNMENT

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ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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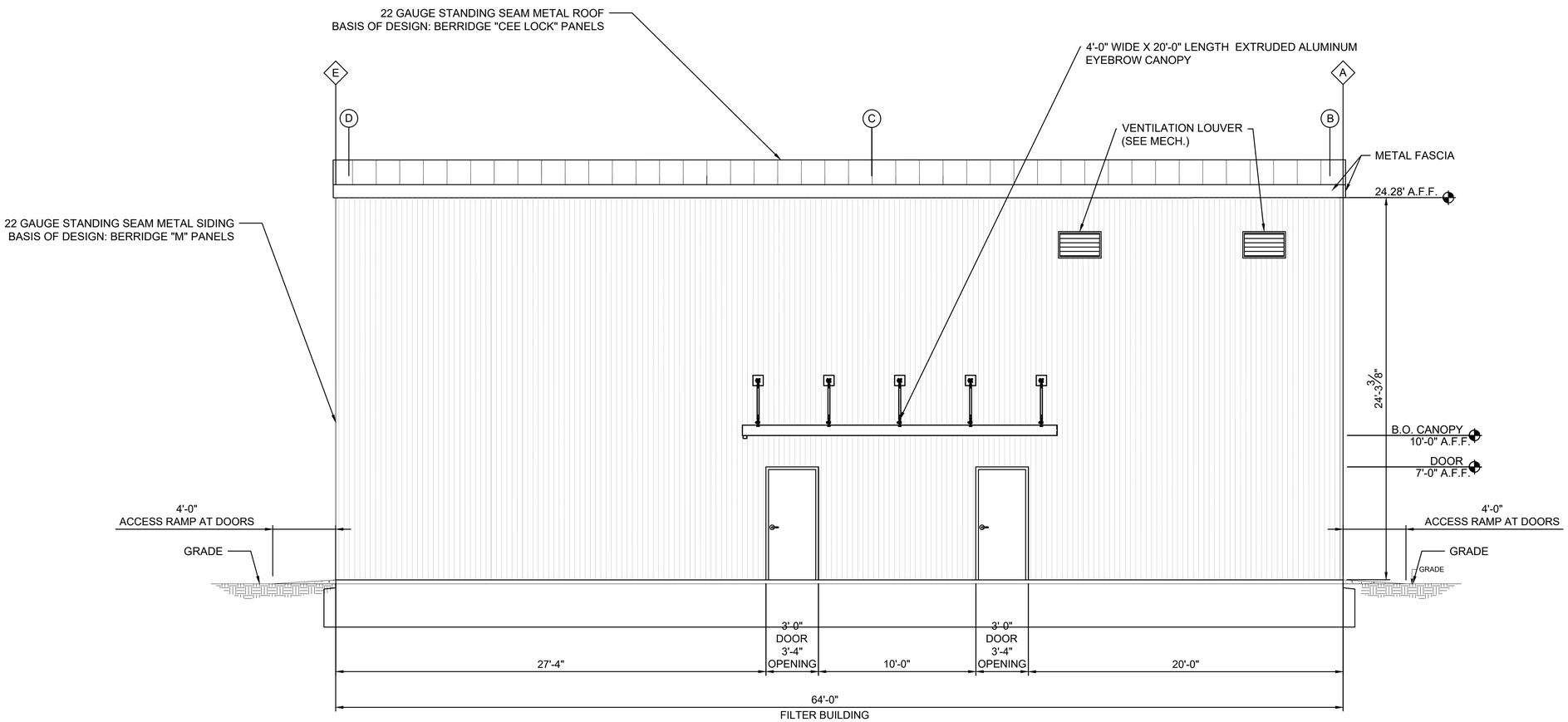
STATE OF LOUISIANA
MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
7/15/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING EXTERIOR NORTH ELEVATION

SHEET NO.
A-003
SHEET 60 OF 92



EXTERIOR SOUTH ELEVATION

SCALE: 1/4" = 1'-0"

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STATE OF LOUISIANA
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CIVIL ENGINEERING

DIVERSIFIED WATER WELL
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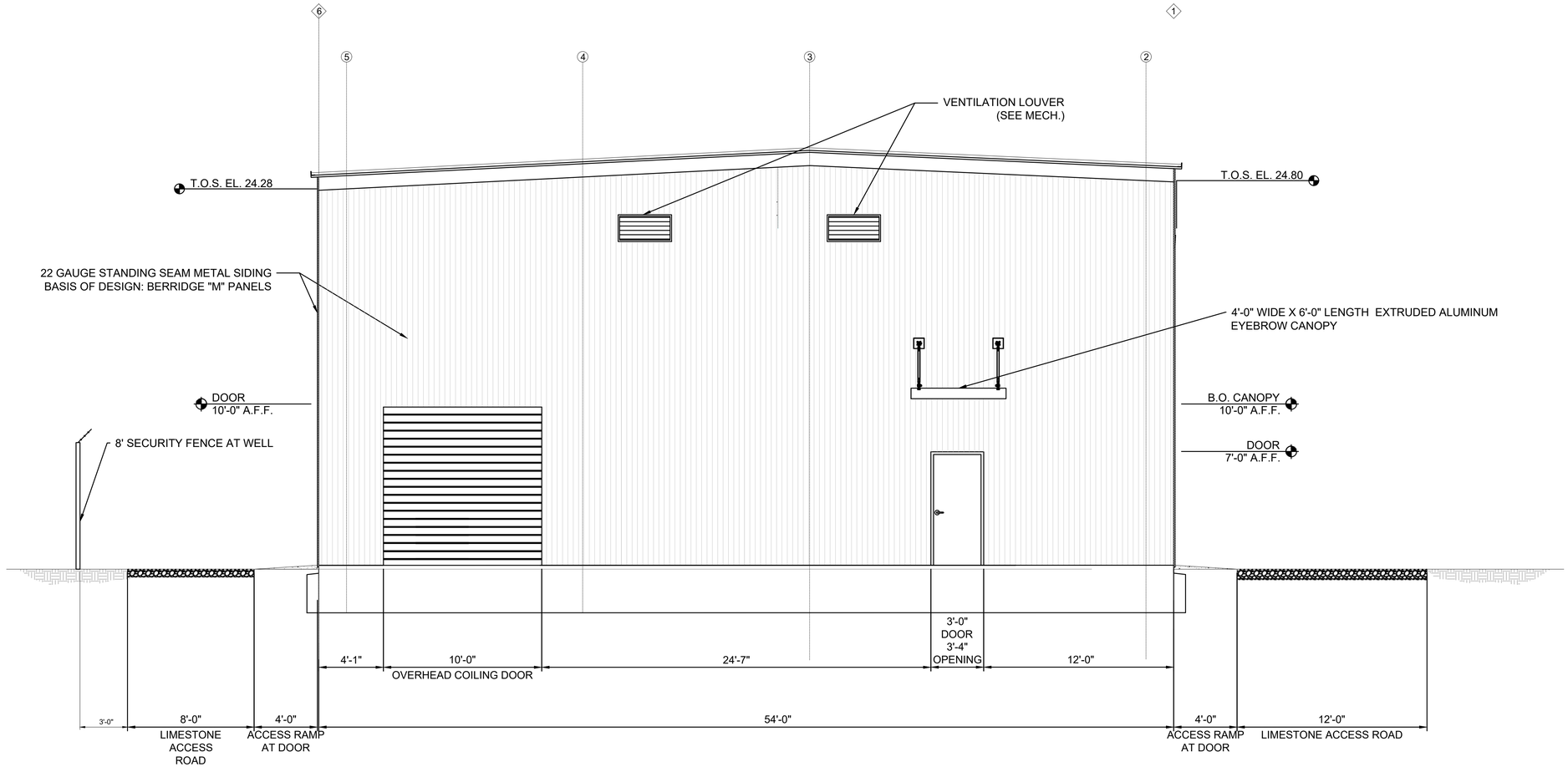
FILTER BUILDING EXTERIOR SOUTH ELEVATION

SHEET NO.
A-004
SHEET 61 OF 92



EXTERIOR EAST ELEVATION
SCALE: 1/4" = 1'-0"

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DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
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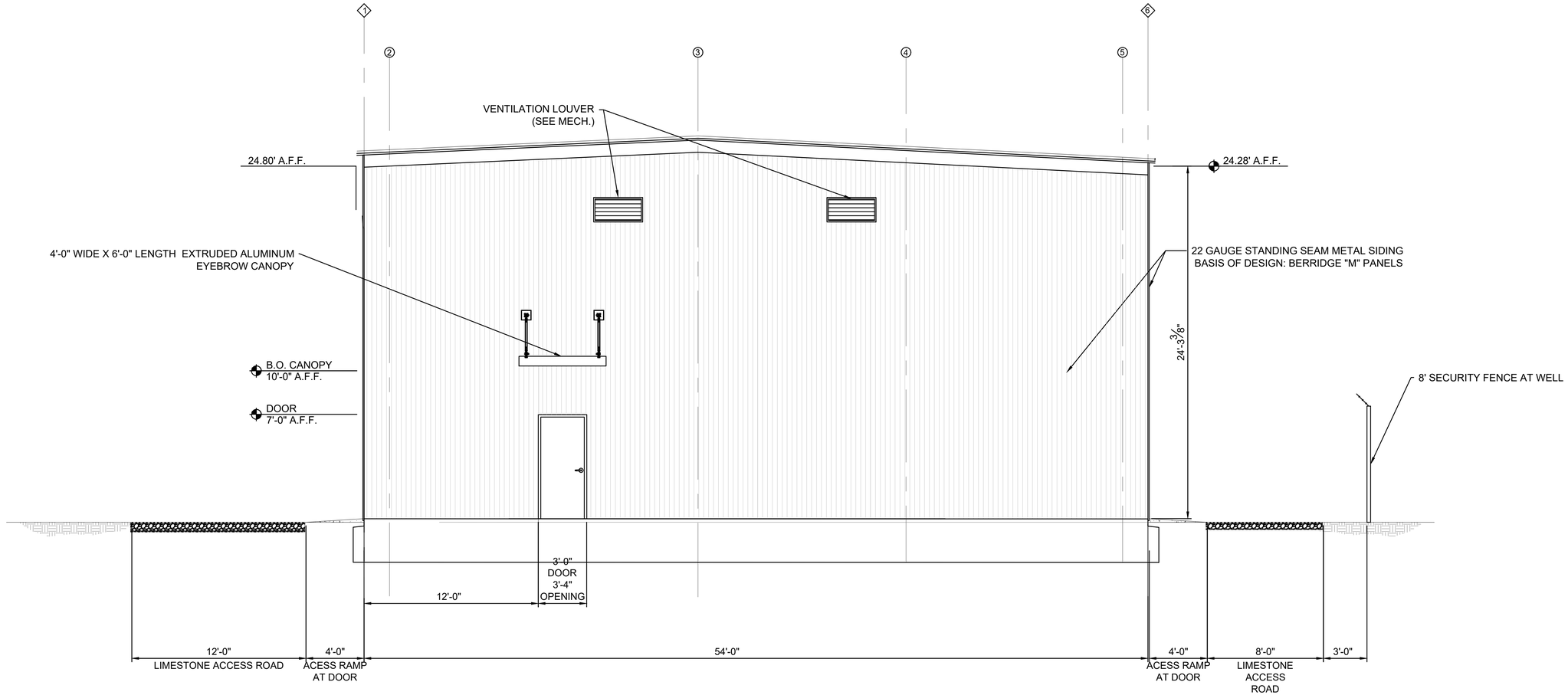
FILTER BUILDING EXTERIOR EAST ELEVATION

SHEET NO.
A-005
SHEET 63 OF 92



EXTERIOR WEST ELEVATION

SCALE: 1/4" = 1'-0"

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DIVERSIFIED WATER WELL
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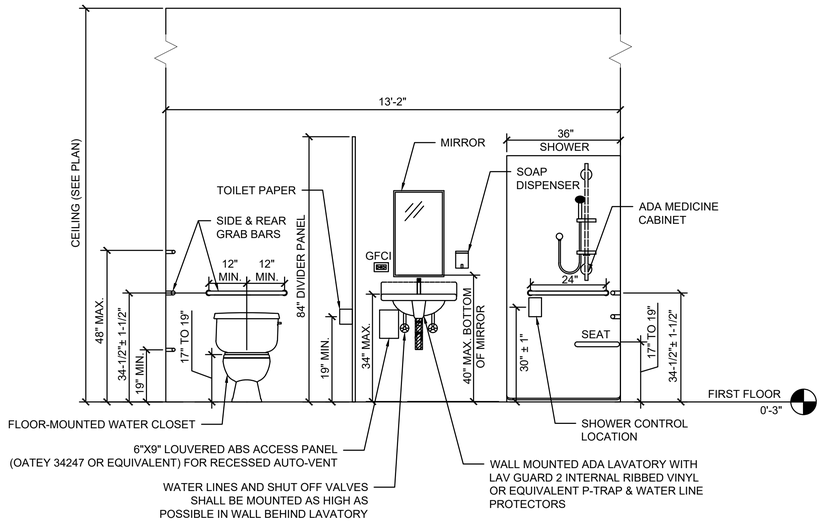
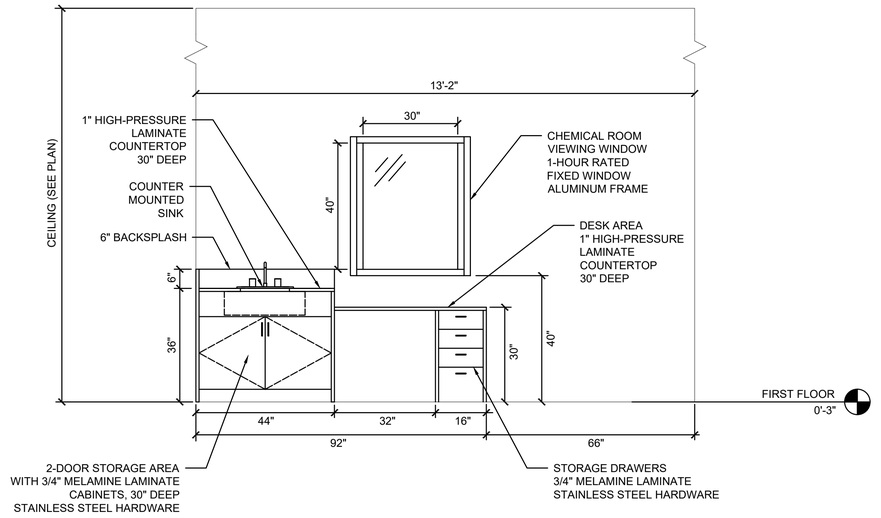
FILTER BUILDING EXTERIOR WEST ELEVATION

SHEET NO.
A-006
SHEET 64 OF 92



1 A-007 RESTROOM INTERIOR ELEVATION
SCALE: 1/2" = 1'-0"



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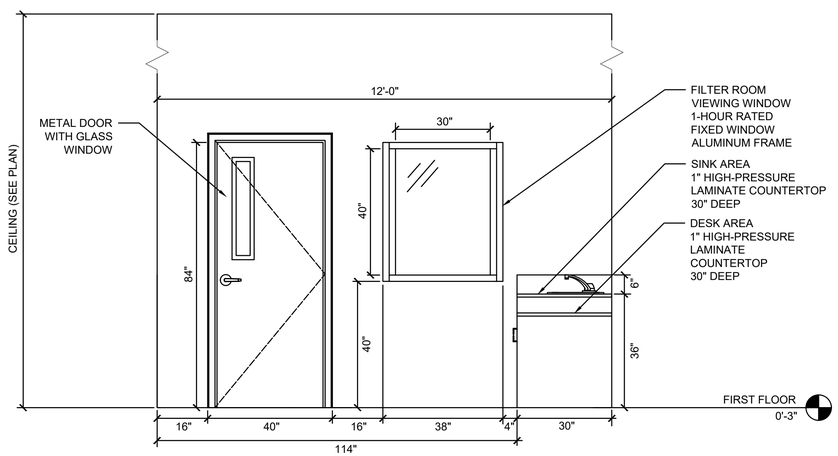

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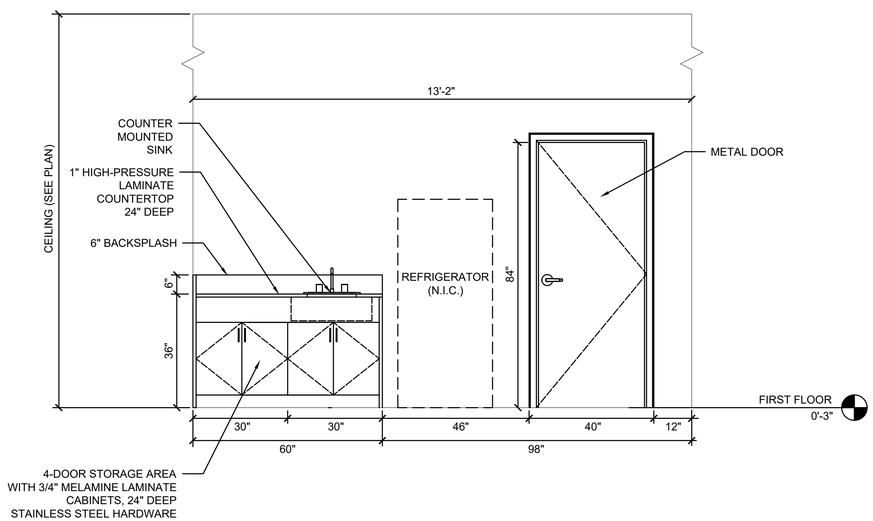
SCALE: 1/2" = 1'-0"



4 A-007 OFFICE 2 - INTERIOR ELEVATION
SCALE: 1/2" = 1'-0"

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY:	MH
DRAWN BY:	PW
CHECKED BY:	JAB
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	JAB
SHEET SIZE:	ANSI D
SCALE:	AS NOTED

STATE OF LOUISIANA
MATTHEW P. HAHN
License No. 44796
PROFESSIONAL ENGINEER
7/15/24
CIVIL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

ARCHITECTURAL ELEVATIONS

SHEET NO.
A-007
SHEET 64 OF 92

DWG FILE: \\bbec-fs1.bbecllc.com\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\A-007- Diversified_Arch Details.dwg - 7/15/2024 2:05 PM
User: Phil
Plot Date: Mon Jul-15-2024 - 05:49PM

PLUMBING GENERAL NOTES

A. ALL OF THE GENERAL NOTES AND PLUMBING NOTES ON THIS PAGE ARE INTENDED TO SUPPLEMENT ANY AND ALL SPECIFICATION SECTIONS ASSOCIATED WITH THIS PROJECT. THESE NOTES DO NOT SUPERCEDE OR TAKE PRECEDENCE OVER FORMAL SPECIFICATION SECTIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO QUESTION ANY AND ALL SPECIFICATION/NOTE CONFLICTS AND OR DISPARITIES AT BID TIME. IF QUESTIONS ARE NOT RAISED AND CLARIFIED PRIOR TO BID TIME, THE MOST STRINGENT INTERPRETATION OF ANY SPECIFICATION/NOTE CONFLICT WILL BE CONSIDERED THE APPLICABLE REQUIREMENT.

B. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES AND LAWS.

C. OBTAIN ALL PERMITS AND INSPECTIONS AS REQUIRED.

D. COORDINATE WORK WITH OTHER TRADES TO MINIMIZE AND RESOLVE POTENTIAL CONFLICTS.

E. COMPLETED SYSTEMS SHALL BE TESTED, BALANCED AND GUARANTEED.

F. THE CONTRACTOR SHALL PROVIDE FITTINGS, OFFSETS, ETC. AS NECESSARY TO PROVIDE A COMPLETE PLUMBING SYSTEM.

G. FURNISH AND INSTALL ALL VALVING FOR THE PROPER SECTIONALIZING AND OPERATION OF PIPING SYSTEMS. PROVIDE ACCESS PANELS AS REQUIRED FOR ACCESS TO VALVES. PROVIDE SHUTOFF VALVES ON HOT AND COLD WATER BRANCH PIPING TO FULLY ISOLATE THE BRANCH LINE. PROVIDE SHUTOFF VALVES AT ALL HOSE BIBBS.

H. ALL PIPES PASSING THROUGH FINISHED WALLS, PARTITIONS AND FLOORS SHALL BE FITTED WITH ADJUSTABLE ESCUTCHEONS AND APPROPRIATE FIRE STOPPING WHERE REQUIRED.

I. ATTACH ALL FIXTURES TO SUPPORTING SURFACES PLUMB AND LEVEL. WALL HUNG FIXTURES SHALL BE SECURELY FASTENED TO WALL MOUNTED BACKING PLATES OR CARRIER ASSEMBLIES.

J. WHERE FIXTURES ARE MOUNTED TO WALLS AND FLOORS, SEAL ALL INTERSECTIONS WITH SILICONE CAULK.

K. FINAL LOCATION OF ALL CEILING FEATURES TO BE LOCATED PER REFLECTED CEILING PLAN.

L. PROVIDE APPROPRIATE FIRE STOPPING MATERIALS WHERE FIRE RATED ASSEMBLIES ARE PENETRATED.

M. ALL WORK AND MATERIALS SHALL BE GUARANTEED IN WRITING FOR NOT LESS THAN ONE YEAR FROM PROJECT COMPLETION.

N. PROVIDE SHOP DRAWINGS FOR APPROVAL AS DIRECTED BY ENGINEERS AND ARCHITECTS.

O. MANUFACTURER'S: THE DESIGN SHOWN ON THE DRAWINGS IS BASED UPON PRODUCTS OF THE MANUFACTURER SCHEDULED. PRIOR APPROVAL EQUAL EQUIPMENT MANUFACTURERS WILL BE ACCEPTABLE IF THE EQUIPMENT MEETS THE SCHEDULED PERFORMANCE AND COMPLIES WITH THE SPECIFICATIONS. IF EQUIPMENT MANUFACTURED BY OTHER THAN THE BASIS OF DESIGN IS UTILIZED, THEN THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATING WITH THE GENERAL CONTRACTOR AND ALL AFFECTED SUBCONTRACTORS TO ENSURE PROPER PROVISIONS FOR INSTALLATION OF THE FURNISHED EQUIPMENT. THIS COORDINATION SHALL INCLUDE, BUT IS NOT LIMITED TO , THE FOLLOWING:
   - A. STRUCTURAL SUPPORT FOR EQUIPMENT.
   - B. PIPING SIZES AND CONNECTION REQUIREMENTS.
   - C. ELECTRICAL POWER REQUIREMENTS AND WIRE/CONDUIT AND OVERCURRENT PROTECTION SIZES.
   - D. CONTROL SYSTEM REQUIREMENTS.
   - E. THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS INCURRED BY THE GENERAL CONTRACTOR, SUBCONTRACTORS, AND CONSULTANTS TO MODIFY THE BUILDING PROVISIONS TO ACCEPT FURNISHED EQUIPMENT.

P. REVIEW AND APPROVAL OF SHOP DRAWINGS BY THE ENGINEER AND ARCHITECT DOES NOT RELIEVE THE CONTRACTOR FROM 100% COMPLIANCE WITH ALL ASPECTS OF THE CONTRACT DOCUMENTS.

Q. SANITIZE ALL NEW HOT AND COLD WATER LINES PER LOCAL WATER DEPARTMENT REQUIREMENTS. FLUSH AND TEST SYSTEM FOR LEAKS. PLUMBING CONTRACTOR IS RESPONSIBLE FOR PROPER LEAK-FREE OPERATION OF SYSTEM. SOLDER CANNOT CONTAIN LEAD.

R. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE CONNECTED.

S. SUPPLY ALL NECESSARY TRIM, P-TRAPS, ANGLE STOPS, ETC., AT EACH PLUMBING FIXTURE.

T. INSTALL EACH FIXTURE WITH ITS TRAP EASILY REMOVABLE FOR SERVICE AND CLEANING.

U. PROVIDE CLEAN OUTS INSIDE AND OUTSIDE THE BUILDING AT NO MORE THAN 100 FT. SEPARATION, AND AT ALL LOCATIONS WHERE A CHANGE IN DIRECTION GREATER THAN 45 DEGREES OCCURS. COMPLY WITH LOUISIANA PLUMBING CODE.

V. AT EACH BARRIER-FREE WATER CLOSET WITH A FLUSH VALVE, INSTALL THE HANDLE SUCH THAT IT POINTS TOWARD THE "OPEN" SIDE OF THE WATER CLOSET STALL.

W. ENSURE CODE COMPLIANT DEPTH OF COVER IS MAINTAINED AT ALL BURIED PIPING OUTSIDE OF BUILDING.

X. INSTALL POTABLE WATER PROTECTION DEVICES ON PLUMBING LINES WHERE CONTAMINATION OF DOMESTIC WATER MAY OCCUR. EXAMPLES WOULD BE, BUT ARE NOT LIMITED TO, JANITOR CLOSETS, FIRE SYSTEMS, IRRIGATION SYSTEMS, FLUSH VALVES, INTERIOR AND EXTERIOR HOSE BIBBS.

Y. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION.

Z. FURNISH AND INSTALL WATER HAMMER ARRESTERS IN ACCORDANCE WITH PDI WH201.

AA. LAYOUT PLUMBING WORK TO AVOID CONFLICTS WITH OTHER BUILDING COMPONENTS.

AB. PROVIDE ALL HANDICAP LAVATORIES AND SINKS WITH APPROPRIATE PIPE WRAP PROTECTION TO MEET ADA GUIDELINES PER SPECIFICATIONS.

AC. PROVIDE ACCESS PANELS FOR EQUIPMENT,VALVES, DAMPER, ETC. LOCATED ABOVE A NON ACCESSIBLE CEILING. ACCESS PANELS SHALL BE LARGE ENOUGH FOR ALL REQUIRED MAINTENANCE, ADJUSTMENT, ECT. PROVIDE MULTIPLE ACCESS PANELS AS REQUIRED. COORDINATE COLOR AND LOCATIONS WITH ARCHITECT. PROVIDE FIRE AND/ OR SMOKE RATED ACCESS PANELS WHERE REQUIRED IN RATED CEILINGS. REFERENCE ARCHITECTURAL DRAWINGS FOR RATED CEILING LOCATIONS.

AD. CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDS FOR THOROUGH INSPECTION IN REGARD TO ANY WORK NECESSARY TO COMPLETE THE PROJECTS SCOPE OF WORK.

AE. DO NOT ROUTE PIPE CONTAINING WATER OVER ELECTRICAL EQUIPMENT.

AC. CONTRACTOR RESPONSIBLE FOR SETTING CIRCUIT SETTERS / BALANCING VALVES WHERE INDICATED ON DRAWINGS OR REQUIRED IN SPECIFICATIONS.

*NOTE: NOT ALL SYMBOLS ARE USED.

PLUMBING ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AAV	AUTOMATIC AIR VENT
AD	AREA DRAIN
AFF	ABOVE FINISHED FLOOR
AMP	AMPERE
AP	ACCESS PANEL
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
AUTO	AUTOMATIC
AVG	AVERAGE
BAL	BALANCE
BTWN	BETWEEN
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BLDG	BUILDING
BLR	BOILER
BOP	BOTTOM OF PIPE
BP	BOILING POINT
BTU	BRITISH THERMAL UNIT
BTUH	BTU PER HOUR
BV	BALL VALVE
BWV	BACKWATER VALVE
C	DEGREE CENTIGRADE
C/C	CENTER TO CENTER
CCW	COUNTER CLOCKWISE
CFM	CUBIC FEET PER MINUTE
CHV	CHECK VALVE
CI	CAST IRON
CLG	CEILING
CO	CLEANOUT
CO2	CARBON DIOXIDE
COL	COLUMN
COND	CONDENSATE
CONN	CONNECTION
CS	CHEMICAL SEWER
CU	COPPER
CU FT	CUBIC FEET
CU IN	CUBIC INCH
CV	CHEMICAL VENT
CW	CLOCKWISE / COLD WATER
DEG	DEGREE
DIA	DIAMETER
DS	DOWNSPOUT
DTW	DRAIN TO WASTE
DWG	DRAWING
EFF	EFFICIENCY
ELEV	ELEVATION
EMD	END OF MAIN DRIP
EWC	ELECTRIC WATER COOLER
EWT	ENTERING WATER TEMP.
F	DEGREE FAHRENHEIT
FD	FLOOR DRAIN
FLR	FLOOR
FLG	FLANGE
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
GAL	GALLON
GALV	GALVANIZED
GLV	GLOBE VALVE
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GV	GATE VALVE
HB	HOSE BIBB
HD	HUB DRAIN
HO	HUB OUTLET
HTG	HEATING
HW	HOT WATER
ID	INSIDE DIAMETER
INV ELEV	INVERT ELEVATION
IN WG	INCHES OF WATER GAUGE
IN	INCHES
INS	INSULATION
IPS	IRON PIPE SIZE
LAV	LAVATORY
LBS	POUND(S)
LF	LINEAL FEET
LWT	LEAVING WATER TEMPERATURE
MA	MANUAL AIR VENT
MAX	MAXIMUM
MBH	BTU PER HOUR, THOUSAND
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NO.	NUMBER
NPCW	NON-POTABLE COLD WATER
NT	NEUTRALIZING TANK
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OV	OUTLET VELOCITY
OZ	OUNCE
PI	PRESSURE INDICATOR
PRV	PRESSURE REDUCING VALVE
PLBG	PLUMBING
PPM	PARTS PER MILLION
PRESS	PRESSURE
PVC	POLYVINYL CHLORIDE
QTY	QUANTITY
RD	ROOF DRAIN
REQ	REQUIRED
RL	ROOF LEADER
SAN	SANITARY
SEC	SECOND
SEW	SEWER
SP GR	SPECIFIC GRAVITY
SHA	SHOCK ABSORBER
SPEC	SPECIFICATION
SQ FT	SQUARE FEET
SQ IN	SQUARE INCH
STD	STANDARD
TD	TRENCH DRAIN
TEMP, T	TEMPERATURE
TYP	TYPICAL
UG	UNDERGROUND
VAC	VACUUM
VB	VACUUM BREAKER
VEL	VELOCITY
VSC	VISCOSITY
VOL	VOLUME
VTR	VENT THROUGH ROOF

*NOTE: NOT ALL SYMBOLS ARE USED.

PLUMBING PIPING SYMBOLS

SYMBOL	DESCRIPTION
	ANGLE VALVE, GATE
	ANGLE VALVE, GLOBE
	ANGLED TRIPLE DUTY VALVE (SHUT-OFF, CHECK AND BALANCING)
	TRIPLE DUTY VALVE (SHUT-OFF, CHECK AND BALANCING)
	BALL VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	DIAPHRAGM VALVE
	GATE VALVE
	GLOBE VALVE
	PLUG VALVE
	CIRCUIT SETTER/BALANCING VALVE
	PRESSURE REDUCING VALVE
	RELIEF OR SAFETY VALVE
	BACK FLOW PREVENTER
	REDUCED PRESSURE BACK FLOW PREVENTER
M	MOTORIZED VALVE
CV CV	PNEUMATICALLY CONTROLLED VALVE-PNEUMATICALLY OPERATED. (2-WAY AND 3-WAY SHOWN)
CV CV	DIGITALLY CONTROLLED VALVE-PNEUMATICALLY OPERATED (2-WAY AND 3-WAY SHOWN)
	ELBOW - TURNED UP
	ELBOW - TURNED DOWN
	TEE - OUTLET UP
	TEE - OUTLET DOWN
	TEE - SIDE VIEW
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	PIPE CAP
	WYE STRAINER WITH ELBOW DOWN VALVE
	UNION
	FLANGED CONNECTION
	PIGTAIL/SYPHON
	EXPANSION JOINT
	INSULATED PIPE
	FLEXIBLE PIPING CONNECTION
	EXPANSION LOOP
	NEEDLE VALVE
P	PRESSURE GAUGE W/ GAUGE COCK
TAV	THERMOSTATIC AIR VENT W/ COCK
AAV	AUTOMATIC AIR VENT W/ COCK
	THERMOMETER
M	METER
	SHOWER HEAD
	SLAB / WALL PENETRATION (RISER)
HB	HOSE BIBB
WH	WALL HYDRANT
WCO	WALL CLEAN OUT
ECO	END CLEAN OUT

*NOTE: NOT ALL SYMBOLS ARE USED.

GENERAL SYMBOLS

SYMBOL	DESCRIPTION
X / XXX	SECTION LETTER; INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN
1	DRAWING NOTE
C22	COLUMN REFERENCE
	POINT OF CONNECTION
1	DRAWING REVISION NUMBER
	DRAWING REVISION CLOUD

*NOTE: NOT ALL SYMBOLS ARE USED.

PLUMBING PIPING LEGEND

SYMBOL	ABBREVIATION	DESCRIPTION
———	CW	DOMESTIC COLD WATER
———	HW	DOMESTIC HOT WATER
—#°F—	HW	DOMESTIC HOT WATER ("#" NOTES TEMPERATURE)
———	T	TEMPERED DOMESTIC WATER
———	HWR	DOMESTIC HOT WATER RETURN
———	SS	SANITARY SEWER
———	GW	GREASE WASTE
———	OW	OILY WATER SEWER
———	SW	STORM WATER DRAIN
———	CS	CHEMICAL SEWER
— — —	SV	SANITARY SEWER VENT
— — —	GV	GREASE WASTE VENT
— — —	OV	OILY WATER SEWER VENT
— — —	CV	CHEMICAL VENT
———	C	CONDENSATE DRAIN
———	CA	COMPRESSED AIR
———	CO_2	CARBON DIOXIDE
———	MA	MEDICAL AIR
———	N	NITROGEN
———	N_20	NITROUS OXIDE
———	WAGD	WASTE ANESTHETIC GAS DISPOSAL
———	O	OXYGEN
———	VAC	VACUUM
~~		HEAT TRACED PIPE
———	R	RELIEF LINE
———	NG	NATURAL GAS
———		EXISTING PIPE (SEE ABOVE FOR SYMBOL & ABBREVIATION)
×××××		EXISTING PIPE TO BE REMOVED (SEE ABOVE FOR SYMBOL & ABBREVIATION)

*NOTE: NOT ALL SYMBOLS ARE USED.

PLUMBING EQUIPMENT ABBREVIATIONS

ABBREVIATION	DESCRIPTION
B-1	BOILER
BT-1	BATH TUB
CO	CLEAN OUT
CS-1	CLINICAL SINK
DF-1	DRINKING FOUNTAIN
ES-1	EMERGENCY SHOWER
EW-1	EMERGENCY EYEWASH
EWC-1	ELECTRIC WATER COOLER
EWES-1	EMERGENCY EYEWASH AND SHOWER COMBINATION UNIT
EWH-1	ELECTRIC WATER HEATER
FCO	FLOOR CLEANOUT
FD-1	FLOOR DRAIN
FS-1	FLOOR SINK
GT-1	GREASE TRAP
GWH-1	GAS WATER HEATER
HB-1	HOSE BIBB
IMB-1	ICE MACHINE BOX
IWH-1	INSTANTANEOUS WATER HEATER
L-1	LAVATORY
LS-1	LAVATORY SYSTEM
LT-1	LAUNDRY TUB
MB-1	MOP BASIN
MS-1	MOP SINK
ORD-1	OVERFLOW ROOF DRAIN
P-1	PUMP
PRV-1	PRESSURE REDUCING VALVE
RD-1	ROOF DRAIN
S-1	SINK
SH-1	SHOWER
SLS-1	SEWER LIFT STATION
SP-1	SUMP PUMP
SS-1	SERVICE SINK
TMV-1	TEMPERATURE MIXING VALVE
UR-1	URINAL
WC-1	WATER CLOSET
WCO	WALL CLEAN OUT
WF-1	WASH FOUNTAIN
WH-1	WALL HYDRANT
WMB-1	WASHING MACHINE OUTLET BOX
WS-1	WATER SOFTNER

*NOTE: NOT ALL SYMBOLS ARE USED.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:
0	100% CONSTRUCTION DOCUMENTS	08/21/23

DESIGNED BY:	DLK
DRAWN BY:	KPW
CHECKED BY:	BTM
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	PPSL-VSF
	23-10-6
ISSUE DATE:	08/21/2023
APPROVED BY:	BTM
SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
BRIAN T. MILLER
License No. 28086
PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING
8-21-23

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: PPSL-VSF 23-10-6

PLUMBING LEGENDS & ABBREVIATIONS

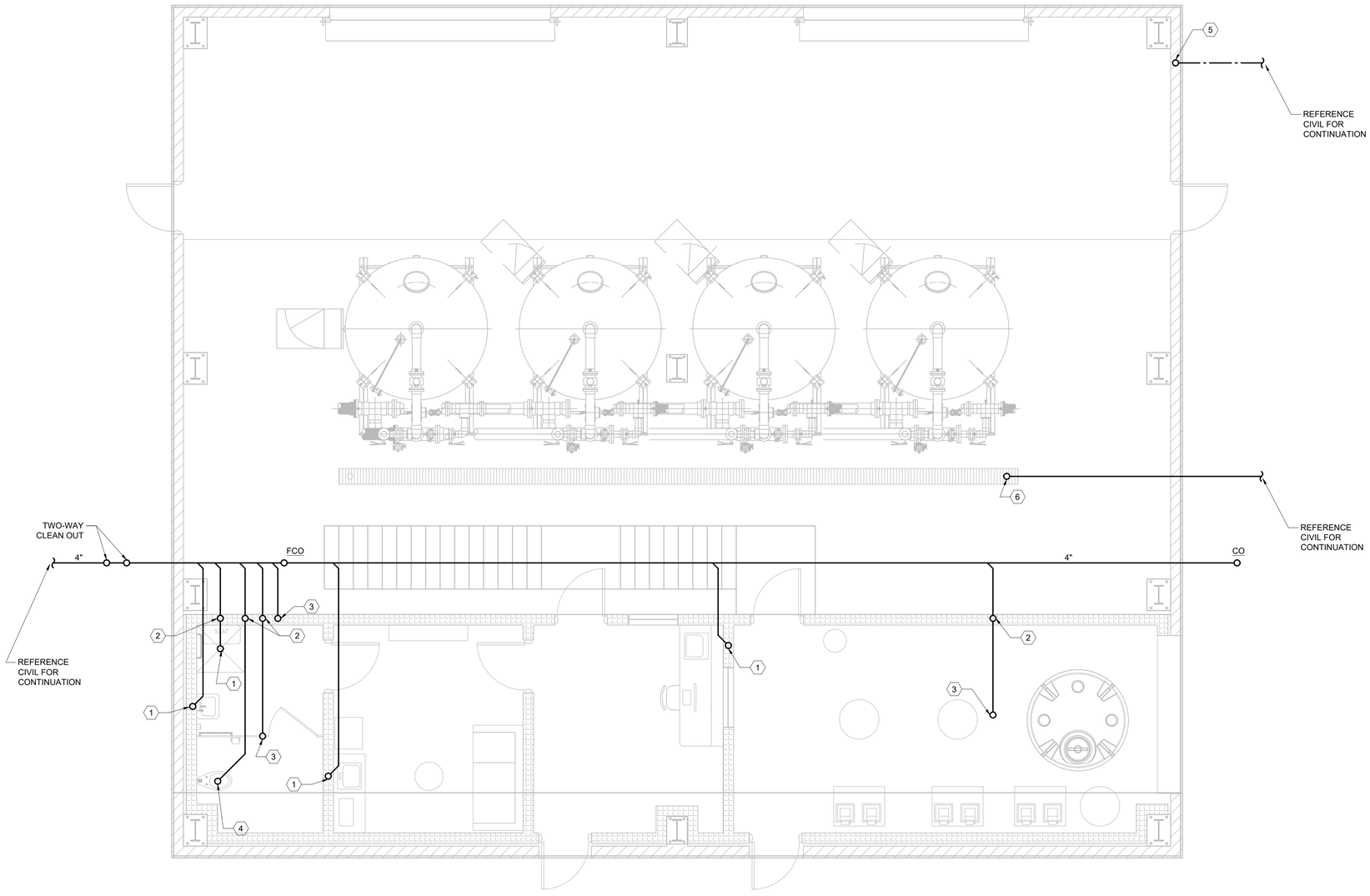
MCA Engineering & Construction
BATON ROUGE - NEW ORLEANS

JOB NO: STP23006
BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
P-001
SHEET XX OF XX

KEY NOTES:

1. 2" SS UP TO LEVEL ABOVE.
2. 2" SV UP TO LEVEL ABOVE.
3. 3" SS UP TO LEVEL ABOVE.
4. 4" SS UP TO LEVEL ABOVE.
5. 2-1/2" CW UP TO LEVEL ABOVE.
6. 4" PIPE UP TO TRENCH DRAIN.



1 PLUMBING UNDERFLOOR PLAN
SCALE: 1/4" = 1'-0"

0' 1' 2' 3' 4' 5'

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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PROJECT No.:	PPSL-VSF 23-10-6
ISSUE DATE:	08/21/2023
APPROVED BY:	BTM
SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
BRIAN T. MILLER
License No. 26080
PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING
8-21-23

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: PPSL-VSF 23-10-6

PLUMBING UNDERFLOOR PLAN

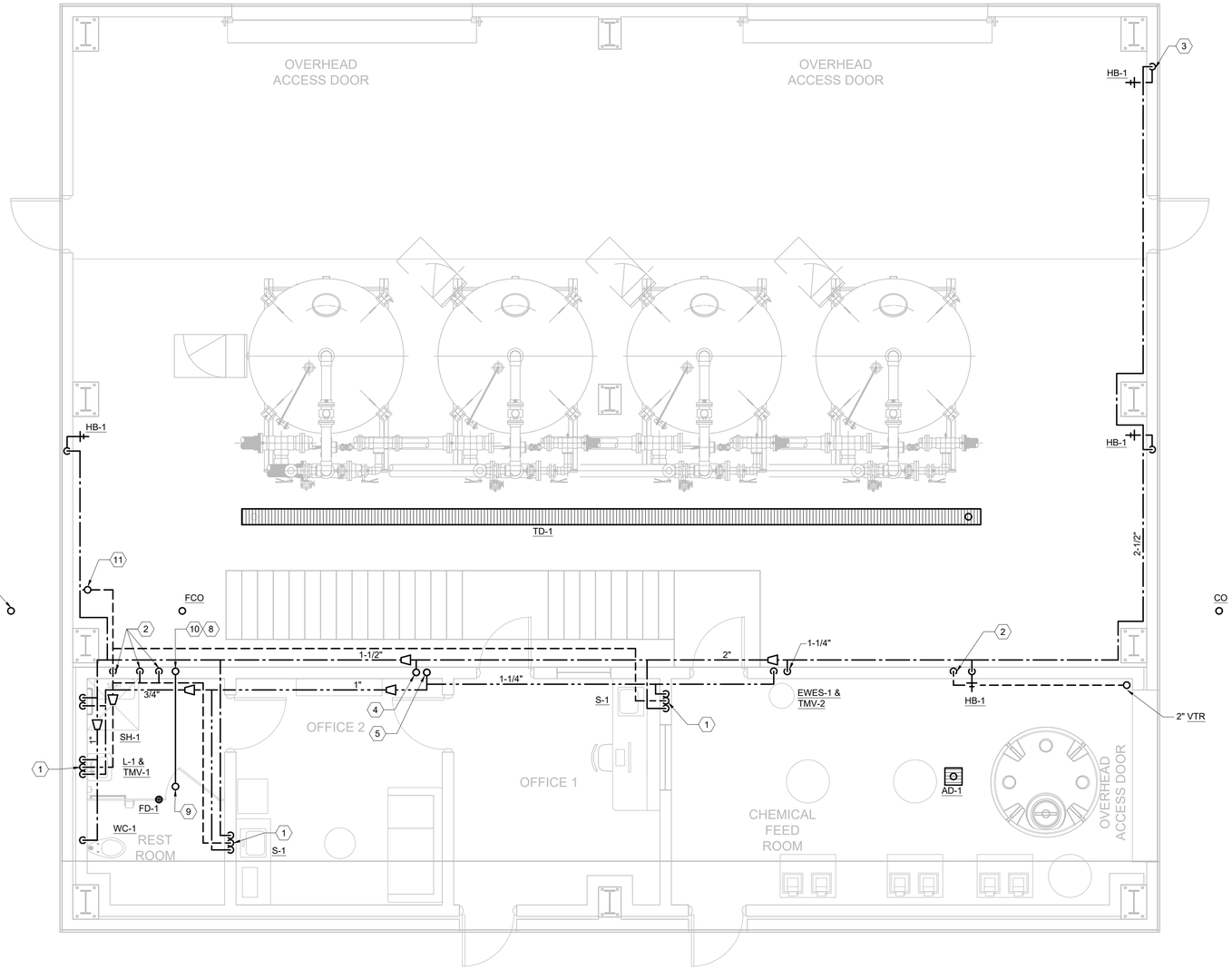
MCA Engineering & Construction
BATON ROUGE - NEW ORLEANS

JOB NO: STP23006
BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
P-101
SHEET XX OF XX

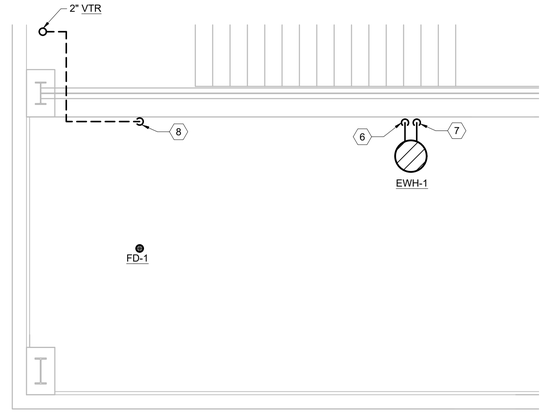
KEY NOTES:

1. 2" SS DOWN TO LEVEL BELOW.
2. 2" SV DOWN TO LEVEL BELOW.
3. 2-1/2" CW DOWN TO LEVEL BELOW.
4. 1-1/4" CW UP TO LEVEL ABOVE.
5. 1-1/4" HW UP TO LEVEL ABOVE.
6. 1-1/4" CW DOWN TO LEVEL BELOW.
7. 1-1/4" HW DOWN TO LEVEL BELOW.
8. 2" SV UP TO LEVEL ABOVE.
9. 3" SS UP TO LEVEL ABOVE.
10. 3" SS DOWN TO LEVEL BELOW.
11. 3" SV UP TO LEVEL ABOVE.



1 PLUMBING FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

0' 1' 2' 3' 4' 5'



2 PLUMBING SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"

0' 1' 2' 3' 4' 5'

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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APPROVED BY:	BTM
SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
BRIAN T. MILLER
License No. 28080
PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING
8-21-23

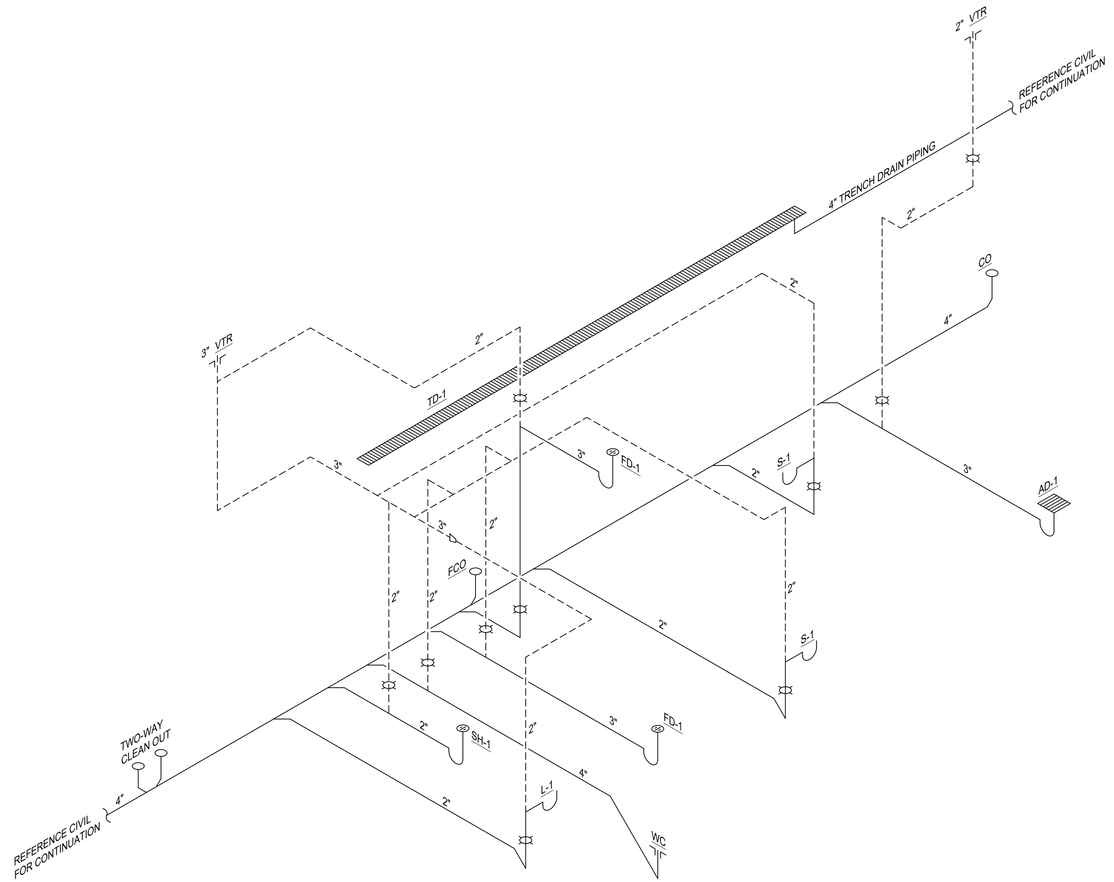
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: PPSL-VSF 23-10-6

PLUMBING FLOOR PLAN

MCA Engineering & Construction
BATON ROUGE - NEW ORLEANS

JOB NO: STP23006
BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
P-102
SHEET XX OF XX



1 PLUMBING RISER DIAGRAM - SS & SV
SCALE: N.T.S.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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ISSUE DATE:	08/21/2023
APPROVED BY:	BTM
SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
BRIAN T. MILLER
License No. 26080
PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING
8-21-23

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: PPSL-VSF 23-10-6

PLUMBING RISER DIAGRAM - SS & SV

MCA Engineering & Construction
BATON ROUGE · NEW ORLEANS

JOB NO: STP23006
BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
P-201
SHEET XX OF XX

PLUMBING FIXTURE SCHEDULE

FIXTURE TAG	WASTE	VENT	CW	HW OR TEMPERED	DESCRIPTION
AD-1	3"	2"	-	-	CAST IRON, TRACTOR GRATE
EWES-1	-	-	-	1-1/4"	BRADLEY MODEL S19314 COMBINATION SHOWER AND EYE WASH SAFETY STATION
FD-1	3"	2"	-	-	CAST IRON, STANDARD GRATE
HB-1	-	-	3/4"	-	EXPOSED HOSE BIBB
L-1	2"	2"	1/2"	1/2"	ADA VITREOUS CHINA, WALL MOUNTED, SENSOR FAUCET
S-1	2"	2"	3/4"	3/4"	STAINLESS STEEL, SINGLE BOWL, MANUAL FAUCET
SH-1	2"	2"	3/4"	3/4"	ADA SHOWER
WC-1	4"	2"	1"	-	ADA VITREOUS CHINA, FLOOR MOUNTED, SENSOR FLUSH VALVE
TD-1	4"	-	-	-	LOAD CLASS C, STAINLESS STEEL GRATE

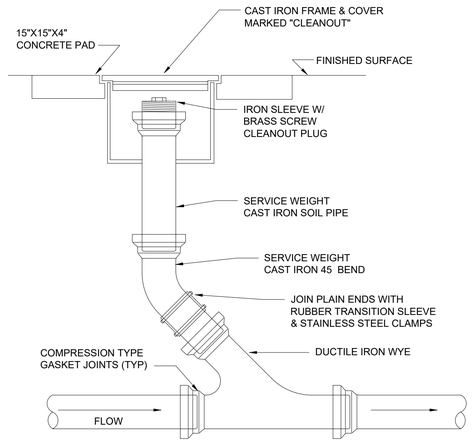
NOTES:
1. OUTLET SIZE SHALL MATCH PIPE SIZE AS NOTED ON THE DRAWING.

THERMAL MIXING VALVE SCHEDULE

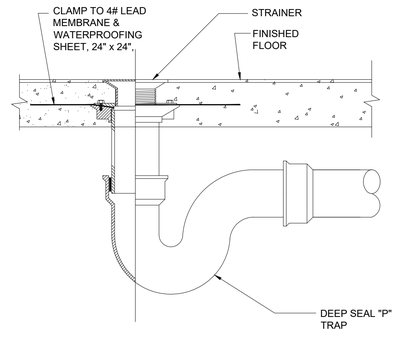
MARK	SERVICE	TYPE	MANUFACTURER	MODEL
TMV-1	L-1	POINT OF USE	POWERS	LFUSG-B
TMV-2	EWES-1	POINT OF USE	POWERS	ETV400

ELECTRIC WATER HEATER SCHEDULE (STORAGE)

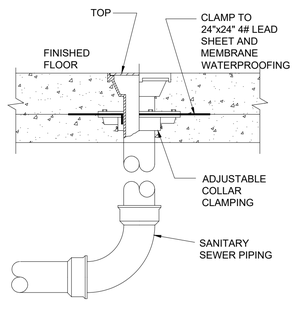
MARK	SERVICE	STORAGE CAPACITY (GAL)	DEMAND (GPH)	RECOVERY (GPH)	TEMP RISE (DEG F)	KW	ELECTRICAL V / PH	MANUFACTURER	MODEL
EWH-1	BUILDING	50	154	123	100	30	480 / 3	A.O SMITH	DRE-52-30



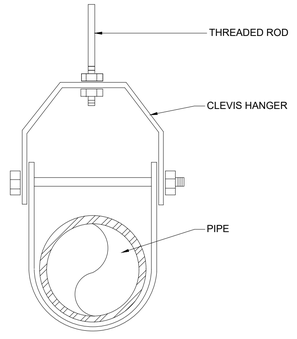
1 EXTERIOR SEWER CLEANOUT DETAIL
SCALE: N.T.S.



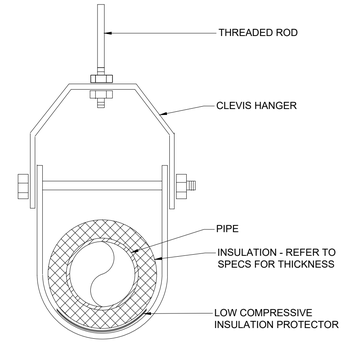
2 FLOOR DRAIN DETAIL
SCALE: N.T.S.



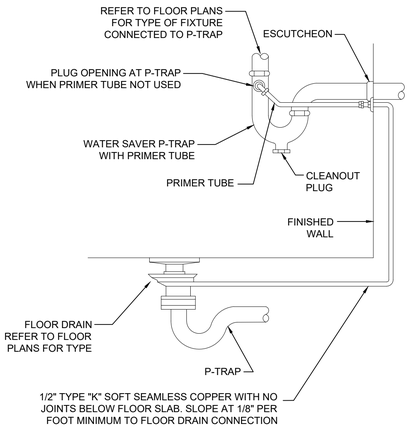
3 FLUSH/FLOOR CLEANOUT DETAIL
SCALE: N.T.S.



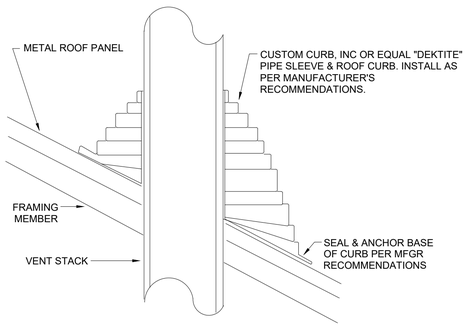
4 PIPE HANGER (CLEVIS) NON INSULATED
SCALE: N.T.S.



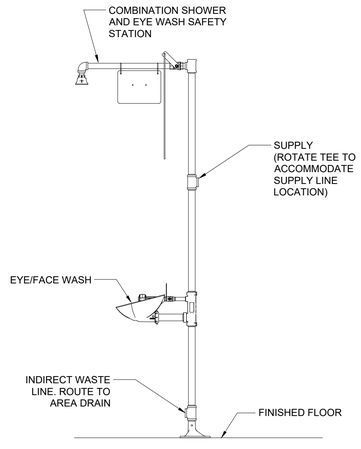
5 PIPE HANGER (CLEVIS) INSULATED
SCALE: N.T.S.



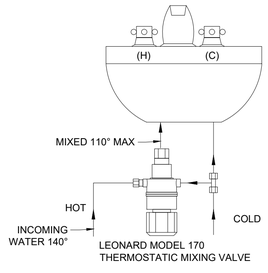
6 TRAP PRIMER DETAIL
SCALE: N.T.S.



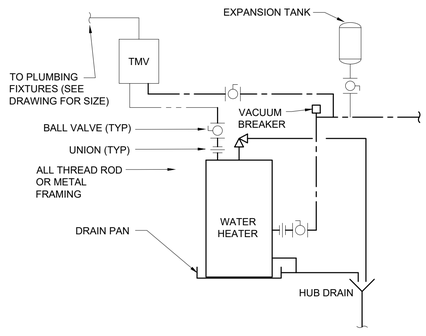
7 VENT FLASHING DETAIL - METAL ROOF
SCALE: N.T.S.



8 EMERGENCY SHOWER WITH EYEWASH
SCALE: N.T.S.



9 TYPICAL SINGLE SINK MIXING VALVE
SCALE: N.T.S.



10 TYPICAL WATER HEATER DETAIL
SCALE: N.T.S.

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:
0	100% CONSTRUCTION DOCUMENTS	08/21/23

DESIGNED BY:	DLK
DRAWN BY:	KPW
CHECKED BY:	BTM
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	PPSL-VSF 23-10-6
ISSUE DATE:	08/21/2023
APPROVED BY:	BTM
SHEET SIZE:	ANSI D
SCALE:	

BRIAN T. MILLER
License No. 26080
PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING
STATE OF LOUISIANA
8-21-23

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: PPSL-VSF 23-10-6

PLUMBING DETAILS & SCHEDULES

MCA Engineering & Construction
BATON ROUGE - NEW ORLEANS

JOB NO: STP23006
BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
P-301
SHEET XX OF XX

MECHANICAL LEGENDS / SYMBOLS - AIR SIDE

SYMBOL	DESCRIPTION
	FLEXIBLE CONNECTION
	SQUARE ELBOW
	SQUARE ELBOW WITH TURNING VANES
	LONG RADIUS ELBOW
R	DUCT RISE IN DIRECTION OF AIR FLOW
D	DUCT DROP IN DIRECTION OF AIR FLOW
AP	ACCESS PANEL
10x8	DUCTWORK, SIZE IN INCHES, FIRST DIMENSION IS SIDE SHOWN
	MANUAL BALANCING DAMPER
	LINED DUCTWORK
	RECTANGULAR TRANSITION
	RECTANGULAR TO ROUND TRANSITION
	RECTANGULAR BOOT TAP WITH BALANCING DAMPER
	ROUND TAP WITH BALANCING DAMPER
	SUPPLY REGISTER
	EXHAUST/RETURN REGISTER
	DUCT TURN UP
	DUCT TURN DOWN
	ROUND CEILING DIFFUSER
	SUPPLY DIFFUSER
	RETURN DIFFUSER
	EXHAUST GRILLE
	LINEAR SLOT SUPPLY DIFFUSER
	LINEAR SLOT RETURN DIFFUSER
	ITEMS TO BE REMOVED (DEMO)
	EXISTING
	NEW
	NEW EQUIPMENT (DASHED LINES INDICATE CLEARANCE)
	FLEXIBLE DUCT
	INDICATES AIR FLOW DIRECTION - SA OR OA
	INDICATES AIR FLOW DIRECTION - RA OR EA
VFD	VARIABLE FREQUENCY DRIVE
M	MOTORIZED DAMPER
FD	FD: FIRE DAMPER SD: SMOKE DAMPER FSD: COMBINATION FIRE SMOKE DAMPER

*NOTE: NOT ALL SYMBOLS ARE USED.

MECHANICAL LEGENDS / SYMBOLS - CONTROLS

SYMBOL	DESCRIPTION
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
	CURRENT SWITCH
T ITEM	THERMOSTAT (SUBSCRIPT DENOTES ITEM CONTROLLED)
TS	TEMPERATURE SENSOR
TT	TEMPERATURE TRANSMITTER
A	AUDIBLE ALARM
V	VISUAL ALARM
H ITEM	HUMIDISTAT (SUBSCRIPT DENOTES ITEM(S) CONTROLLED)
HS	HUMIDITY SENSOR
G TYPE	GAS SENSOR (SUBSCRIPT DENOTES TYPE OF SENSOR)
	DENOTES CONTROL WIRING CONNECTING DEVICES
	PNEUMATIC TUBE
	CONTROL / ALARM WIRE / CABLE
	POWER WIRE
	BAS / LAN WIRE
	FAN
	DAMPER
H L	MAGNEHELIC GAUGE
	TEMPERATURE SENSOR
	HUMIDITY SENSOR
	AVERAGING TEMPERATURE SENSOR
	STATIC PRESSURE SWITCH
	SMOKE OR CO2 DETECTOR
H L	DIFFERENTIAL PRESSURE SENSOR
M	ELECTRIC/ELECTRONIC ACTUATOR
	AIRFLOW MONITORING STATION
	STATIC PRESSURE TRANSMITTER

*NOTE: NOT ALL SYMBOLS ARE USED.

MECHANICAL LEGENDS / SYMBOLS - WATER SIDE

SYMBOL	DESCRIPTION
	TRIPLE DUTY VALVE (SHUT-OFF, CHECK AND BALANCING)
	BALL VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	DIAPHRAGM VALVE
	GATE VALVE
	GLOBE VALVE
	PLUG VALVE
	CIRCUIT SETTER/BALANCING VALVE
	PRESSURE REDUCING VALVE
	RELIEF OR SAFETY VALVE
	BACK FLOW PREVENTER: REDUCED - PRESSURE - PRINCIPLE
	BACK FLOW PREVENTER: DOUBLE CHECK
	THREE WAY VALVE
	ELBOW - TURNED DOWN
	ELBOW - TURNED UP
	TEE - OUTLET UP
	TEE - OUTLET DOWN
	TEE - SIDE VIEW
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	PIPE CAP
	STRAINER
	UNION
	FLANGED CONNECTION
	EXPANSION JOINT
	INSULATED PIPE
	FLEXIBLE PIPING CONNECTION
	PIPE ANCHOR
PS	PIPE SUPPORT
	PIPE GUIDE
	PUMP
	NEEDLE VALVE
P	PRESSURE GAUGE W/ GAUGE COCK
FM	FLOW METER
	FLOW DIRECTION
FS	FLOW SWITCH
TE	TEMPERATURE SENSOR
DPE	DIFFERENTIAL PRESSURE SENSOR
M	ELECTRIC / ELECTRONIC ACTUATOR
	PNEUMATIC ACTUATOR
S	SOLENOID ACTUATOR
TW	THERMO WELL
TE	TEMPERATURE INDICATOR (THERMOMETER)
	AIR VENT - AUTOMATIC
PSD	PUMP SUCTION DIFFUSER

*NOTE: NOT ALL SYMBOLS ARE USED.

MECHANICAL ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AC	AIR CONDITIONING
ACCU	AIR COOLED CONDENSING UNIT
AF	AIR FILTER
AFF	ABOVE FINISHED FLOOR
AFS	AIR FLOW STATION
AHU	AIR HANDLING UNIT
AMB	AMBIENT
AMP	AMPERE
AS	AIR SEPARATOR
AUTO	AUTOMATIC
AV	AIR VENT
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BFP	BACKFLOW PREVENTER
BOD	BOTTOM OF DUCT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	COMMON
CAP	CAPACITY
CC	COOLING COIL
CD	CEILING DIFFUSER
CDS	CENTRIFUGAL DIRT SEPARATOR
CFF	CAP FOR FUTURE
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHWCF	CHILLED WATER CHEMICAL FEED
CHWP	CHILLED WATER PUMP
CL	CENTERLINE
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
COMP	COMPRESSOR
COND	CONDENSING/ CONDENSATE
CP	CONTROL PANEL
CU	CONDENSING UNIT
CT	COOLING TOWER
CV	CONTROL VALVE
CW	COLD WATER
CWCF	CONDENSER WATER CHEMICAL FEED
CWR	CONDENSER WATER RETURN
CWP	CONDENSER WATER PUMP
CWS	CONDENSER WATER SUPPLY
DB	DRY BULB TEMP (DEG F)
DDC	DIRECT DIGITAL CONTROL
DH	DEHUMIDIFIER
DIA	DIAMETER
DIFF	DIFFUSER
DIM	DIMENSION
DMPR	DAMPER
DN	DOWN
DP	DIFFERENTIAL PRESSURE
DPS	DIFFERENTIAL PRESSURE SWITCH
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DWG	DRAWING
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EDH	ELECTRIC DUCT HEATER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ENT	ENTERING
EOM	END OF MAIN DRIP
ERU	ENERGY RECOVERY UNIT
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
EUH	ELECTRIC UNIT HEATER
EVAP	EVAPORATOR
EXH	EXHAUST
EXT	EXTERNAL
FA	FRESH AIR
FC/FCU	FAN COIL UNIT
FD	FIRE DAMPER
FT	FEET
FLA	FULL LOAD AMPS
FL	FLOOR
FLEX	FLEXIBLE
FO	FLAT OVAL
FPB	FAN POWERED BOX
FPM	FEET PER MINUTE
FUT	FUTURE
FV	FACE VELOCITY
GALV	GALVANIZED
GND	GROUND
GPM	GALLONS PER MINUTE
GPH	GALLONS PER HOUR
GUH	GAS UNIT HEATER
GV	GATE VALVE
HC	HEATING COIL
HORIZ	HORIZONTAL
HP	HORSEPOWER
HR	HOUR
HWS	HEATING WATER SUPPLY
HWR	HEATING WATER RETURN
ID	INSIDE DIAMETER
IN	INCHES
KW	KILOWATTS
L	LOUVER
LVG	LEAVING
LEL	LOWER EXPOSURE LIMIT
LF	LINEAR FEET
MA	MIXED AIR
MAX	MAXIMUM
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MFR	MANUFACTURER
NC	NORMALLY CLOSED
NG	NATURAL GAS
MIN	MINIMUM
NK	NECK
MVD	MANUAL VOLUME DAMPER
NAT	NATURAL
NFPA	NATIONAL FIRE PROTECTION ASSOC.
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAF	OUTSIDE AIR FAN
OAU	OUTSIDE AIR UNITS
OBVD	OPPOSED BLADE VOLUME DAMPER
OC	ON CENTER
OS&Y	OUTSIDE STEM AND YOKE
OZ	OUNCES (PRESSURE)

*NOTE: NOT ALL SYMBOLS ARE USED.

MECHANICAL ABBREVIATIONS

ABBREVIATION	DESCRIPTION
PCHR	PRIMARY CHILLED WATER RETURN
PCHS	PRIMARY CHILLED WATER SUPPLY
PCHWP	PRIMARY CHILLED WATER PUMP
PD	PRESSURE DROP
PRESS	PRESSURE
PROP	PROPELLER
PTAC	PACKAGED TERMINAL AIR CONDITIONER
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
RA	RETURN AIR
REF	REFERENCE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RND	ROUND
RPM	REVOLUTIONS PER MINUTE
RTU	ROOF TOP UNIT
SA	SUPPLY AIR
SCHR	SECONDARY CHILLED WATER RETURN
SCHS	SECONDARY CHILLED WATER SUPPLY
SCHWP	SECONDARY CHILLED WATER PUMP
SD	SMOKE DAMPER
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SF	SUPPLY AIR FAN
SHT	SHEET
SP	STATIC PRESSURE
SPEC	SPECIFICATIONS
TC	TEMPERATURE CONTROLLER
TEF	TRUCK EXHAUST FAN
TEMP	TEMPERATURE
TK	TANK
TOD	TOP OF DUCT
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LISTED
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VI	VIBRATION ISOLATOR
VOJ	VERIFY ON JOB
W /	WITH
W / O	WITHOUT
WB	WET BULB (DEG F)

*NOTE: NOT ALL SYMBOLS ARE USED.

GENERAL SYMBOLS

SYMBOL	DESCRIPTION
	SECTION LETTER INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN
1	DRAWING NOTE
C22	COLUMN REFERENCE
	POINT OF CONNECTION
1	DRAWING REVISION NUMBER
	DRAWING REVISION CLOUD
TP SIZE CFM	TYPE OF AIR DEVICE (REFER TO HVAC SCHEDULE DRAWING) AIR DEVICE SIZE (WHERE APPLICABLE) CFM

*NOTE: NOT ALL SYMBOLS ARE USED.

MECHANICAL PIPING LEGEND

SYMBOL	ABBREVIATION	DESCRIPTION
	CHS	CHILLED WATER SUPPLY
	CHR	CHILLED WATER RETURN
	CWS	CONDENSER WATER SUPPLY
	CWR	CONDENSER WATER RETURN
	HWS	HEATING WATER SUPPLY
	HWR	HEATING WATER RETURN
	RL	REFRIGERANT LIQUID
	RS	REFRIGERANT SUCTION
	FOS	FUEL OIL SUPPLY
	FOR	FUEL OIL RETURN
		EXISTING (SEE ABOVE FOR DESIGNATION)

*NOTE: NOT ALL SYMBOLS ARE USED.

MECHANICAL GENERAL NOTES

A. ALL WORK SHALL BE DONE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL CODES, AND COMPLY WITH LOCAL AUTHORITIES HAVING JURISDICTION.

B. PROVIDE MANUFACTURER RECOMMENDED MAINTENANCE CLEARANCES AT ALL EQUIPMENT.

C. PROVIDE AND INSTALL MANUAL VOLUME DAMPERS ON ALL MAIN DUCT TAKEOFFS TO SUPPLY DIFFUSERS.

D. PROVIDE OFFSETS, RISERS AND DROPS TO COORDINATE DUCTWORK WITH STRUCTURE, LIGHTING, SPRINKLER PIPING, CONDUITS, PLUMBING, ETC.

E. CONTRACTOR IS TO COORDINATE WITH ALL APPROPRIATE TRADES TO ELIMINATE CONFLICTS AND PROVIDE MANUFACTURER REQUIRED MAINTENANCE AND REPAIR CLEARANCES PRIOR TO ORDERING EQUIPMENT AND PRIOR TO ROUGH-IN.

F. CONTRACTOR SHALL BE COMPLETELY FAMILIAR WITH THE SCOPE OF WORK AND SHALL INCLUDE ALL WORK IN BID PRICE.

G. DUCT DIMENSIONS INDICATED ON DRAWINGS ARE SHEET METAL SIZES. ALLOWANCE IS MADE FOR INTERNAL LINER WHERE APPLICABLE. IF DOUBLE WALL DUCTWORK IS UTILIZED, THE SIZE SHOWN INDICATES THE OUTER DUCT DIMENSION.

H. IF REQUESTED BY THE OWNER/ARCHITECT, THE CONTRACTOR SHALL PROVIDE AND INSTALL CLEAR, PROTECTIVE LOCKABLE COVERS EQUAL TO RESIDEO MODEL TG511A1000 FOR ALL THERMOSTATS AND WALL MOUNTED SENSORS, HUMIDISTATS, ETC.

I. CONTRACTOR SHALL INSTALL EQUIPMENT TO ACCOMMODATE ARCHITECTURAL CEILING HEIGHTS.

J. EXISTING SYSTEMS, INCLUDING EXISTING UTILITIES TO BE COORDINATED BY CONTRACTOR INCLUDES SEWER, GAS, DOMESTIC WATER, CHILLED WATER, ELECTRIC DUCT BANKS, AND POWER. COMPLETELY COORDINATE WITH ALL EXISTING CONDITIONS, SYSTEMS, INSTALLATION, PRIOR TO BEGINNING WORK AND ROUGH-IN. NOT ALL EXISTING SYSTEMS ARE INCLUDED ON DRAWINGS. VERIFY ALL SYSTEM LOCATIONS PRIOR TO STARTING WORK.

K. CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDS FOR THOROUGH INSPECTION IN REGARD TO ANY WORK NECESSARY TO COMPLETE THE PROJECTS SCOPE OF WORK.

L. COORDINATE INSTALLATION OF ALL MECHANICAL SYSTEMS WITH ASSOCIATED TRADES PRIOR TO ROUGH-IN.

M. CONTRACTOR SHALL COORDINATE AND REVISE DUCTWORK DIMENSIONS TO ACCOMMODATE NEW AND EXISTING CONFLICTS INCLUDING STRUCTURAL, MECHANICAL, PLUMBING AND ARCHITECTURAL SYSTEMS. DUCTWORK FREE AREA SHALL BE MAINTAINED AS NOTED.

N. PROVIDE FIRE DAMPERS WHERE SHOWN ON PLANS AND AS REQUIRED BY N.F.P.A. AND LOCAL BUILDING CODES.

O. PROVIDE U.L. LISTED SMOKE DETECTORS IN THE MAIN SUPPLY AND RETURN AIR DUCT FOR ALL RECIRCULATING AIR SYSTEMS HANDLING OVER 2000 C.F.M. NOTE: SMOKE DETECTORS SHALL BE WIRED TO THE BUILDING FIRE ALARM SYSTEM BY FIRE ALARM CONTRACTOR. FIRE ALARM CONTRACTOR IS TO PROVIDE AND INSTALL ALL WIRING, TERMINATIONS, ETC. TO PROVIDE A COMPLETE, PROPERLY FUNCTIONING AND OPERATING SYSTEM.

P. PROVIDE ALL GAS REGULATORS REQUIRED FOR MANUFACTURER RECOMMENDED PRESSURE AND FLOW TO ALL NEW GAS FIRED EQUIPMENT.

Q. UNDER NO CIRCUMSTANCES SHALL EQUIPMENT AND RELATED SYSTEM COMPONENTS FOUND POSITIVE FOR MOLD, MILDEW, ASBESTOS, HARMFUL BACTERIA AND ANY OTHER CONTAMINATION BE PLACED INTO SERVICE. THIS INCLUDES HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS (HVAC) EQUIPMENT, (DUCTWORK, DAMPERS, ETC.), PLUMBING SYSTEMS, FIRE PROTECTION SYSTEMS, CONTROL SYSTEMS, ELECTRICAL SYSTEMS AND RELATED COMPONENTS THAT INVOLVE MATTERS OF HEALTH, HYGIENE, CONTACT HAZARDS AND OTHER CONTAMINATION.

R. PROVIDE ACCESS PANELS FOR EQUIPMENT,VALVES, DAMPER, ETC. LOCATED ABOVE A NON ACCESSIBLE CEILING. ACCESS PANELS SHALL BE LARGE ENOUGH FOR ALL REQUIRED MAINTENANCE, ADJUSTMENT, ECT. PROVIDE MULTIPLE ACCESS PANELS AS REQUIRED. COORDINATE COLOR AND LOCATIONS WITH ARCHITECT. PROVIDE FIRE AND/ OR SMOKE RATED ACCESS PANELS WHERE REQUIRED IN RATED CEILINGS. REFERENCE ARCHITECTURAL DRAWINGS FOR RATED CEILING LOCATIONS. WHERE ACCESS PANELS ARE SHOWN ON ARCHITECTURAL REFLECTED CEILING PLAN, COORDINATE EXACT LOCATION OF EQUIPMENT, DEVICES, ETC. WITH ACCESS PANEL LOCATIONS.

S. PROVIDE TRANSITIONS, AS REQUIRED, PER SMACNA AT ALL EQUIPMENT LOCATIONS.

T. EXHAUST LOUVERS SHALL BE LOCATED MIN. 10 FEET FROM ANY AIR INTAKE OR OPENING INTO THE BUILDING.

U. PROVIDE TURNING VANES FOR ALL DUCT ELBOWS WHERE DUCT IS POSITIVELY PRESSURIZED, EVEN IF TURNING VANES ARE NOT SHOWN IN ELBOW.

V. DO NOT ROUTE PIPE CONTAINING WATER OVER ELECTRICAL EQUIPMENT.

W. CONTRACTOR SHALL COORDINATE EXACT LOCATION OF ALL SLAB PENETRATIONS WITH STRUCTURAL BEAMS, JOISTS, COMPONENTS, ETC. DO NOT CUT OR MODIFY ANY STRUCTURAL COMPONENTS WITHOUT APPROVAL FROM STRUCTURAL ENGINEER.

X. DRAWINGS ARE BASED ON SCHEDULED/SPECIFIED EQUIPMENT. CONTRACTOR SHALL ENSURE PURCHASED EQUIPMENT FITS IN SPACE PROVIDED AND ALL MAINTENANCE / SERVICE CLEARANCES ARE MAINTAINED. CONTRACTOR IS RESPONSIBLE FOR ANY REQUIRED MODIFICATIONS WHERE PURCHASED EQUIPMENT IS DIFFERENT OR HAS DIFFERENT REQUIREMENTS THAN THE BASIS OF DESIGN EQUIPMENT.

Y. MECHANICAL CONTRACTOR SHALL COORDINATE WITH PLUMBING CONTRACTOR ON EXACT LOCATIONS OF ALL FLOOR DRAINS IN MECHANICAL OR EQUIPMENT ROOMS AS NOT TO CONFLICT WITH MECHANICAL EQUIPMENT NOR EQUIPMENT PADS. FLOOR DRAIN LOCATIONS SHOWN ON DRAWINGS ARE BASED ON SCHEDULED EQUIPMENT.

Z. IF NOT CLEARLY SHOWN ON THE MECHANICAL DRAWINGS, REFER TO ARCHITECTURAL DRAWINGS FOR MOUNTING HEIGHTS OF ALL SIDEWALL DIFFUSERS, GRILLES AND REGISTERS. COORDINATE MOUNTING HEIGHT WITH ARCHITECT IF NOT CLEARLY SHOWN ON ARCHITECTURAL DRAWINGS.

AA. CONTRACTOR SHALL COORDINATE ALL WALL MOUNTED DEVICES IN MECHANICAL/EQUIPMENT ROOMS WITH SOUND INSULATION INSTALLED ON THE WALLS. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS WHERE SOUND INSULATION IS INSTALLED ON THE WALLS.

*NOTE: NOT ALL NOTES ARE USED.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:
0	100% CONSTRUCTION DOCUMENTS	08/21/23

DESIGNED BY:	DLK
DRAWN BY:	KPW
CHECKED BY:	BTM
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	PPSL-VSF
ISSUE DATE:	23-10-6
APPROVED BY:	08/21/2023
SHEET SIZE:	BTM
SCALE:	ANSI D

STATE OF LOUISIANA
BRIAN T. MILLER
License No. 26080
PROFESSIONAL ENGINEER IN MECHANICAL ENGINEERING
8-21-23

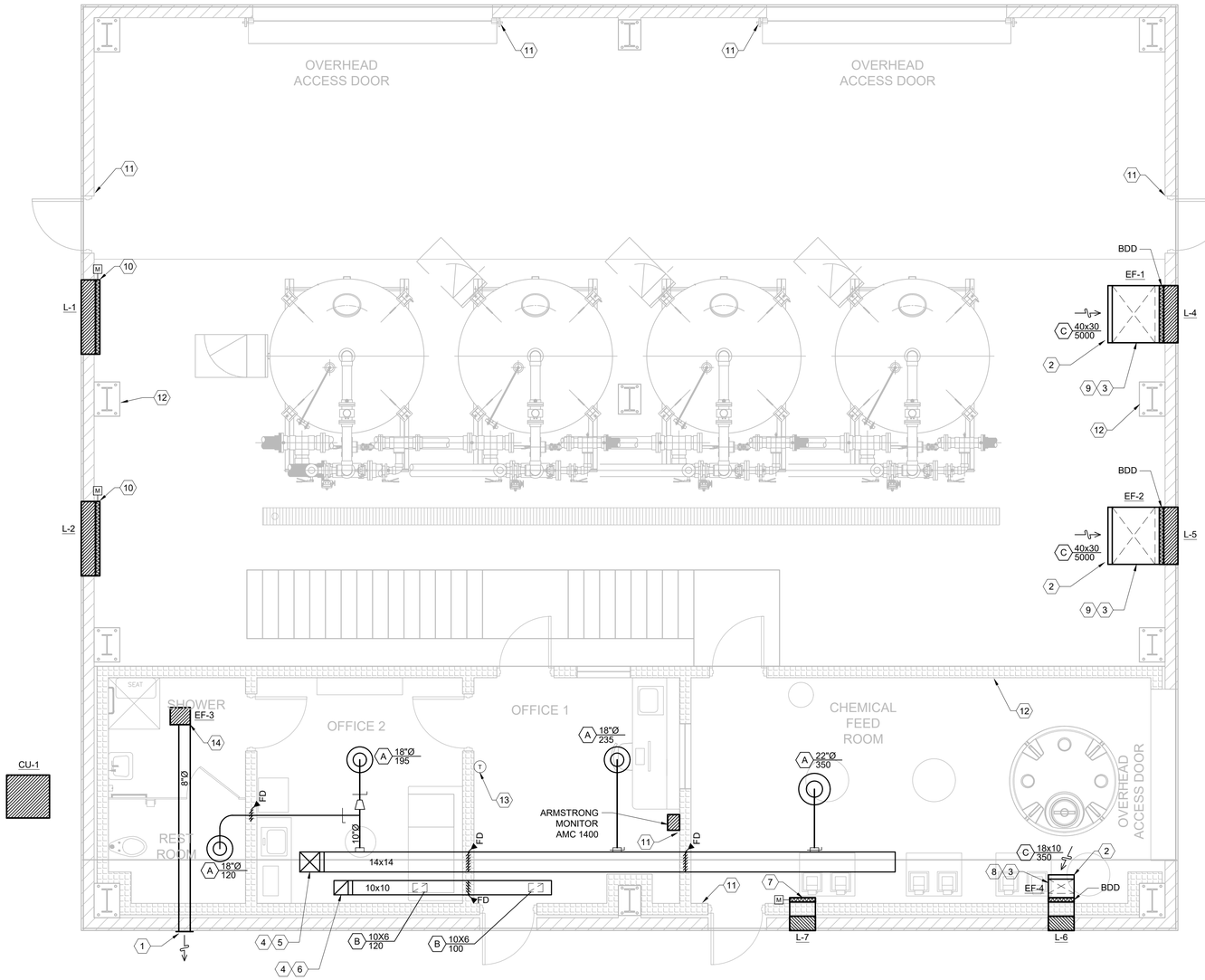
DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: PPSL-VSF 23-10-6

MECHANICAL LEGENDS & ABBREVIATIONS

MCA Engineering & Construction
BATON ROUGE · NEW ORLEANS

JOB NO: STP23006
BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
M-001
SHEET XX OF XX



1 MECHANICAL FLOOR PLAN
SCALE: 1/4" = 1'-0"

0' 1' 2' 3' 4' 5'

KEY NOTES:

1. INSTALL ALUMINUM WALL CAP WITH BUILT-IN BACKDRAFT DAMPER, BIRD SCREEN AND WEATHER HOOD. WALL CAP SHALL MATCH CONNECTING DUCT SIZE.
2. THE BOTTOM OF THE AIR DEVICE SHALL BE LOCATED NO MORE THAN 12 INCHES ABOVE THE FLOOR.
3. EXHAUST FAN LOCATED IN THE VERTICAL PORTION OF THE DUCTWORK SECTION.
4. FIRE DAMPER LOCATED IN VERTICAL DUCTWORK AT THE SLAB.
5. 14x14 SA DUCT UP TO LOFT FLOOR
6. 10x10 RA DUCT UP TO LOFT FLOOR.
7. INTERLOCK MOTORIZED DAMPER FOR L-7 TO THE AMC-1400 GAS MONITOR. WHEN GAS IS DETECTED WITHIN THE CHEMICAL FEED ROOM THE DAMPER SHALL BE IN THE OPEN POSITION AND IN THE CLOSED POSITION DURING NORMAL OPERATION.
8. INTERLOCK EF-4 TO THE AMC-1400 GAS MONITOR. WHEN GAS IS DETECTED WITHIN THE CHEMICAL FEED ROOM EF-4 SHALL RAMP UP TO 820 CFM.
9. INTERLOCK EF-1 AND EF-2 TO THE AMC-1400 GAS MONITOR. WHEN GAS IS DETECTED WITHIN THE FILTER ROOM EF-1 AND EF-2 SHALL ENGAGE. EF-1 AND EF-2 SHALL BE MANUALLY TURNED ON AND OFF BY A HOA MOTOR STARTER LOCATED BELOW EACH EACH EXHAUST FAN DURING NORMAL OPERATION.
10. INTERLOCK MOTORIZED DAMPERS L-1 AND L-2 TO EF-1 AND EF-2. WHEN THE EF-1 AND EF-2 ARE OPERATING, DAMPERS L-1 AND L-2 SHALL BE IN THE OPEN POSITION AND WHEN EF-1 AND EF-2 ARE OFF, DAMPERS L-1 AND L-2 SHALL BE CLOSED.
11. PROVIDE A REMOTE ALARM MODULES EQUAL TO AMC-RAM-3 NEAR THE DOOR ENTRANCE AND NEXT TO AMC-1400 PANEL.
12. PROVIDE AN ELECTROCHEMICAL CHLORINE (Cl_2) SENSOR / TRANSMITTER EQUAL TO AMC-297-A AT THE SHOWN LOCATIONS.
13. PROGRAMMABLE THERMOSTAT TO CONTROL AHU-1 / CU-1.
14. INTERLOCK EF-3 TO AHU-1. EF-3 SHALL OPERATE WHILE AHU-1 IS ON AND EF-3 IS OFF WHEN AHU-1 IS OFF. PROVIDE AN ON/OFF SWITCH TO MANUALLY TURN ON EXHAUST FAN.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:
0	100% CONSTRUCTION DOCUMENTS	08/21/23

DESIGNED BY: DLK
DRAWN BY: KPW
CHECKED BY: BTM
SUBMITTED BY: BBEC, LLC
PROJECT No.: PPSL-VSF
ISSUE DATE: 23-10-6
APPROVED BY: 08/21/2023
SHEET SIZE: BTM
SCALE: ANSI D

STATE OF LOUISIANA
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MECHANICAL FLOOR PLAN

MCA Engineering & Construction
BATON ROUGE - NEW ORLEANS

JOB NO: STP23006
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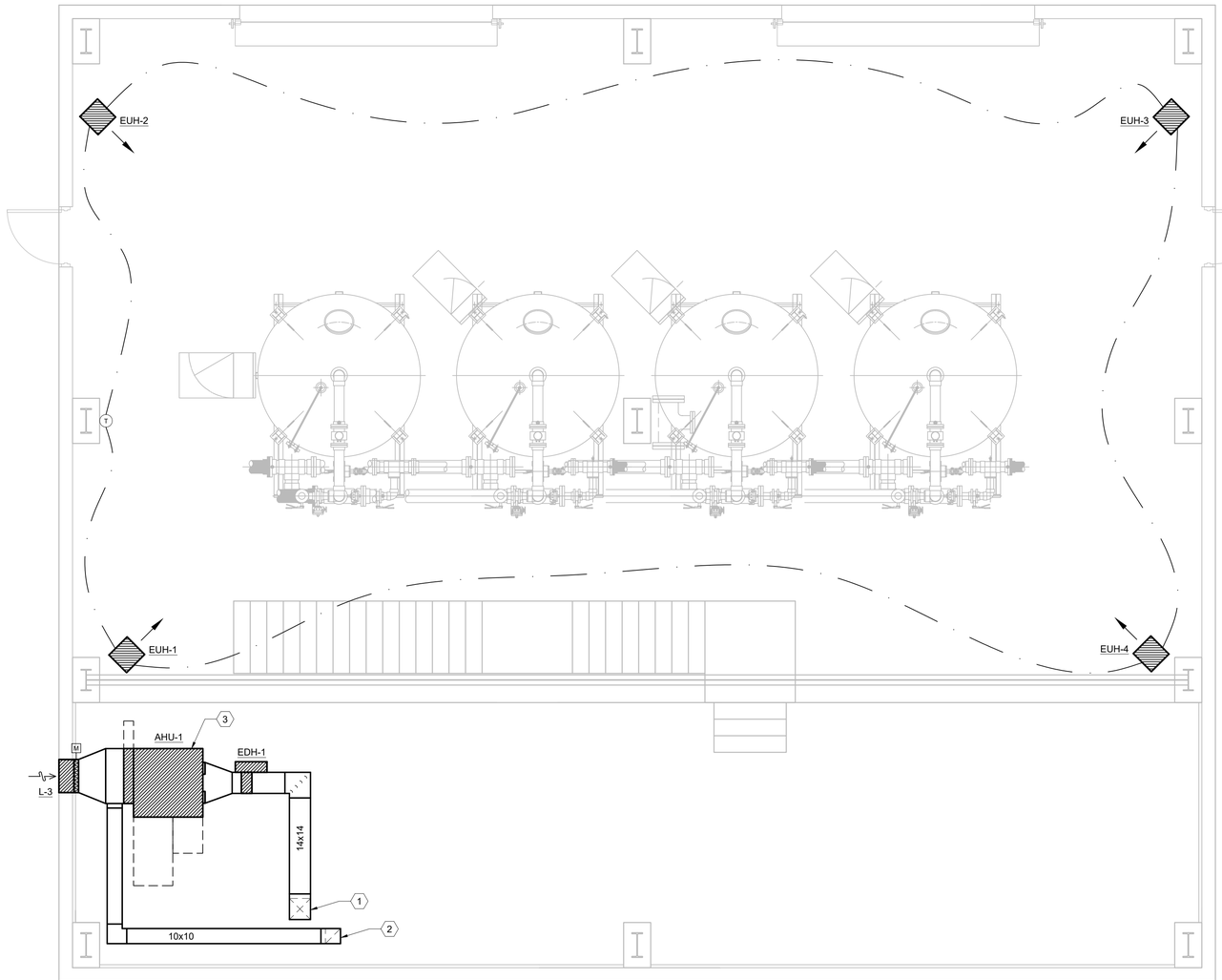
SHEET NO.
M-101
SHEET XX OF XX

KEY NOTES:

1. 14x14 SA DUCT DOWN TO FIRST FLOOR.
2. 10x10 RA DUCT DOWN TO FIRST FLOOR.
3. INTERLOCK AHU-1/CU-1 TO THE AMC-1400 GAS MONITOR. WHEN GAS IS DETECTED AHU-1/CU-1 SHALL ENGAGE AND RETURN TO NORMAL OPERATION ONCE GAS IS CLEARED.



1 MECHANICAL LOFT PLAN
SCALE: 1/4" = 1'-0"

0' 1' 2' 3' 4' 5'

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SUBMITTED BY:	BBEC, LLC
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SHEET SIZE:	ANSI D
SCALE:	

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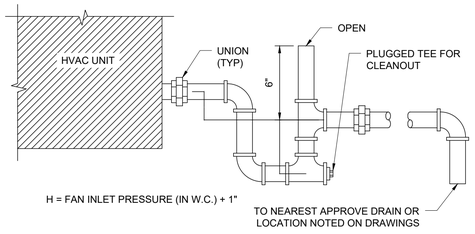
MECHANICAL LOFT PLAN

MCA Engineering & Construction
BATON ROUGE - NEW ORLEANS

JOB NO: STP23006
BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
M-102
SHEET XX OF XX

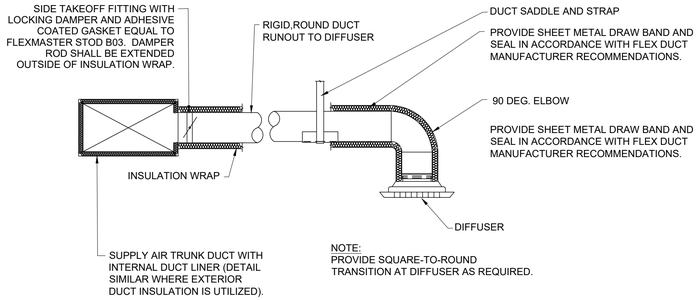
CONDENSATE DRAIN PIPE SIZE	
EQUIPMENT CAPACITY (NOMINAL TONS)	NOMINAL PIPE SIZE (IN)
20 AND BELOW	3/4
21 - 40	1
41 - 90	1-1/4
91 - 125	1-1/2
126 - 250	2



NOTE: PROVIDE DIELECTRIC UNION AT UNIT CONNECTION WHERE COPPER CONDENSATE PIPE IS SPECIFIED.

1 CONDENSATE DRAIN DETAIL
SCALE: N.T.S.

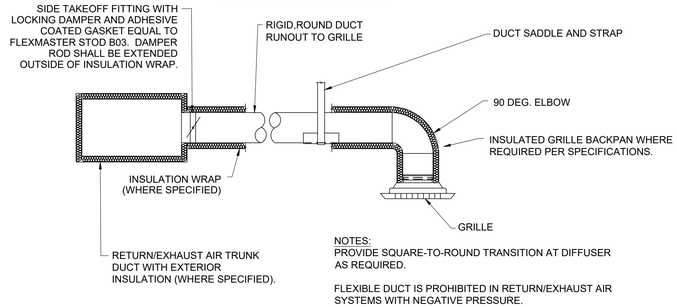
CEILING DIFFUSER DUCTWORK RUN-OUT SIZING	
RUNOUT / NECK SIZE	CFM RANGE
6" Ø	0 - 75 CFM
8" Ø	80 - 240 CFM
10" Ø	245 - 380 CFM
12" Ø	385 - 550 CFM
14" Ø	555 - 745 CFM



NOTE:
PROVIDE SQUARE-TO-ROUND TRANSITION AT DIFFUSER AS REQUIRED.

2 SUPPLY RUNOUT/DIFFUSER INSTALLATION
SCALE: N.T.S.

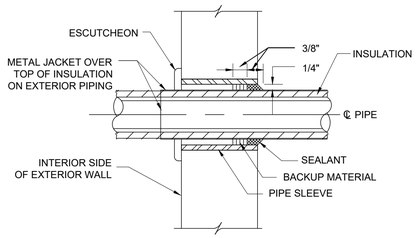
GRILLE DUCTWORK RUN-OUT SIZING (U.N.O.)	
RUNOUT	CFM RANGE
6" Ø	0 - 75 CFM
8" Ø	80 - 240 CFM
10" Ø	245 - 380 CFM
12" Ø	385 - 550 CFM
14" Ø	555 - 745 CFM



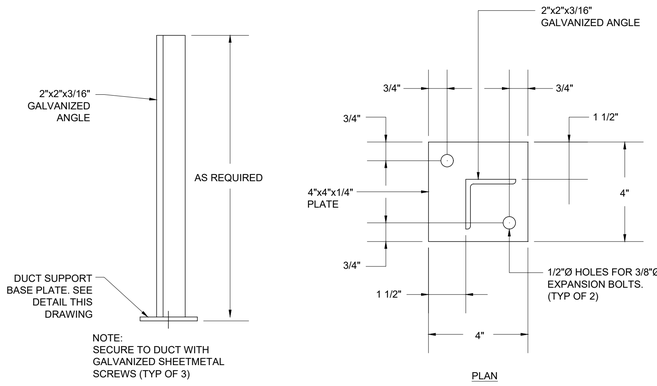
NOTES:
PROVIDE SQUARE-TO-ROUND TRANSITION AT DIFFUSER AS REQUIRED.

FLEXIBLE DUCT IS PROHIBITED IN RETURN/EXHAUST AIR SYSTEMS WITH NEGATIVE PRESSURE.

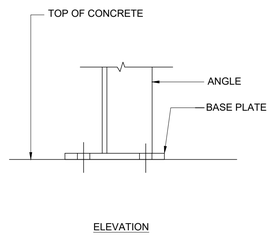
3 RETURN/EXHAUST RUNOUT/DIFFUSER INSTALLATION
SCALE: N.T.S.



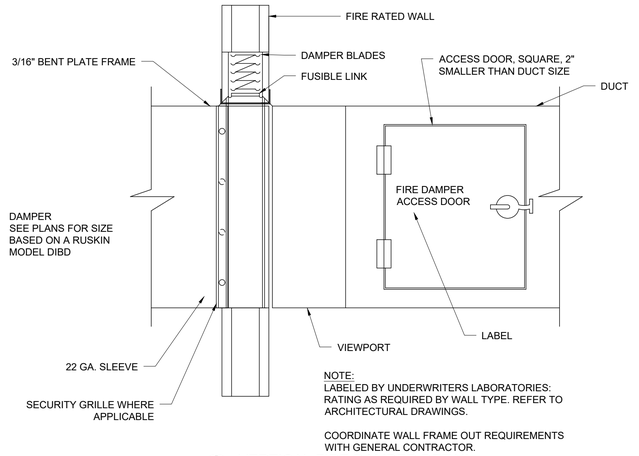
4 PIPE THROUGH WALL DETAIL
SCALE: N.T.S.



5 DUCT SUPPORT DETAIL
SCALE: N.T.S.



6 BASE PLATE DETAIL
SCALE: N.T.S.



NOTE:
LABELED BY UNDERWRITERS LABORATORIES: RATING AS REQUIRED BY WALL TYPE. REFER TO ARCHITECTURAL DRAWINGS.

COORDINATE WALL FRAME OUT REQUIREMENTS WITH GENERAL CONTRACTOR.

7 VERTICAL FIRE DAMPER DETAIL
SCALE: N.T.S.

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MECHANICAL DETAILS

MCA Engineering & Construction
BATON ROUGE - NEW ORLEANS

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BG: 801
PROJECT MANAGER: BRIAN MILLER

SHEET NO.
M-201
SHEET XX OF XX

AIR DEVICE SCHEDULE

MARK	SUPPLY	RETURN	OA	EXHAUST	REGISTER	GRILLE	LOUVER	DIFFUSER	SLOT	CEILING	WALL	DAMPER	DUCT	MOUNTING TYPE	MATERIAL	FINISH	EQUAL TO:
A	●							●					●	SURFACE	ALUMINUM	BAKED ENAMEL	TITUS MODEL TMRA-AA, TYPE 1 ADJUSTABLE CEILING DIFFUSER.
B		●				●							●	SURFACE	ALUMINUM	BAKED ENAMEL	TITUS MODEL 350FL, TYPE 1.
C				●		●							●	SURFACE	ALUMINUM	BAKED ENAMEL	TITUS MODEL 350FL, TYPE 1.

ELECTRIC DUCT HEATER SCHEDULE

MARK	SERVICE	CFM	ELECTRICAL DATA				EQUAL TO:
			KW	STAGES	VOLTS	PH	
EDH-1	AHU-1	900	5.7	SCR	460	1	CBK-5-14x14

AIR HANDLING SCHEDULES

ITEMS	SERVES	LOCATION	FAN DATA										DX COOLING COIL DATA											FILTER DATA		EQUAL TO:
													AIR								COIL DATA						
			TOT. S.P. IN.	EXT. S.P. IN.	BHP	RPM	QTY	HP	V	PH	HZ	RPM	TOT. CFM	O.A. CFM	EADB	EAWB	LADB	LAWB	SEN. (MBH)	TOT. (MBH)	MAX FACE VELOCITY (FPM)	ROWS	MAX FINS PER INCH	AIR PRESS DROP I.W.G.	MERV	THICK-NESS IN	
AHU-1	OFFICE / CHEMICAL FEED ROOM	LOFT SPACE	-	1.5	0.47	1445	2	0.5	460	1	60	-	900	680	89	76	54	53.7	34.4	68.8	280.5	3	12	0.17	12	2	DAIKIN BCHD0161

NOTES:
1. PROVIDE PROGRAMMABLE THERMOSTAT WITH A 7-DAY SCHEDULE.

AIR COOLED CONDENSING UNIT (HEAT PUMP) SCHEDULE

MARK	SERVICE	LOCATION	NOMINAL COOLING CAPACITY (MBH)	NOMINAL HEATING CAPACITY (MBH)	EER	COOLING OUTDOOR TEMP. (°F)	HEATING OUTDOOR TEMP. (°F)	FAN		COMPRESSOR		ELECTRICAL CONNECTION						EQUAL TO:
								TYPE	QTY	TYPE	QTY	V	PH	HZ	MCA	MOCP	MAX BRK	
CU-1	AHU-1	OUTSIDE	69.0	73.0	12.7	95	47	PROPELLER	1	SCROLL	1	460	3	60	12.3	20	20	DAIKIN RXYQ72XAYDA

ELECTRIC UNIT HEATER SCHEDULE

MARK	SERVICE	CFM	ELECTRICAL DATA				EQUAL TO:
			KW	FAN H.P.	VOLTS	PH	
EUH-1 THRU 4	FILTER ROOM	700	5	0.03	480	3	REZNOR EGHB

NOTES:
1. MANUFACTURER MUST PROVIDE CEILING BRACKETS FOR HORIZONTAL DISCHARGE.
2. PROVIDE A WALL - MOUNTED THERMOSTAT TO CONTROL EUH.

FAN SCHEDULE

MARK	SERVES	LOCATION	FAN				MOTOR						TYPE	DRIVE	EQUAL TO:
			CFM	SP (IN W.G.)	BHP	RPM	HP	WATTS	V	PH	HZ	RPM			
EF-1	FILTER ROOM	EXTERIOR WALL	5000	0.3	0.52	1276	2	-	460	60	3	1750	CENTRIFUGAL	DIRECT	GREENHECK SQ-16-M2-VG
EF-2	FILTER ROOM	EXTERIOR WALL	5000	0.3	0.52	1276	2	-	460	60	3	1750	CENTRIFUGAL	DIRECT	GREENHECK SQ-16-M2-VG
EF-3	RESTROOM	RESTROOM	150	1.0	0.08	1681	-	57	120	60	1	1750	CENTRIFUGAL	DIRECT	GREENHECK SP-A390-VG
EF-4	CHEMICAL FEED ROOM	EXTERIOR WALL	350/820	0.3	0.04	1308	1/10	-	460	60	3	1725	CENTRIFUGAL	DIRECT	GREENHECK SQ-90-VG

NOTES:
1. EF-4 MUST HAVE FACTORY PROVIDED TWO SPEED CONTROLLER.
2. EF MUST HAVE FACTORY PROVIDED SPEED CONTROLLER FOR SYSTEM BALANCING.

LOUVER SCHEDULE

MARK	SERVICE	BPWP (FPM)	SIZE (W"x H" X D")	CFM	FREE AREA (SQ. FT)	VELOCITY	STATIC PRESSURE DROP (IN. WC)	MATERIAL	EQUAL TO:
L-1	EF-1	1250	52x52x5	5000	10.1	494	0.04	ALUMINUM	GREENHECK MODEL EVH-501D
L-2	EF-2	1250	52x52x5	5000	10.1	494	0.04	ALUMINUM	GREENHECK MODEL EVH-501D
L-3	AHU-1	1250	22x22x5	680	1.3	505	0.04	ALUMINUM	GREENHECK MODEL EVH-501D
L-4	EF-1	1250	40x52x5	5000	7.6	662	0.07	ALUMINUM	GREENHECK MODEL EVH-501D
L-5	EF-2	1250	40x52x5	5000	7.6	662	0.07	ALUMINUM	GREENHECK MODEL EVH-501D
L-6	EF-4	1250	18x24x5	820	1.2	698	0.08	ALUMINUM	GREENHECK MODEL EVH-501D
L-7	EF-4	1250	18x18x5	470	0.8	596	0.06	ALUMINUM	GREENHECK MODEL EVH-501D

NOTES:
1. LOUVERS MUST INCLUDE FACTORY INSTALL DAMPERS EQUAL TO GREENHECK VCD-40 WITH MOTORIZED ACTUATOR OR GREENHECK BR-30 WHERE INDICATED ON DRAWINGS.
2. LOUVERS MUST INCLUDE FACTORY BIRD SCREEN AND EXTENDED SILL IF REQUIRED FOR INSTALLATION.

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MECHANICAL SCHEDULES

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BATON ROUGE - NEW ORLEANS

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SHEET NO.
M-301
SHEET XX OF XX

INDEX TO ELECTRICAL SHEETS

ELECTRICAL GENERAL NOTES

1. ALL ELECTRICAL WORK ON THIS PROJECT SHALL BE PERFORMED BY EMPLOYEES OF A COMPANY LICENSED TO DO SUCH WORK IN THE STATE OF LOUISIANA, ST. TAMMANY PARISH.
2. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH THE 2023 NATIONAL ELECTRICAL CODE (NEC). IN SOME INSTANCES, NEC REQUIREMENTS ARE EXCEEDED BY THE ELECTRICAL DESIGN. INSTALL THOSE ITEMS AS DESIGNED.
3. ALL MATERIALS AND PRODUCTS INSTALLED ON THIS PROJECT SHALL BE NEW, UNLESS INDICATED OTHERWISE, AND SHALL BE UL LISTED.
4. ALL CONDUIT INSTALLED ON THIS PROJECT SHALL BE AS INDICATED IN THE ELECTRICAL SPECIFICATIONS AND ON THESE DRAWINGS.
5. ALL WIRE INSTALLED ON THIS PROJECT SHALL BE STRANDED COPPER. THIS IS NOT APPLICABLE TO CONDUCTORS INSTALLED BY THE POWER COMPANY.
6. WHERE ELECTRICAL CONDUITS WILL PASS THROUGH ELEVATED CONCRETE SLABS, PROVIDE (THIS MEANS FURNISH AND INSTALL) STEEL THIMBLES OF SUFFICIENT SIZE, CAST INTO THE SLAB IN THE CORRECT LOCATION, TO ALLOW INSTALLATION OF SERVICE ENTRANCE CONDUITS, FEEDER CONDUITS, AND BRANCH CIRCUIT CONDUITS, AS NEEDED FOR THE PROJECT, AND FOR SPARES AS INDICATED ON THE ONE-LINE DIAGRAM. COORDINATE EXACT REQUIRED LOCATIONS WITH EQUIPMENT SHOP DRAWINGS, AND WITH OTHER TRADES, TO AVOID CONFLICTS. AS AN ALTERNATIVE AT CONTRACTOR'S OPTION, RIGID GALVANIZED STEEL CONDUIT NIPPLES MAY BE SET DIRECTLY THROUGH THE CONCRETE SLAB, IN LIEU OF THIMBLES.
7. MAKE ELECTRICAL CONNECTIONS TO ALL MECHANICAL AND ELECTRICAL EQUIPMENT FOR PROPER OPERATION OF SUCH EQUIPMENT.
8. PROVIDE AN 18" TO 24" SECTION OF METALLIC LIQUIDTIGHT CONDUIT FOR CONNECTION TO OUTDOOR MOTORS AND TRANSFORMERS, AND A SIMILAR CONNECTION USING GREENFIELD TO INDOOR MOTORIZED EQUIPMENT AND TRANSFORMERS, AND OTHER VIBRATING EQUIPMENT, SUCH AS OVERHEAD DOOR OPERATORS.
9. ALL LIQUIDTIGHT CONDUIT FITTINGS SHALL HAVE A MALLEABLE IRON BODY, WITH ASSOCIATED THREADED CONNECTING PARTS, AND SHALL HAVE INTERNAL TAPERED SEALS AGAINST THE CONDUIT, AND A RUBBER O-RING FOR SEALING AGAINST THE ENCLOSURE. CAST METAL FITTINGS, AND "QUARTER-TURN QUICK CONNECTS", ARE NOT ACCEPTABLE.
10. ALL ANNULAR SPACES BETWEEN CONDUITS AND STEEL SLEEVES SHALL BE SEALED USING 3M FIREPROOFING EXPANDING SPRAY FOAM, APPLIED NEATLY.
11. ALL CONDUITS ENTERING OUTDOOR ENCLOSURES, AND ALL CONDUITS ENTERING ENCLOSURES FROM OUTDOORS, SHALL BE SEALED COMPLETELY AT THE ENCLOSURE USING A FIBROUS PLIABLE PRODUCT, SUCH AS "DUCTSEAL", TO PRECLUDE ENTRY OF MOISTURE OR WATER INTO SUCH ENCLOSURES. SILICONE, OR THE LIKE, IS NOT AN ACCEPTABLE ALTERNATIVE. UNUSED FLOOR THIMBLES AND SLEEVES SHALL BE SEALED BY USE OF A SHORT SECTION OF THE LARGEST CONDUIT THAT WILL FIT INTO THE SLEEVE, HELD IN PLACE BY EXPANDING FOAM, WITH THE TOP OF SAID CONDUIT SECTION SEALED EITHER WITH "DUCTSEAL", AND A PVC ENDCAP, AS APPROPRIATE.
12. THERE SHALL BE NO SHARED NEUTRALS IN THIS PROJECT. EVERY 120 VOLT PHASE HOMERUN CONDUCTOR SHALL HAVE ITS OWN ASSOCIATED NEUTRAL. HOWEVER, MULTIPLE HOMERUNS CAN BE RUN IN SHARED CONDUITS, MAXIMUM OF 6 CONDUCTORS (PHASE + NEUTRALS), PLUS GROUND WIRES. IF CONDUITS ARE SHARED, EACH NEUTRAL THEREIN SHALL HAVE A COLORED STRIPE MATCHING ITS ASSOCIATED PHASE CONDUCTOR COLOR.
13. MINIMUM CONDUIT SIZE SHALL BE 3/4".
14. AN INSULATED GREEN GROUND WIRE SHALL BE INSTALLED IN EVERY CONDUIT, AND LIGHTING MAKEUP WHIP. SIZE SHALL BE #12 FOR ALL 20 AMP RATED BRANCH CIRCUITS, AND OTHER SIZES AS GIVEN IN THE CONDUIT/WIRE SCHEDULE.

LUMINAIRE SCHEDULE

F1 - FILTER ROOM MAIN LUMINAIRE
ROUND "PANCAKE" STYLE LED HIGH BAY LUMINAIRE, APPROX. 16" DIAMETER, GLOSS WHITE FINISH
SITE SELECTABLE LUMENS, 21000LM, 24000LM, 27000LM
SITE SELECTABLE WHITE COLOR TEMPERATURE, 4000K, 5000K
PENDENT MOUNT AT 20' ABOVE FLOOR, USING 3/4" CONDUIT STEM
PROVIDE WITH 6" BLACK DAMP LOCATION CORD WITH TWIST LOK PLUG
LEDS RATED L85/60,000
PROVIDE 7' AIRCRAFT STYLE SAFETY CABLE, SECURE TO BUILDING STRUCTURE
120 VOLTS
LITHONIA CAT # CPRB-AL014-120-SWW9--80CRI-PM

CONTRACTOR: PROVIDE TWIST LOK RECEPTACLE TO MATCH PLUG FOR EACH J_BOX ADJACENT TO THE LUMINAIRE MOUNTING STEM
PROVIDE SWIVEL BOX COVER AT EACH LUMINAIRE TO ALLOW STEM TO HANG PLUMB

F2 - LED EXIT /EMERGENCY LIGHT COMBO WITH BATTERY BACKUP
20 GAUGE WHITE PAINTED STEEL HOUSING
TWO 1.9 WATT WHITE LED PAR 36 ADJUSTABLE HEADS WITH GLASS LENS, TOP MOUNT.
90 MINUTE EMERGENCY UNIT WITH TEST SWITCH, STATUS INDICATOR AND NI-CAD RECHARGEABLE BATTERY.
6" HIGH LED RED EXIT LETTERS, SINGLE FACE, GLASS PANEL, NO DIRECTIONAL ARROWS
120 VOLTS
WALL MOUNT TO BOX, FLUSH WITH WALL, OR MOUNT TO WALL GIRTS USING TWO VERTICAL STEEL CHANNELSTRUT PIECES SPANNING TWO GIRTS
LITHONIA CAT # LLXC

F3 - LED EMERGENCY BATTERY BACKUP LIGHT
THERMOPLASTIC HOUSING, TWO 1.9 WATT WHITE LED PAR 36 ADJUSTABLE HEADS WITH GLASS LENS, TOP MOUNT.
90 MINUTE EMERGENCY UNIT WITH TEST SWITCH, STATUS INDICATOR AND NI-CAD RECHARGEABLE BATTERY.
UL WET LOCATION LISTED, 120 VOLTS
WALL MOUNT TO BOX, FLUSH WITH WALL, OR MOUNT TO WALL GIRTS USING TWO VERTICAL STEEL CHANNELSTRUT
PIECES SPANNING TWO GIRTS, OR TO BUILDING COLUMN USING TWO PIECES OF STEEL CHANNELSTRUT
LITHONIA CAT # WLTU_LED

F4 - OUTDOOR LED WALLMOUNT PERIMETER LIGHT, UL WET LABEL, 120 VOLTS, WITH BUILTIN BUTTON PHOTOCELL
DIECAST ALUMINUM BRONZE COLOR HOUSING WITH BOROSILICATE LENS, ONE PIECE DOOR GASKET, WIDTH APPROX. 18"
SITE SWITCHABLE LED COLOR, 3000K, 4000K, 5000K
SITE SWITCHABLE LUMEN OUTPUT 8,200 , 12,100 , 16,100
LED RATED LIFE OF 90% AT 50,000 HOURS (L90/50000)
120 VOLTS
MOUNT AS INDICATED ON LIGHTING FLOOR PLAN
LITHONIA CAT # TWR2-LED-ALO-SWW2-UVOLT-PE-DDBTXD

F5 - 1ST FLOOR OFFICES AND CHEMICAL ROOM LED LUMINAIRE, UL DAMP LABEL
SURFACE MOUNT LED "BOX", APPROX. DIMS. 24.75" x 24.75" x 4.75" THICK
COLD ROLLED STEEL HOUSING PAINTED WHITE, ALL CORNERS AND SEAMS GROUND SMOOTH, PAINT AFTER FABRICATION.
EXTRUDED FLUSH ALUMINUM DOOR FRAME WITH MITERED CORNERS, ACYLIC SHIELDING.
ACRYLIC LENS IS STANDARD #A19 DIAMOND PATTERN, 0.156" THICK.
LEDS SHALL BE RATED L90/60,000
ALL ELECTRONICS ARE ACCESSIBLE FROM THE BOTTOM, WITH PLUG IN CONNECTIONS, WITHOUT REMOVING THE LUMINAIRE.
FACTORY TOP MOUNTING HOLES ARE APPROX. 20" OC, WIRING ACCESS IS ON TOP.
4,000 LUMENS, 4000K COLOR, "GZ1" DRIVER ALLOWS DIMMING TO 1%, 120 VOLTS
LITHONIA CAT # 2TLX2

CONTRACTOR: THE FIRST FLOOR CEILING IS APPROX. 14' ABOVE THE FLOOR.
THESE F5 LUMINAIRES ARE TO BE MOUNTED AT A HEIGHT OF 10' ABOVE THE FLOOR, TO THE BOTTOM OF THE LUMINAIRE.
ACCOMPLISH THIS BY USING A SERIES OF CONCRETE CEILING INSERTS, 1/2" THREADED RODS WITH DOUBLE-NUTTED HARDWARE, AND 1-5/8" ZINC STEEL CHANNELSTRUT TO FABRICATE A SUPPORT STRUCTURE.
SECURE EACH LUMINAIRE TO THE SUPPORT STRUCTURE WITH FOUR BOLTS, EITHER USING SPRING NUTS, OR THRU BOLTS.
SUPPORTED WEIGHT OF THE FABRICATED SUPPORT STRUCTURE SHALL BE 25% OF THE INSERT MANUFACTURER'S PUBLIISHED RATINGS
SUBMIT LITERATURE AND SUPPORT CALCULATIONS FOR ENGINEER'S REVIEW.

F6 - LOFT LED WRAPAROUND, 8' LONG, MOUNTED FOR THRU WIRING
8' LONG FIBERGLASS HOUSING ENCLOSED AND GASKETED WITH A ONE PIECE POURED-IN-PLACE NEMA 4X GASKET, UL DAMP LABEL.
PROVIDE WITH TYPE 316 STAINLESS STEEL CAPTIVE LATCHES.
PROVIDE WITH DEEP STYLE, 0.080" THICK, INJECTION MOLDED ACRYLIC LENS
LEDS SHALL BE RATED L80/60,000
8' LONG, 18,000 LUMENS, DEEP LENS, MED DISTRIBUTION, "GZ10" DIMMING, 4000K COLOR, 120 VOLTS
MOUNT AND SECURE AS INDICATED ON LOFT LIGHTING PLAN
LITHONIA CAT # FEM-L96-18000LM-DEEP LENS-MD-120V-GZ10-40K-80CRI

ELECTRICAL SYMBOL SCHEDULE

- ϕ — 20 AMP, 125 VOLT GROUNDED DUPLEX RECEPTACLE
- ϕ_{GFI} — 20 AMP, 125 VOLT SELF-CONTAINED GFI RECEPTACLE
- ϕ_{CT} — 20 AMP, 125 VOLT RECEPTACLE AT COUNTERTOP HEIGHT. VERIFY HEIGHT WITH ARCHITECT BEFORE ROUGHIN
- ϕ_{WP} — 20 AMP, 125 VOLT WEATHERPROOF DUPLEX RECEPTACLE
- S — 20 AMP SINGLE POLE LIGHT SWITCH
- S_3 — 20 AMP 3-WAY LIGHT SWITCH
- 60/3 — FUSIBLE DISCONNECT SWITCH, AMPS AND POLES AS INDICATED ON DRAWINGS. HEAVY DUTY ONLY, 250 OR 600 VOLTS AS REQ'D. FOR SYSTEM VOLTAGE, NEMA 1 FOR INDOORS, NEMA 3R FOR OUTDOORS, UNLESS INDICATED OTHERWISE
- CONDUIT UNDERGROUND OR IN SLAB
- CONDUIT CONCEALED IN WALLS OR ABOVE CEILING. ARROWS INDICATE HOMERUNS, HASH MARKS INDICATE NUMBER OF CONDUCTORS, 1 LONG=NEUTRAL, 3 SHORT =3 HOT WIRES, GROUND NOT SHOWN, BUT REQ'D. PER SPECIFICATIONS, OR AS SHOWN ON DRAWINGS
- J — 4" SQUARE, UNLESS SHOWN OTHERWISE, JUNCTION BOX
- PB — PULLBOX, SIZED AS SHOWN ON DRAWINGS. DO NOT MAKE CONDUCTOR SPLICES OR TAPS IN PULLBOXES.
- JB — JUNCTION BOX, SIZED AS SHOWN ON DRAWINGS.
- ELECTRICAL PANELS

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

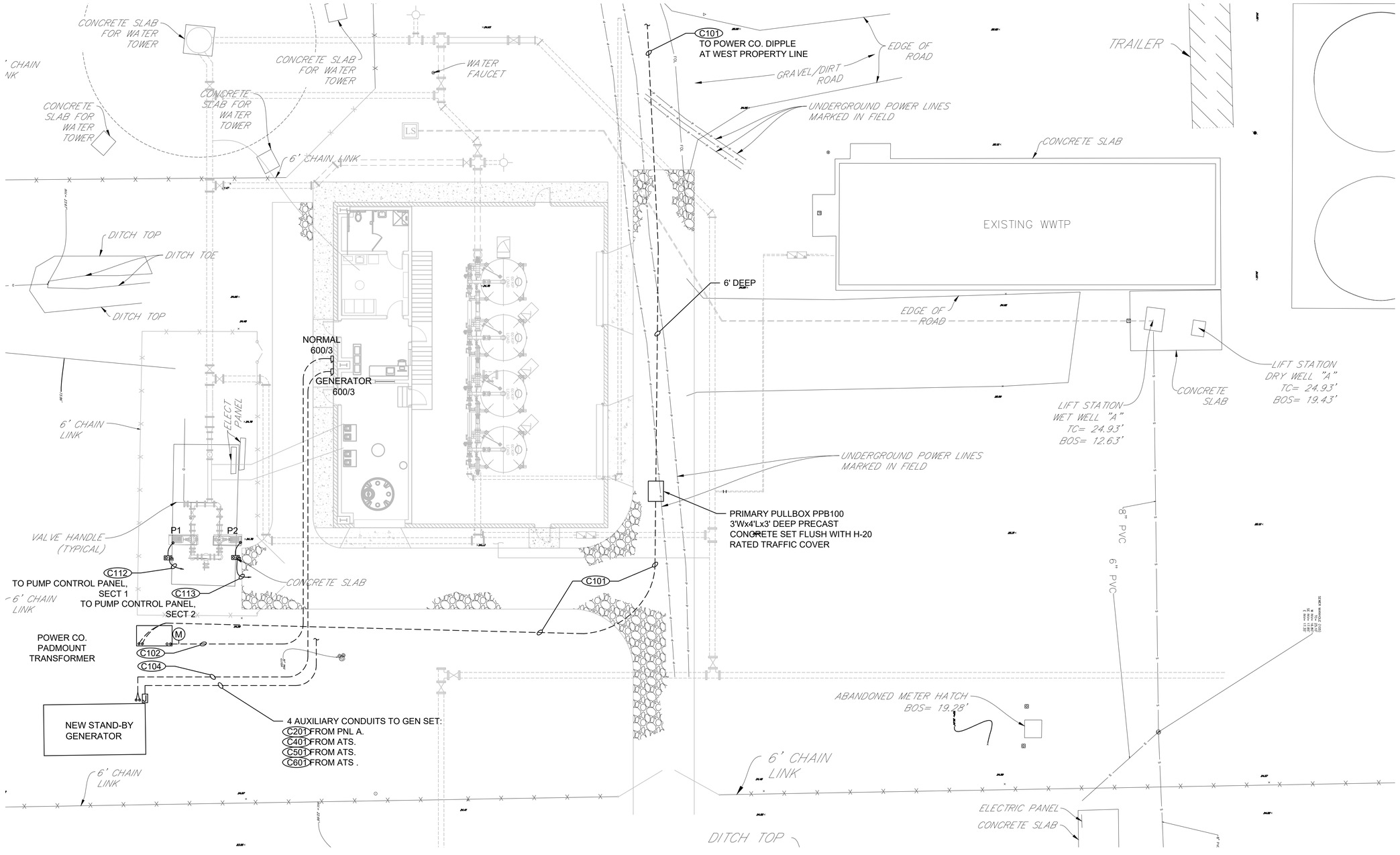
DESIGNED BY:	BB
DRAWN BY:	PW
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	N.T.S.

STATE OF LOUISIANA — BRUCE D. BARTON — REG. No. 18286 — ELECTRICAL ENGINEER — 05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

ELECTRICAL GENERAL NOTES

SHEET NO.
E-001
SHEET 75 OF 92



ELECTRICAL SITE PLAN

SCALE: 1" = 10"

10 0 5 10 20 40

SCALE: 1" = 10'-0" HORIZ.

DWG FILE: \\bbec-fs1\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\E-002 - Diversified_Electrical Site Plan.dwg - 7/2/2024 2:39 PM User: mhahn Plot Date: Mon Jul-15-2024 - 03:30PM

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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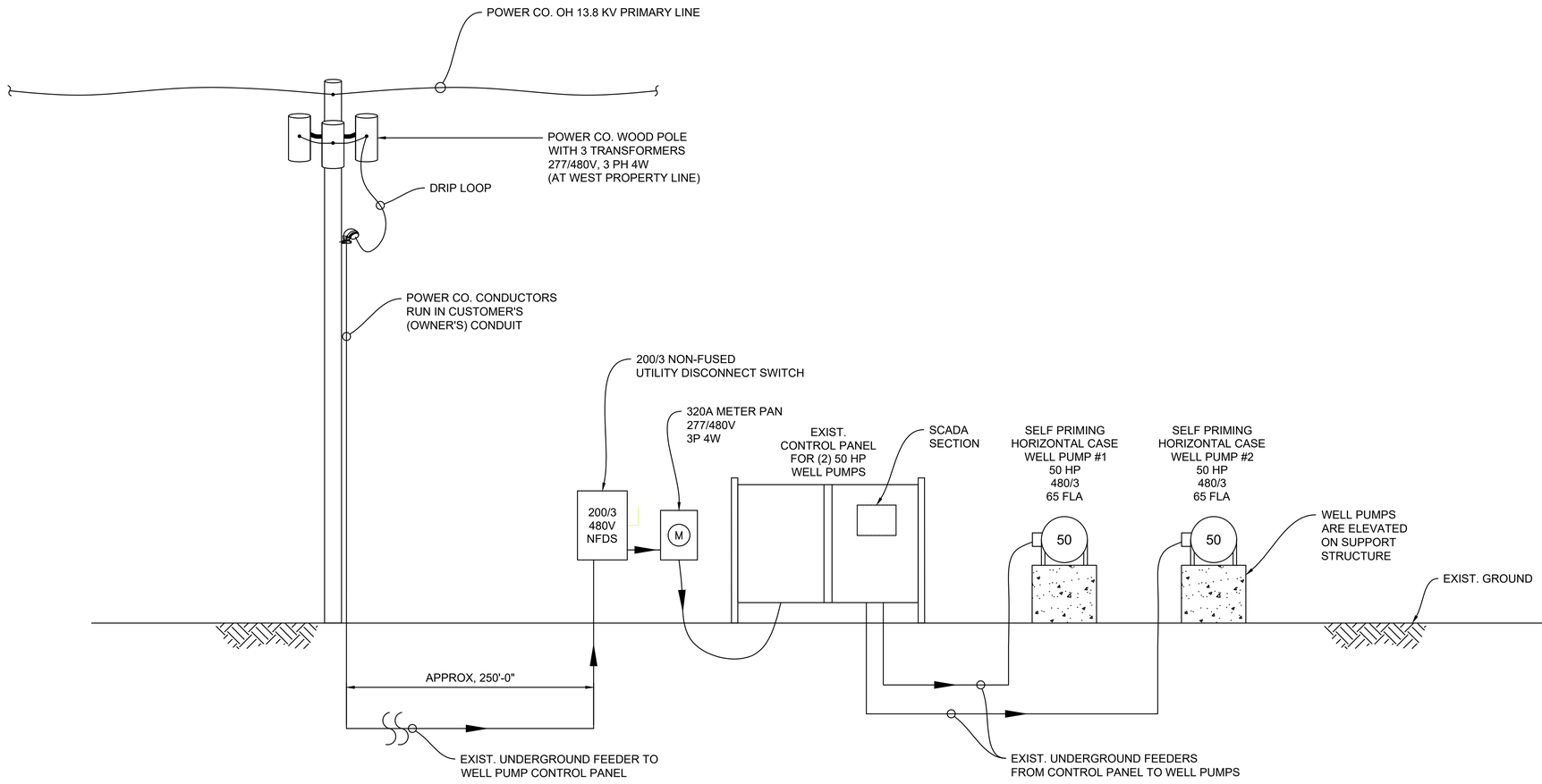
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	AS NOTED

STATE OF LOUISIANA
BRUCE D. BARTON
R/C No.: 18288
05/10/24
REGISTERED PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

ELECTRICAL SITE PLAN

SHEET NO.
E-002
SHEET 76 OF 92



EXISTING ELECTRICAL RISER DIAGRAM

SCALE: N.T.S.

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	N.T.S.

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18286
REGISTERED
PROFESSIONAL ENGINEER
ELECTRICAL ENGINEERING
Bruce D. Barton
05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

EXISTING ELECTRICAL RISER
DIAGRAM

SHEET NO.
E-003
SHEET 77 OF 92

600 AMP, 4 POLE AUTOMATIC TRANSFER SWITCH WITH MANUAL BYPASS SWITCH, FOR 277/480V 3PH 4WIRE SERVICE NEMA 12 ENCLOSURE

AIR HANDLER #1, 480/3, 1 FLA

DUCT HTR. 5.7KW 480/3, 7FLA

ATS

BYPASS

PANEL DP1 600A MCB

PANEL A 120/208V 3PH4W 250A MCB

PANEL DP2 277/480V 3PH4W 250 A MLO

T1 75 KVA TO 480/3 120/208 V3PH4W

WATER HEATER

30KW 480/3

PUMP CONTROL PANEL 300 A, 480/3, 3 PH

SECT. 1 — VFD P1

SECT. 2 — VFD P2

SECT. 3

SECT. 4 — SCADA

NEMA 1 PULLBOX PBZ02 18x24x36 W/ REMOVABLE SIDE COVER LOFT MEZZANINE DECK

NEMA 1 PULLBOX PBZ01 18x24x36 W/ REMOVABLE SIDE COVER

STEEL SLEEVES THRU LOFT FLOOR, TYPICAL

STEEL SLEEVES THRU LOFT FLOOR, TYPICAL

STEEL SLEEVES, TYP.

FLEX

FLEX

TWO 6" STEEL THIMBLES (SLEEVES)THRU LOFT DECK FOR 2-3 1/2" CONDUITS FOR "NORMAL" POWER CONDUITS, AND TWO 6" STEEL SLEEVES THRU LOFT DECK FOR 2-3 1/2" CONDUITS FOR " STANDBY GENERATOR " POWER. FIRESEAL ANNULAR SPACES.

NORMAL POWER FEED 600/3 480V FDS

GENERATOR FEED 600/3 480V FDS

30/3 typ. 10

UNIT HTR #1, 5KW 6 FLA

UNIT HTR #2, 5KW 6 FLA

UNIT HTR ~~#3, 5KW~~ 6 FLA

UNIT HTR #4, 5KW 6 FLA

FILTER ROOM EXH, FAN #1 (NORTH) 2 HP 3.4FLA

OH DOOR #1 1HP 2.6FLA

FILTER ROOM EXH FAN (SOUTH) #2 2HP 3.4FLA

OH DOOR #2, 1HP 2.6FLA

OH DOOR #3 CHEMICAL ROOM 3/4HP 2.1 FLA

MONORAIL HOIST 8 FLA

A/C CONDENSER

FILTER BUILDING SLAB

XFMR SLAB

NEW INCOMING PRIMARY FEED FROM CO. POWER

PRIMARY PULL BOX PPB100 3'W X 4'L X 3'D PRECAST CONCRETE WITH H-20 RATED TRAFFIC COVER

3 AUXILLARY CONDUITS FROM ATS TO GENSET

GENERATOR BATTER CHG. WIRES, IF BATT. CHGR IS IN ATS, OTHERWISE EMPTY SPARE CONDUCT WITH PULLSTRING.

NATURAL GAS GENERATOR — STANDBY GENRATOR SET 250KW, 375FLA,312KVA,277/480V,3P, 4W "WYE"

OUTDOOR ENCLOSURE

FROM NEW PUMP CONTROL PANEL 480V/3

WELL PUMP 200/3 P2 60 C113

WELL PUMP 200/3 P1 60 C112

500/3 G

PNL. G, BY GENSET VENDOR

J 12X12X6 JB

CONTROL SECTION J J

C201

NEW ELECTRICAL RISER DIAGRAM

SCALE: N.T.S.

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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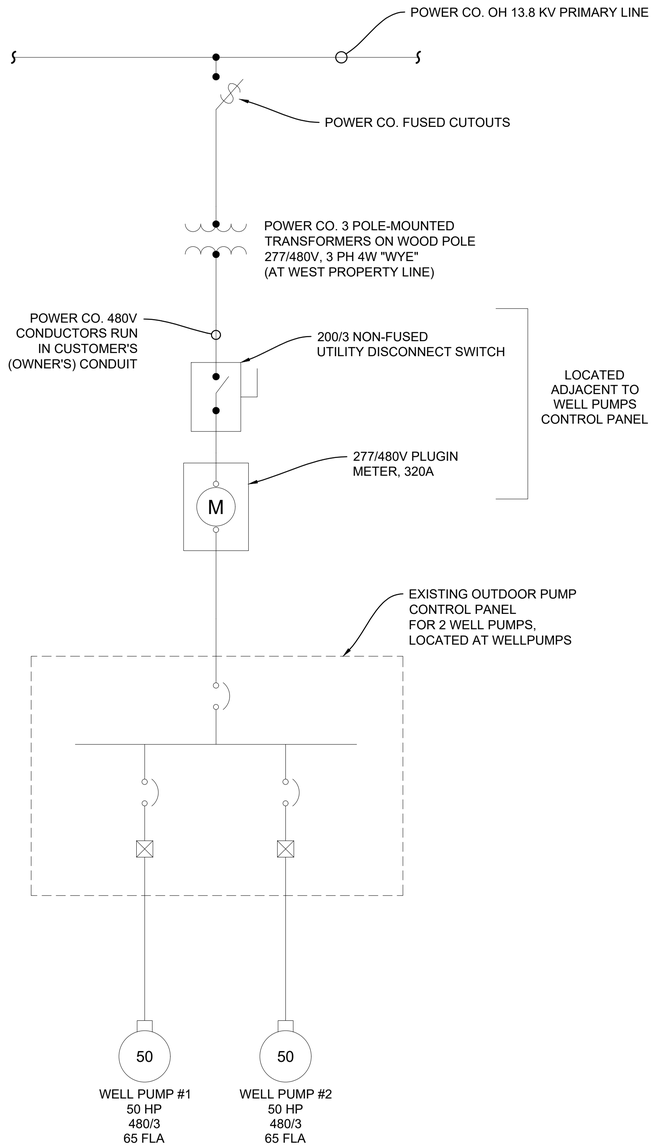
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	N.T.S.

STATE OF LOUISIANA — BRUCE D. BARTON — REG. No. 18666 — PROFESSIONAL ENGINEER — ELECTRICAL ENGINEERING — 05/10/24

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

NEW ELECTRICAL RISER DIAGRAM

SHEET NO.
E-004
SHEET 78 OF 92



EXISTING ELECTRICAL ONE LINE DIAGRAM

SCALE: N.T.S.

DWG FILE: \\bbec-fs1\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\E-005 - Diversified_ Existing Electrical One Line Diagram.dwg - 7/15/2024 4:54 PM User: mhahn Plot Date: Mon Jul-15-2024 - 05:43PM

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

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DRAWN BY:	AH
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18666
MECHANICAL
ELECTRICAL ENGINEER
Bruce D. Barton
05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

EXISTING ELECTRICAL ONE LINE DIAGRAM

SHEET NO.
E-005
SHEET 79 OF 92

POWER CO. HIGH VOLTAGE PRIMARY FEED
NEW PRIMARY PULLBOX PPB100 3'x4'x3'D PRECAST CONCRETE
C101
POWER CO. NEW PADMOUNT TRANSFORMER 225 KVA, 270 FLA 277/480V, 3 PH., 4W WYE
M
NEW METER FOR WATER PLANT INCLUDING FILTER BLDG. MOUNTED ON NEW PADMOUNT TRANSFORMER
POWER COMPANY METERING CTs
C102
#3/0 BOND
BLDG. COLUMN
EXOTHERMALLY WELD ½"Ø X 2" L BOLT TO BLDG. COLUMN TO MOUNT GROUNDING LUGS
GND. TO 2-3/4"ØX10' GND. RODS NEXT TO BLDG. SLAB
8'
#1/0, 1" PVC SCH. 80 PVC
N
G
600
NORMAL POWER DISCONNECT SWITCH NEMA 3R ENCLOSURE ISCA =7,200A
C103
ISCA =7,200A
ATS
BYPASS
600 AMP FOUR POLE AUTOMATIC TRANSFER SWITCH WITH MANUAL BYPASS, NEMA 12 FREESTANDING INDOOR ENCLOSURE
PULLBOX PBZ02
PULLBOX PBZ01
C104
#3/0 BOND
3/4" x 10' GND ROD
STANDBY GENERATOR DISCONNECT SWITCH NEMA 3R ENCLOSURE
C105
#3/0 1 ½" C. SCH.80 PVC
NATURAL GAS STANDBY GENERATOR SET 277/480V, 3PH4W, 250 KW, 312 KVA, 375FLA
CONTROL SECTION
500/3
G
NO BOND
PNL "G" (FURNISHED WITH GENERATOR SET)
60/2
#3/0 1 ½" C. SCH.80 PVC
¾" x 10' GND. ROD
J
3 CONDUITS
12X12X6 NEMA 3R JB @ EDGE OF GENERATOR SLAB
C401
C501
C601
C201
C106
C114

600 A DISTRIBUTION PANEL "DP1" - REFER TO PANEL SCHEDULES

ISCA =7,200A

600/3
1 2 3 4 5 6 7 8 9 10
100/3 60/3 70/3 60/3 300/3 100 60 225 225 250/3
SPARE
SPARE
C108
100/3
100
T1 75 KVA 480-120/208V 90FLA PRI
#2, 3/4" PVC SCH. 80 PVC
GND. TO BLDG. STEEL FRAME
C109
C201
PANEL "A" REFER TO PANEL SCHEDULES. BOND NEUTRAL TO GND. IN THIS PANEL
250
60/2
N
G
#2 BOND
C107
60/3
45
30 KW
WATER HEATER 30KW 480/3 36FLA
C111
SPARE
SPARE
BUSSED SPACE
BUSSED SPACE
ISCA =7,200A
NEW PUMP CONTROL PANEL 480V/30
SECT. 1
SECT. 2
SECT. 3
SECT. 4 SCADA
300/3
150
150
30
VFD
VFD
BOND
30/2
5 KVA480 - 120/240V 1PH3W
C112
200/3 110AF AT PUMP
110
C113
200/3 110AF AT PUMP
WELL PUMP P1 60HP, 480/3 75FLA
60
WELL PUMP P2 60HP, 480/3 75FLA
60

225 A DISTRIBUTION PANEL "DP2" - REFER TO PANEL SCHEDULES

ISCA =7,200A

1 2 3 4 5 6 7 8 9 10 11 12 13 14
30/3 20/3 30/3 30/3 30/3 30/3 30/3 20 20/3 30/3 20/3 30/3 20/3 30/3
C115 C116 C117 C118 C119 C120 C121 C122 C123 C125 C126 C128 C130
15 10 15 15 15 20 15 20 20 20 20 20 30
UNIT HEATER #1 5KW 480/3 6 FLA
AIR HANDLER #1 1/2 AP 480/3 1 FLA
UNIT HEATER #2 5KW 480/3 6 FLA
DUCT HEATER #1 5.7KW 480/3 7 FLA
UNIT HEATER #3 5KW 480/3 6 FLA
AC CONDENSOR UNIT #1 480/3 MCA: 12.3 MOCP: 20
UNIT HEATER #4 5KW 480/3 6 FLA
FILTER ROOM EXH. FAN #1 (NORTH) 2HP 480/3 3.4 FLA
FILTER ROOM EXH. FAN #2 (SOUTH) 2HP 480/3 3.4 FLA
SPARE
POWER TRACK RAILS
C124
C127
C129
C131
OPEN/CLOSE OPERATOR FILTER ROOM WEST 1HP 480/3 2.6 FLA
OPEN/CLOSE OPERATOR FILTER ROOM EAST 1HP 480/3 2.6 FLA
OPEN/CLOSE OPERATOR CHEMICAL ROOM 3/4HP 480/3 2.1 FLA
CONTROLS PENDANT
OH DOOR 1
OH DOOR 2
OH DOOR 3
HOIST
TROLLEY
MONORAIL HOIST

NEW ELECTRICAL RISER DIAGRAM

SCALE: N.T.S.

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

DESIGNED BY:	BB
DRAWN BY:	PW
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	NO SCALE

STATE OF LOUISIANA — BRUCE D. BARTON — REG. No. 18286 — PROFESSIONAL ENGINEER — ELECTRICAL ENGINEERING
Bruce D. Barton 05/10/24

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

NEW ELECTRICAL RISER DIAGRAM/ ONE LINE DRAWING

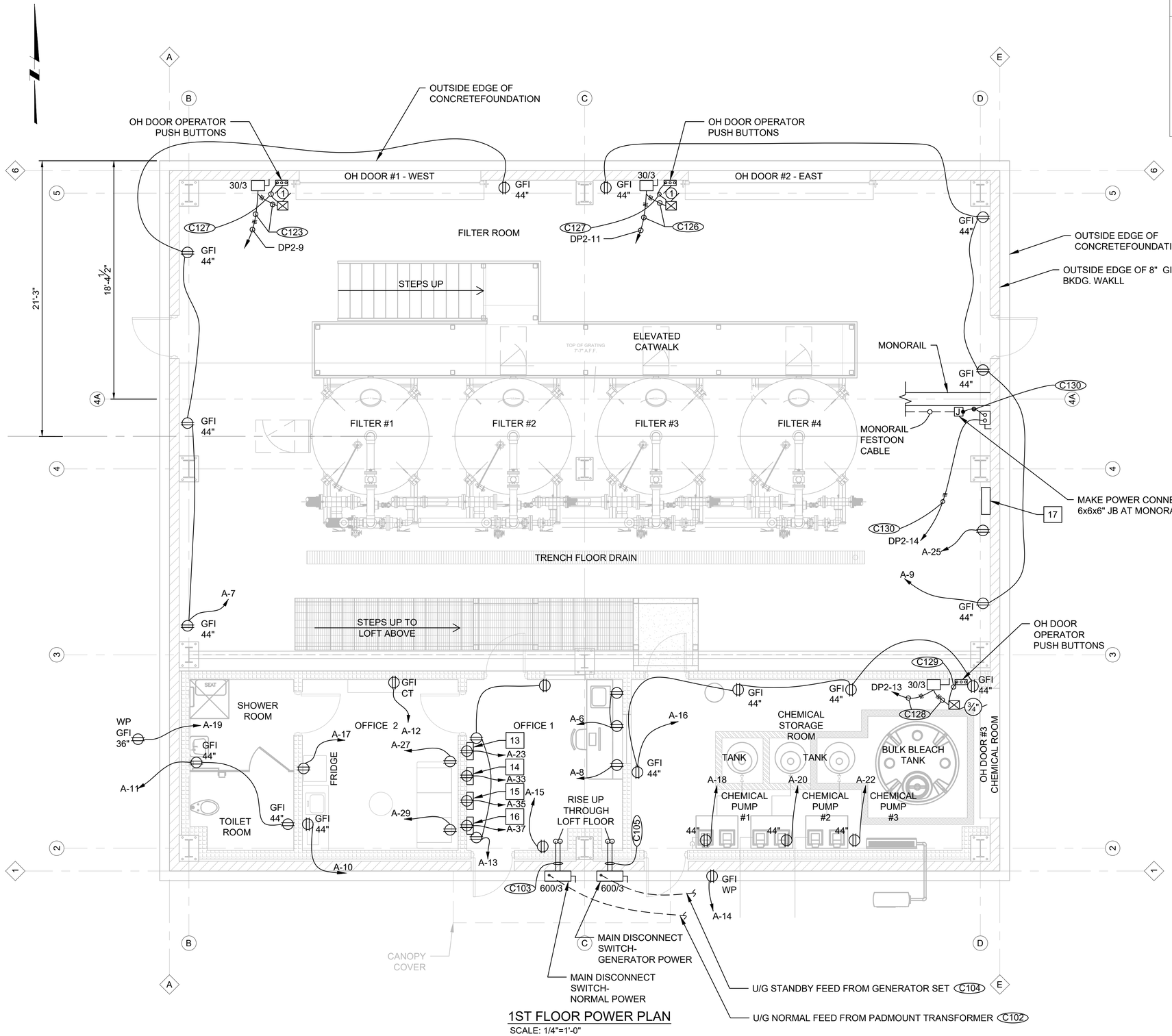
SHEET NO.
E-006
SHEET 80 OF 92

GENERAL SHEET NOTES

1. ALL CIRCUITRY FOR RECEPTACLES IS 2#12+#12 GREEN GROUND, 3/4"C., UNLESS INDICATED OTHERWISE.
2. THERE ARE NO "MULTIWIRE" BRANCH CIRCUITS (I.E. SHARED NEUTRALS) IN THIS PROJECT.
3. EVERY RECEPTACLE INDICATED AS "GFI" MEANS A STANDALONE GFI, WITH 120 V POWER FROM THE FEEDING CIRCUIT BREAKER. GFI'S SHALL NOT BE USED TO PROTECT "DOWNSTREAM" RECEPTACLES.

SHEET KEYNOTES

13	SCADE PANEL
14	TURBIDITY MONITOR
15	FREE CHLORINE MONITOR
16	TOTAL CHLORINE MONITOR
17	MAGMETER DISPLAY



1ST FLOOR POWER PLAN

SCALE: 1/4"=1'-0"

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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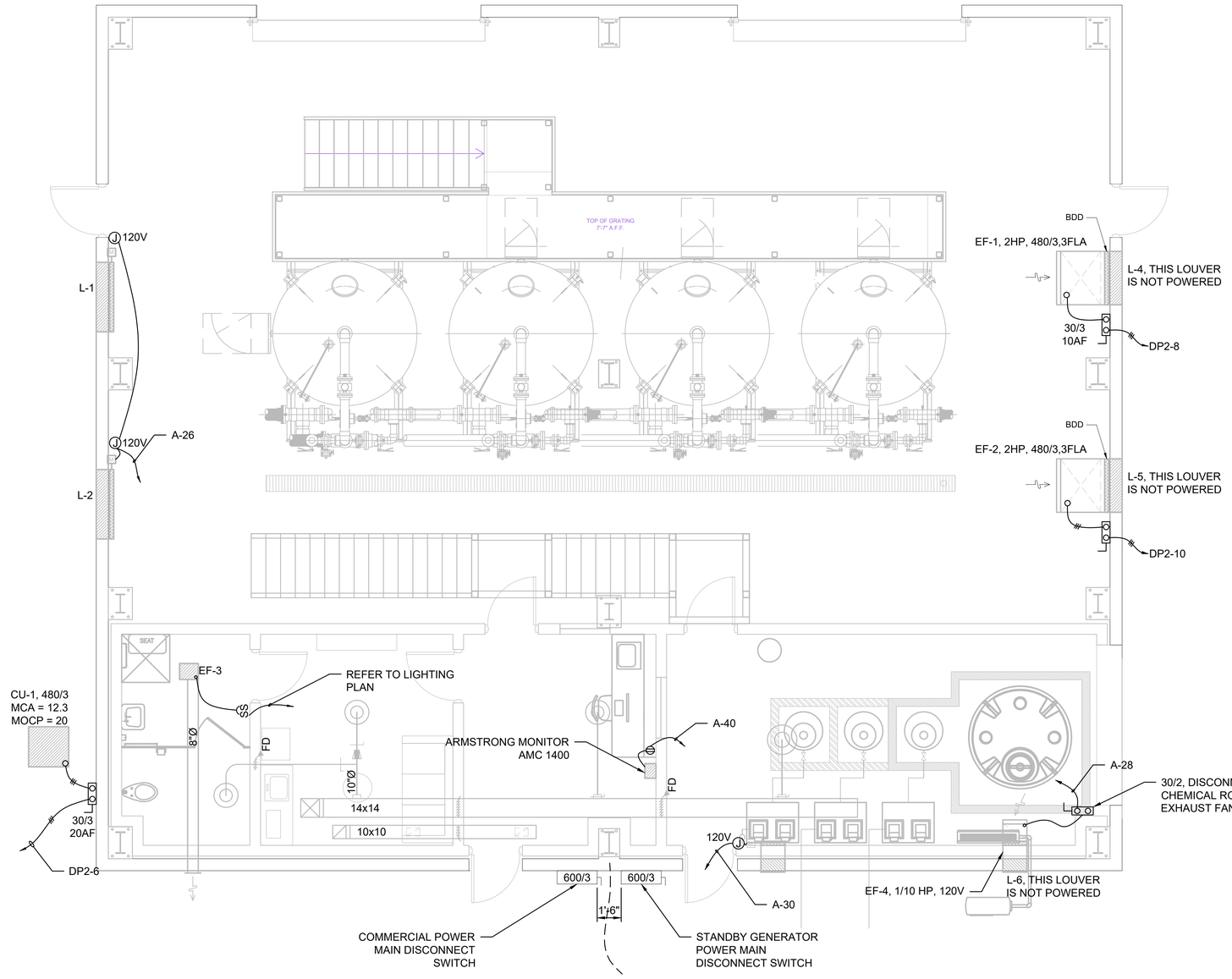
SHEET SIZE:	ANSI D
SCALE:	

BRUCE D. BARTON
REG. No. 31846
REGISTERED PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING
STATE OF LOUISIANA
5/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING 1ST FLOOR POWER PLAN

SHEET NO.
E-007
SHEET 81 OF 92



ELECTRICAL 1ST FLOOR HVAC POWER PLAN

SCALE: 1/4"=1'-0"

DWG FILE: \\bbec-fs1\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\E-008 - Diversified_1st Floor HVAC Power Plan.dwg - 7/15/2024 3:46 PM User: ahenry Plot Date: Mon Jul-15-2024 - 03:54PM

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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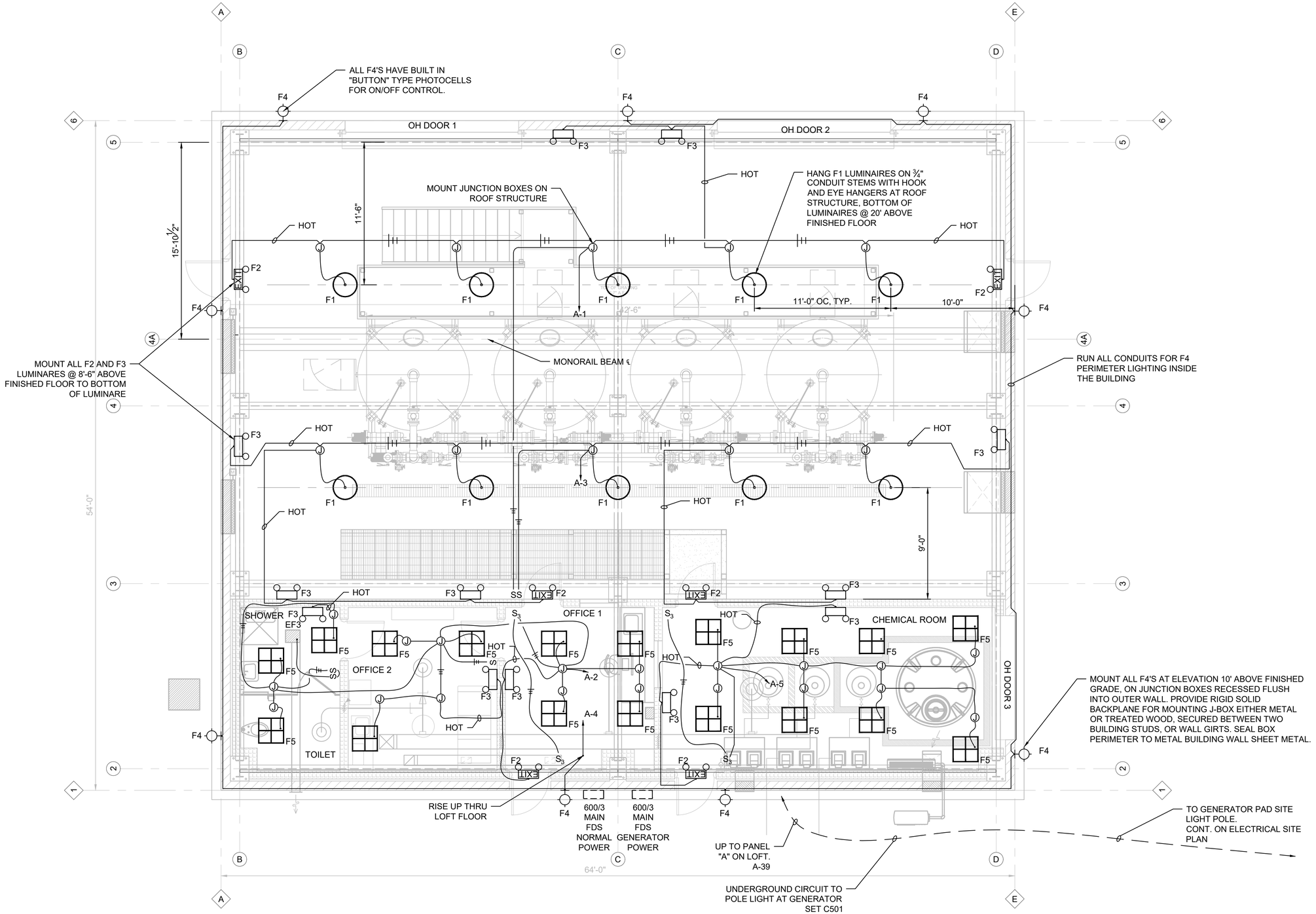
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	1/4"=1'-0"

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18286
REGISTERED
PROFESSIONAL ENGINEER
ELECTRICAL ENGINEERING
Bruce D. Barton
05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING HVAC ELECTRICAL
FLOOR PLAN

SHEET NO.
E-008
SHEET 82 OF 92



1ST FLOOR LIGHTING PLAN

SCALE: ¼"=1'-0"

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE:	ANSI D
SCALE:	

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18286
05/10/24
ELECTRICAL ENGINEERING

DIVERSIFIED WATER WELL PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING LIGHTING PLAN

SHEET NO.
E–009
SHEET 83 OF 92

DWG FILE: \\bbec-fs1\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\E-009 - Diversified_Lighting Floor Plan.dwg - 7/15/2024 3:48 PM
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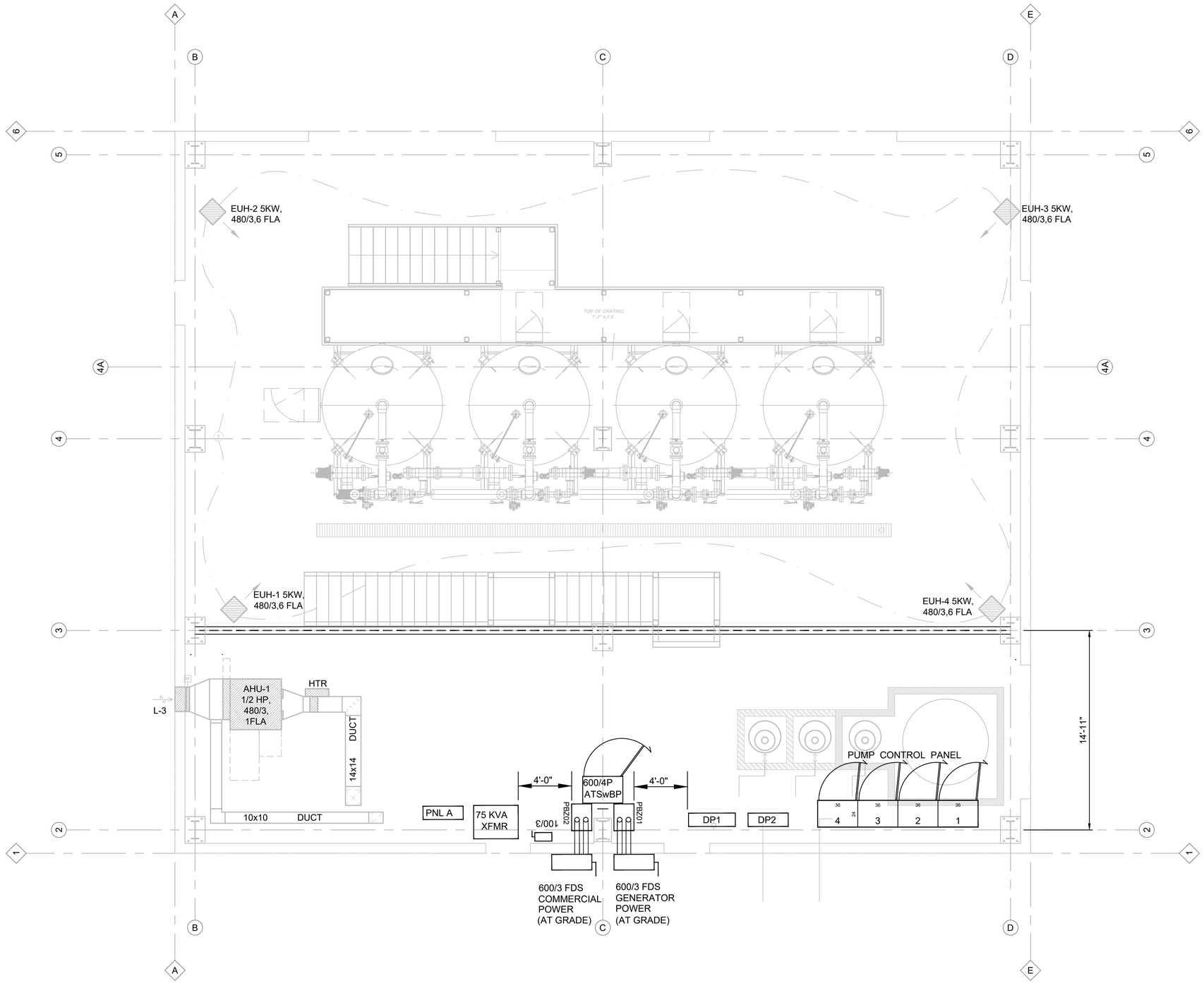

ELECTRICAL LOFT POWER PLAN

SCALE: 1/4"=1'-0"

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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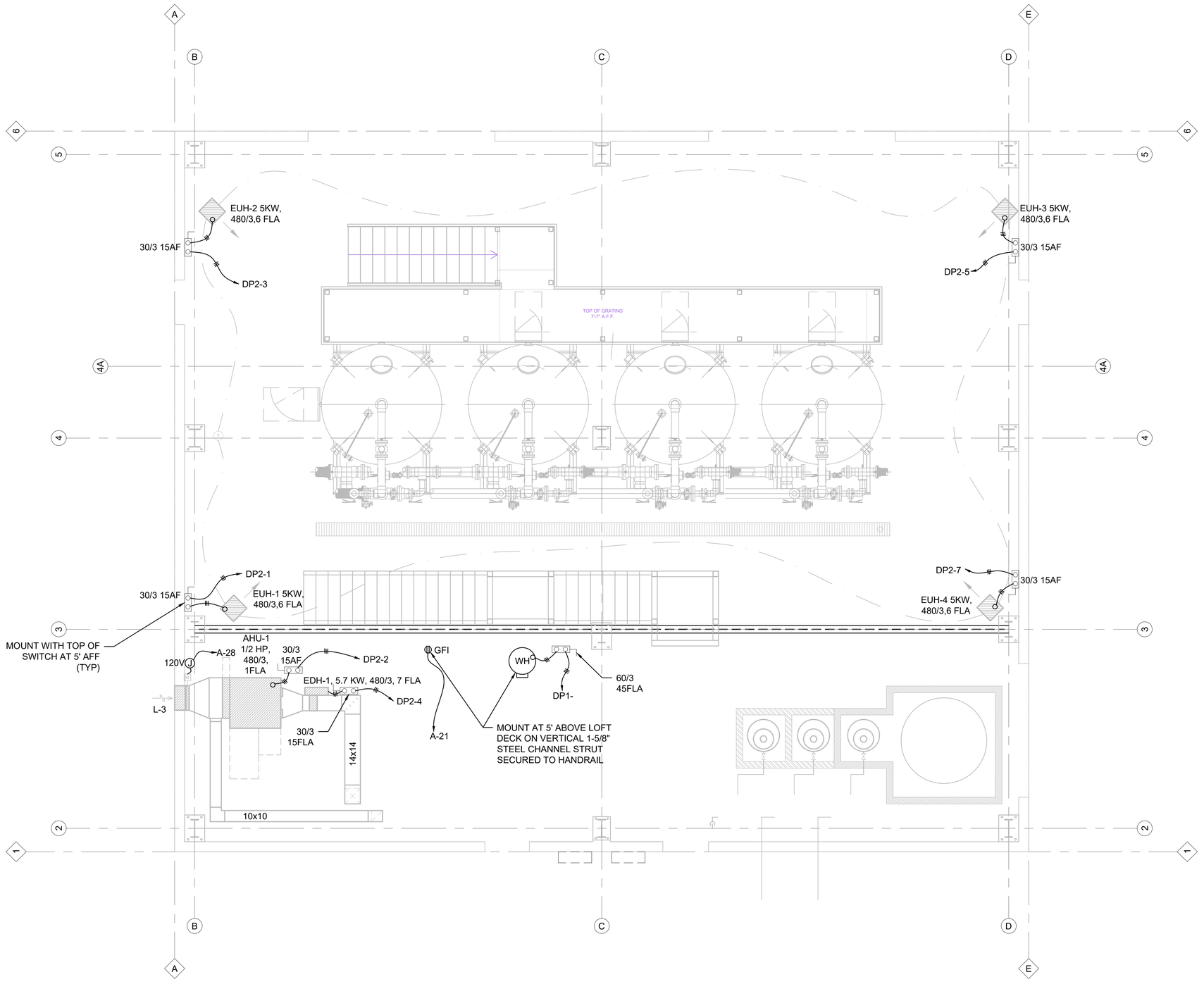
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	1/4"=1'-0"

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18286
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING
05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING ELECTRICAL LOFT
POWER PLAN

SHEET NO.
E-010
SHEET 84 OF 92



ELECTRICAL LOFT HVAC POWER PLAN
SCALE: 1/4"=1'-0"

ST. TAMMANY PARISH GOVERNMENT

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

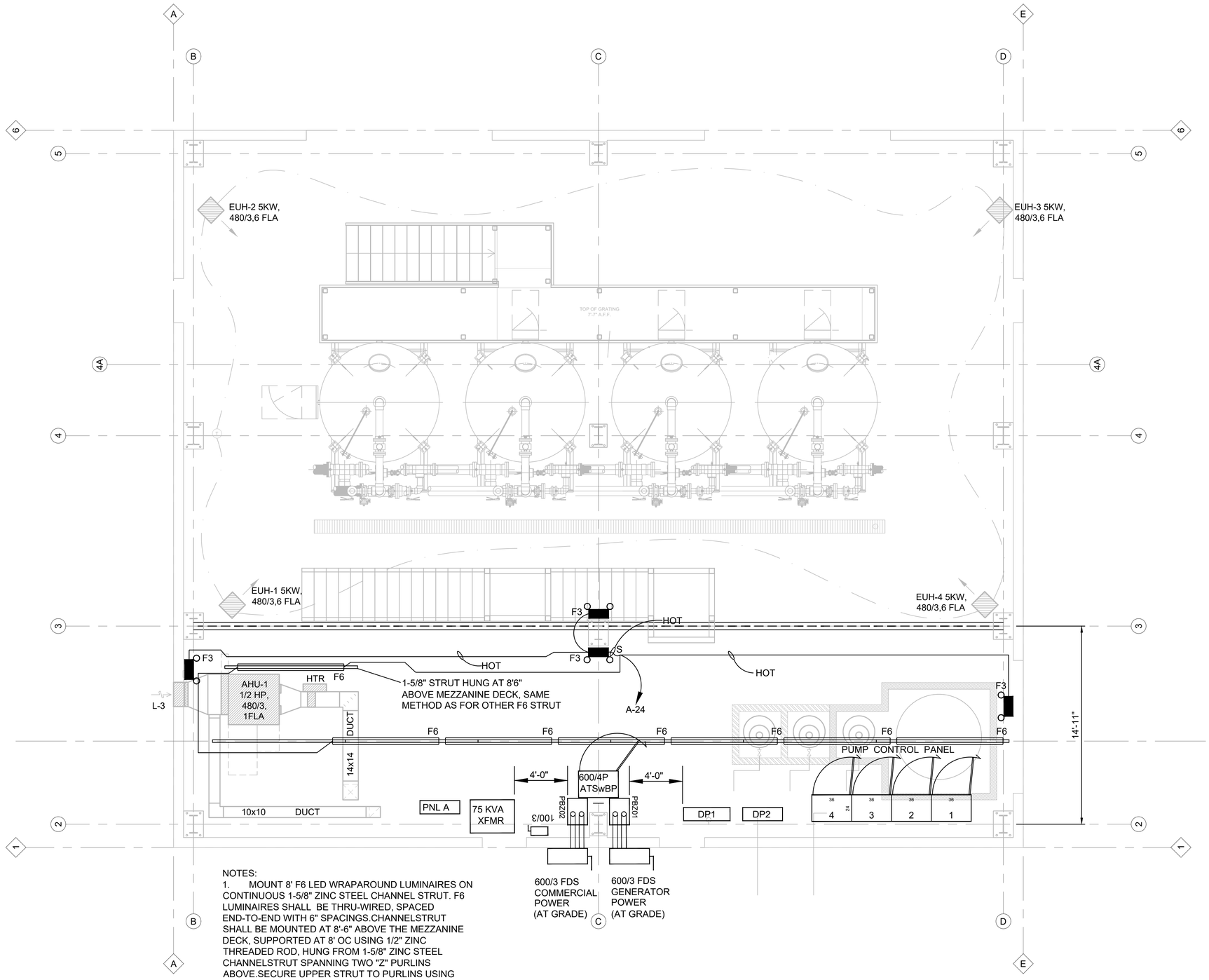
DESIGNED BY:	BB
DRAWN BY:	AH
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	1/4"=1'-0"

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18286
CIVIL
PROFESSIONAL ENGINEER
ELECTRICAL ENGINEERING
Bruce D. Barton
05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING ELECTRICAL LOFT
HVAC POWER PLAN

SHEET NO.
E-011
SHEET 85 OF 92



NOTES:

1. MOUNT 8' F6 LED WRAPAROUND LUMINAIRES ON CONTINUOUS 1-5/8" ZINC STEEL CHANNEL STRUT. F6 LUMINAIRES SHALL BE THRU-WIRED, SPACED END-TO-END WITH 6" SPACINGS.CHANNELSTRUT SHALL BE MOUNTED AT 8'-6" ABOVE THE MEZZANINE DECK, SUPPORTED AT 8' OC USING 1/2" ZINC THREADED ROD, HUNG FROM 1-5/8" ZINC STEEL CHANNELSTRUT SPANNING TWO "Z" PURLINS ABOVE.SECURE UPPER STRUT TO PURLINS USING MALLEABLE IRON BEAM CLAMPS WITH MINIMUM 3/8" BOLTS. DO NOT SUPPORT HORIZONTAL CONTINUOUS STRUT FROM ONLY A SINGLE PURLIN.
2. MOUNT LIGHT SWITCH TO COLUMN

ELECTRICAL LOFT LIGHTING PLAN

SCALE: 1/4"=1'-0"

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ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE:	ANSI D
SCALE:	1/4"=1'-0"

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18286
REGISTERED PROFESSIONAL ENGINEER IN ELECTRICAL ENGINEERING
05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING ELECTRICAL LOFT PLAN

SHEET NO.
E-012
SHEET 86 OF 92

DWG FILE: \\bbec-fs1\Drafting And Design\Jobs - Parish Of St Tammany\Diversified Well Improvements\Design\Drawings\E-012 - Diversified_ Lightning Loft Plan.dwg - 7/15/2024 4:16 PM
User: ahenry Plot Date: Mon Jul-15-2024 - 04:19PM

PANEL SCHEDULE

PANEL NAME DP-2
LOCATION MEZZANINE DECK
FOUND ON DWG. NO. ____
FED FROM BP-1
AVAILABLE FAULT CURRENT 7,200 SYM. AMPS
PANEL AIC RATING 35000
● FULLY RATED
○ SERIES RATED FOR ____ KAIC FROM ____
FEEDER 4#4/0+#1/0GND., 2 1/2"C.
● FEEDER PROTECTED BY OVERCURRENT DEVICE

VOLTAGE ● 480/277V, 3Ø 4W, WYE
○ 208/120V, 3Ø 4W, WYE
○ 240/120V, 3Ø 4W, DELTA W/BØ "STINGER"
MAINS, 225 AMP
● FACTORY MAIN CIRCUIT BREAKER
○ SHUNT TRIP MAIN CB
○ MAIN LUGS ONLY
○ UL LISTED FEED-THRU LUGS
○ LIGHTNING ARRESTOR WIRED TO LOAD SIDE OF MAIN, 3 POLE, 650V, JOSLYN Z3-650-0A, OR EQUAL
NEUTRAL ● 100% ○ 200%
MOUNTING ● SURFACE ○ FLUSH

ENCLOSURE ● NEMA1 ○ NEMA3R ○ NEMA12 ○ NEMA4X STAINLESS STEEL
● LOCKABLE COVER
FEED ● TOP ○ BOTTOM
BRANCHES ● BOLT-ON, PANELBOARD CONSTR. ○ STAB-IN, LOAD CENTER CONSTR.

PANEL HAS FRONT ACCESS ONLY
ALL COPPER BUSSING
FURNISH COPPER GROUND BAR KIT
○ ALSO FURNISH ADDITIONAL ISOLATED GROUND BAR KIT
○ SERVICE ENTRANCE LABEL
● PANEL NAMEPLATE, 2"x4" ENGRAVED PLASTIC LAMINATE
USE 1/4" LETTERING FOR PANEL NAME, ON 1 LINE
USE 1/8" LETTERING FOR VOLTS, AMPS, WHERE FED FROM, MO./YR. INSTALLED, ON 4 LINES
● BLACK FIELD, WHITE LETTERS
○ RED FIELD, WHITE LETTERS

CKT. #	# OF POLES	TRIP AMPS	LOAD DESCRIPTION	VOLT-AMPS A	VOLT-AMPS B	VOLT-AMPS C	LOAD DESCRIPTION	TRIP AMPS	# OF POLES	CKT. #
1	3	30	FILTER ROOM UNIT HTR #1	500			AIR HANDLER #1	20	3	2
		=	"		500		"	=		
		=	"			500	"	=		
3	3	30	FILTER ROOM UNIT HTR #2	500			ELECTRIC DUCT HTR #1	30	3	4
		=	"		500		"	=		
		=	"			500	"	=		
5	3	30	FILTER ROOM UNIT HTR #3	500			AC CONDENSING UNIT #1	30	3	6
		=	"		500		"	=		
		=	"			500	"	=		
7	3	30	FILTER ROOM UNIT HTR #4	500			FILTER ROOM EXIT FAN #1 (NORTH)	20	3	8
		=	"		500		"	=		
		=	"			500	"	=		
9	3	20	FILTER ROOM OH DOOR #1 (WEST)	500			FILTER ROOM EXIT FAN #2 (SOUTH)	20	3	10
		=	"		500		"	=		
		=	"			500	"	=		
11	3	20	FILTER ROOM OH DOOR #2 (EAST)	500			SPARE CB	30	3	12
		=	"		500		"	=		
		=	"			500	"	=		
13	3	20	CHEMICAL ROOM OH DOOR #3	500			MONORAIL HOIST	30	3	14
		=	"		500		"	=		
		=	"			500	"	=		
			SUBTOTAL ODD SIDE	—	—	—	SUBTOTAL EVEN SIDE	—	—	—
							SUBTOTAL ODD SIDE	—	—	—
							FEED-THRU LUG LOAD	—	—	—
							TOTAL CONN. LOAD	—	—	—

FROM PANEL ____
= ____ KVA
= ____ AMPS

REMARKS:

PNLSCH01 ✖ ●
03-01-23

PANEL SCHEDULE

PANEL NAME A
LOCATION MEZZANINE DECK
FOUND ON DWG. NO. ____
FED FROM XMFR T2 - 75KVA
AVAILABLE FAULT CURRENT 4,140 SYM. AMPS
PANEL AIC RATING 10000
● FULLY RATED
○ SERIES RATED FOR ____ KAIC FROM ____
FEEDER 4#250KCM+#1/0GND., 3"C.
○ FEEDER PROTECTED BY OVERCURRENT DEVICE

VOLTAGE ○ 480/277V, 3Ø 4W, WYE
● 208/120V, 3Ø 4W, WYE
○ 240/120V, 3Ø 4W, DELTA W/BØ "STINGER"
MAINS, 250 AMP
● FACTORY MAIN CIRCUIT BREAKER
○ SHUNT TRIP MAIN CB
○ MAIN LUGS ONLY
○ UL LISTED FEED-THRU LUGS
○ LIGHTNING ARRESTOR WIRED TO LOAD SIDE OF MAIN, 3 POLE, 650V, JOSLYN Z3-650-0A, OR EQUAL
NEUTRAL ● 100% ○ 200%
MOUNTING ● SURFACE ○ FLUSH

ENCLOSURE ● NEMA1 ○ NEMA3R ○ NEMA12 ○ NEMA4X STAINLESS STEEL
● LOCKABLE COVER
FEED ● TOP ○ BOTTOM
BRANCHES ● BOLT-ON, PANELBOARD CONSTR. ○ STAB-IN, LOAD CENTER CONSTR.

PANEL HAS FRONT ACCESS ONLY
ALL COPPER BUSSING
FURNISH COPPER GROUND BAR KIT
○ ALSO FURNISH ADDITIONAL ISOLATED GROUND BAR KIT
○ SERVICE ENTRANCE LABEL
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USE 1/4" LETTERING FOR PANEL NAME, ON 1 LINE
USE 1/8" LETTERING FOR VOLTS, AMPS, WHERE FED FROM, MO./YR. INSTALLED, ON 4 LINES
● BLACK FIELD, WHITE LETTERS
○ RED FIELD, WHITE LETTERS

CKT. #	# OF POLES	TRIP AMPS	LOAD DESCRIPTION	VOLT-AMPS A	VOLT-AMPS B	VOLT-AMPS C	LOAD DESCRIPTION	TRIP AMPS	# OF POLES	CKT. #
1	1	20	FILTER ROOM CLG LITES- NORTH	500			LIGHTS - RESTROOM & OFFICE 2	20	1	2
3	1	20	FILTER ROOM CLG LITES- SOUTH		500		LIGHTS - BLDG. EXT. PERIMETER OFF.1	20	1	4
5	1	20	LIGHTS - CHEMICAL ROOM			500	REC - OFFICE	20	1	6
7	1	20	GFI REC'S - FILTER RM - WEST	500			REC - OFFICE 3	20	1	8
9	1	20	GFI REC'S - FILTER RM - EAST		500		REC CT - KITCHEN	20	1	10
11	1	20	GFI REC'S - RESTROOM			500	REC CT - KITCHEN	20	1	12
13	1	20	REC'S - OFFICE	500			OUTDOOR GFI @ DISC. SWS.	20	1	14
15	1	20	REC'S - OFFICE		500		GFI RECS - CHEMICAL ROOM	20	1	16
17	1	20	REC - KITCHEN - FRIDGE			500	REC'S CHEMICAL ROOM- CHEM PUMPS#1	20	1	18
19	1	20	OUTDOOR GFI REC'S @ CU-1	500			REC'S CHEMICAL ROOM- CHEM PUMPS#2	20	1	20
21	1	20	GFI REC AT AC UNIT ON MEZZANINE		500		REC'S CHEMICAL ROOM- CHEM PUMPS#3	20	1	22
23	1	20	C004 ITEM 13 SCADA PNL.			500	MEZZANINE DECK LIGHTING	20	1	24
25	1	20	C004 ITEM 17 MAGMETER DISPLAY	500			FILTER ROOM WALL LOUVERS L1-L2	20	1	26
27	1	20	REC. OFF.2		500		AHU #1 INLET LOUVER L-3	20	1	28
29	1	20	REC. OFF.2			500	CHEMICAL ROOM AIR INLET LOUVER L-7	20	1	30
31	1	20	SPARE CB.	500			SPARE CB	20	1	32
33	1	20	C004 ITEM 14, TURBIDITY MONITOR		500		SPARE CB	20	1	34
35	1	20	C004 ITEM 15, FREE CL2 MONITIOR			500	SPARE CB	20	1	36
37	1	20	C004 ITEM 16, TURBIDITY MONITOR	500			CHLORINE ROOM EXH. FAN #4	20	1	38
39	1	20	SITELIGHT @ GENERTAOR SLAB		500		ARMSTRONG CHLORINE MONITOR AMC-1400	20	1	40
41	1	20	SPARE CB			500	SPARE CB	20	1	42
			SUBTOTAL ODD SIDE	3500	3500	3500	SUBTOTAL EVEN SIDE	3500	3500	3500
							SUBTOTAL ODD SIDE	3500	3500	3500
							FEED-THRU LUG LOAD	—	—	—
							TOTAL CONN. LOAD	7K	7K	7K

FROM PANEL ____
= 21 KVA
= 58.2 AMPS

REMARKS:
1. BOND NEUTRAL TO GROUND IN THIS PANEL, WITH #2.

PNLSCH01 ✖ ●
03-01-23

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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SHEET SIZE: ANSI D
SCALE: N.T.S.

STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18286
05/10/24
EER
ELECTRICAL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

PANEL SCHEDULES

SHEET NO.
E-013
SHEET 87 OF 92

PANEL SCHEDULE

PANEL NAME DP1
LOCATION LOFT MEZZANINE DECK
FOUND ON DWG. NO. ____
FED FROM AUTOMATIC TRANSFER SWITCH
AVAILABLE FAULT CURRENT 7,200 SYM. AMPS
PANEL AIC RATING 10000
● FULLY RATED
○ SERIES RATED FOR ____ KAIC FROM ____
FEEDER 2 SETS (4#350KCM+3/0 GND., 3 1/2"C)
● FEEDER PROTECTED BY OVERCURRENT DEVICE

VOLTAGE
● 480/277V, 3Ø 4W, WYE
○ 208/120V, 3Ø 4W, WYE
○ 240/120V, 3Ø 4W, DELTA W/BØ "STINGER"

MAINS, 600 AMP
● FACTORY MAIN CIRCUIT BREAKER
○ SHUNT TRIP MAIN CB
○ MAIN LUGS ONLY
○ UL LISTED FEED-THRU LUGS

○ LIGHTNING ARRESTOR WIRED TO LOAD SIDE OF MAIN, 3 POLE, 650V, JOSLYN Z3-650-0A, OR EQUAL

NEUTRAL ● 100% ○ 200%
MOUNTING ● SURFACE ○ FLUSH

ENCLOSURE ● NEMA1 ○ NEMA3R ○ NEMA12 ○ NEMA4X ○ STAINLESS STEEL
● LOCKABLE COVER
FEED ● TOP ○ BOTTOM
BRANCHES ● BOLT-ON, PANELBOARD CONSTR. ○ STAB-IN, LOAD CENTER CONSTR.

PANEL HAS FRONT ACCESS ONLY
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FURNISH COPPER GROUND BAR KIT
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USE 1/8" LETTERING FOR VOLTS, AMPS, WHERE FED FROM, MO./YR. INSTALLED, ON 4 LINES
● BLACK FIELD, WHITE LETTERS
○ RED FIELD, WHITE LETTERS

CKT. #	# OF POLES	TRIP AMPS	LOAD DESCRIPTION	VOLT-AMPS A	B	C	LTG	REC	MTR		MTR	REC	LTG	VOLT-AMPS A	B	C	LOAD DESCRIPTION	TRIP AMPS	# OF POLES	CKT. #
1	3	100	SPARE	10K					●	●				10K			SPARE	60	3	2
–	–	–	"		10K				●	●					10K		"	–	–	–
–	–	–	"			10K			●	●						10K	"	–	–	–
3	3	100	TRANSFORMER T1 (75KVA), 90FLA	25K					●	●				10K			WATER HEATER (30KW), 36FLA	60	3	4
–	–	–	"		25K				●	●					10K		"	–	–	–
–	–	–	"			25K			●	●						10K	"	–	–	–
5	3	300	PUMP CONTROL PANEL	42K					●	●				10K			SPARE	100	3	6
–	–	–	"		42K				●	●					10K		"	–	–	–
–	–	–	"			42K			●	●						10K	"	–	–	–
7	3	60	SPARE	5K					●	●				20K			BUSSED SPACE	225	3	8
–	–	–	"		5K				●	●					20K		"	–	–	–
–	–	–	"			5K			●	●						20K	"	–	–	–
9	3	225	BUSSED SPACE	10K					●	●				14K			SUBFEED TO DP2	225	3	10
–	–	–	"		10K				●	●					14K		"	–	1	–
–	–	–	"			10K			●	●						14K	"	–	1	–
			SUBTOTAL ODD SIDE	92K	92K	92K								SUBTOTAL EVEN SIDE	64K	64K				
														SUBTOTAL ODD SIDE	92K	92K	92K			
														FEED-THRU LUG LOAD	———	———	———	FROM PANEL ____		
														TOTAL CONN. LOAD	156K	156K	156K	= 468 KVA		
																		= 561 AMPS		

REMARKS:

PNLSCH01 ✕ ●
03-01-23

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

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STATE OF LOUISIANA
BRUCE D. BURTON
REG. No. 18286
PROFESSIONAL ENGINEER
05/10/24
CIVIL
CRITICAL ENGINEERING

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

PANEL SCHEDULES - WIRE/CONDUIT SCHEDULE

SHEET NO.
E-014
SHEET 88 OF 92

ENGINE SERVICE CONNECTIONS

GAS INLET	2" NPT
ENGINE WATER IN	2.50" O.D.
ENGINE WATER OUT	2.25" O.D.
DE-AERATION	1/4" NPT
MAG PICK-UP	5/8-18 UNF
OIL DRAIN PLUG	1-18 NS
EXHAUST STACK	5.00" O.D.
AFTERCOOLER WATER IN	1-1/2" NPT
AFTERCOOLER WATER OUT	1" O.D.
EXH TEMP COUPLING	1/4" NPT

FLUID CAPACITIES

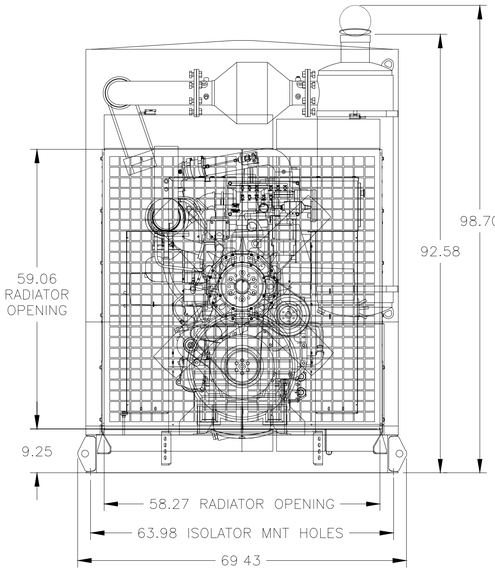
ENGINE OIL	9 GAL
ENGINE COOLANT	22 QTS
AFTERCOOLER COOLANT	4 QTS
RAD JACKET WATER	13.81 GAL
RAD AFTERCOOLER	9.93 GAL

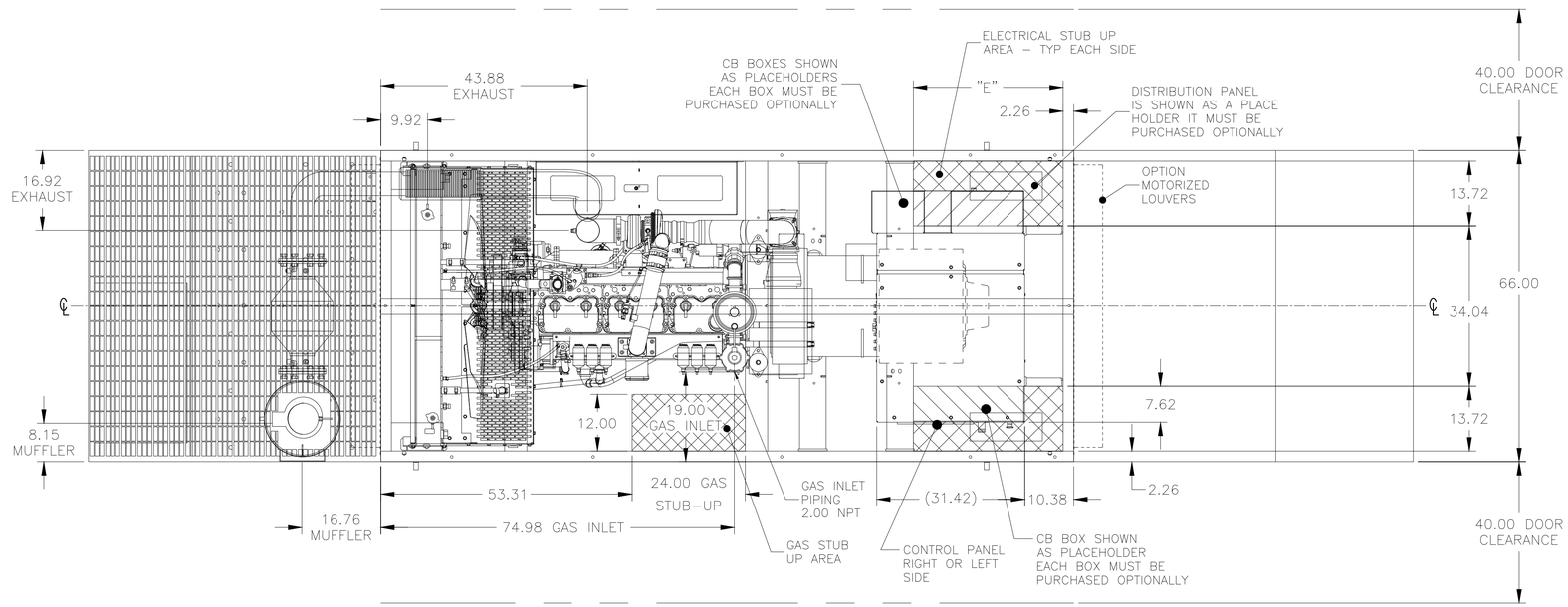
SERVICE NOTES

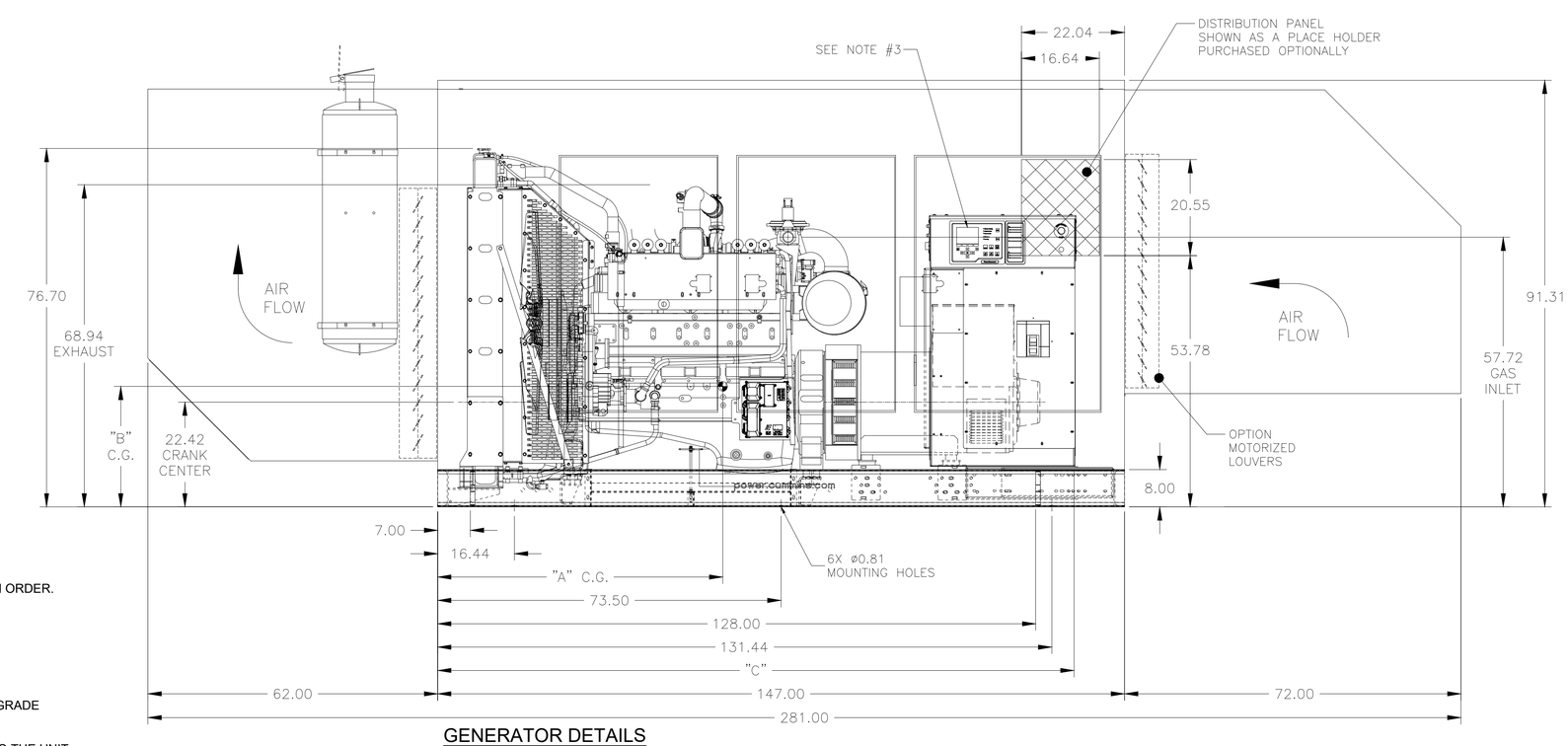
OIL PAN REMOVAL	8.25"
DIPSTICK REMOVAL	15.00"
OIL FILTER REMOVAL	2.40"

GENERATOR FRAME SIZE	DIM* "A"	DIM "B"	DIM "C"	DIM "E"	TOTAL WEIGHT* (WET) LBS/KG
NEWAGE S4L1S-C4	64.12	25.67	136.20	31.77	10845/4919
NEWAGE S4L1S-D4	65.19	25.59	136.20	31.77	11016/4997
NEWAGE S4L1S-E4	65.19	25.59	136.20	31.77	11200/5080
NEWAGE S4L1S-F4	TBD	TBD	136.20	31.77	11477/5206

*SEE NOTES 7, 8 AND 9







GENERATOR DETAILS

SCALE: 1/4"=1'-0"

NOTES:
1. ENCLOSURE TO BE PAINTED ONAN GREEN UNLESS OTHERWISE NOTED ON ORDER.
2. ALL ENCLOSURES HARDWARE TO BE STAINLESS STEEL.
3. ALL DOORS KEYED ALIKE.
4. STAINLESS STEEL LIFT-OFF DOOR HINGES.
5. FOLDING T-HANDLE COMPOSITE DOOR LATCH.
6. ENCLOSURE IS 14 GAUGE.
7. ALL WEIGHT AND DIMENSIONS ARE APPROXIMATE
8. WEIGHTS DO NOT INCLUDE BATTERIES OR OPTIONAL EQUIPMENT
9. WEIGHTS INCLUDE STANDARD CRITICAL GRADE EXHAUST FOR HOSPITAL GRADE EXHAUST ADD 150 LBS/ 68 KG.
10. CONTROLLER CAN BE MOUNTED ON EITHER SIDE OF CABINET
11. REQUIRES USE OF SPREADER BAR WHEN LIFTING TO PREVENT DAMAGE TO THE UNIT.
12. GENSET DOES NOT INCLUDE FLOOR. CONTACT FACTORY FOR PRICING.
13. GENSET HAVE INTEGRAL ISOLATION

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STATE OF LOUISIANA
BRUCE D. BARTON
REG. No. 18288
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING
05/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

FILTER BUILDING GENERATOR DETAILS

SHEET NO.
E-015
SHEET 89 OF 92

CONDUIT/WIRE SCHEDULE

C101 - UNDERGROUND, (3) 5" SCH. 80 PVC CONDUITS BY CONTRACTOR, ALUMINUM CONDUCTORS BY POWER COMPANY.

C102 - 4 SETS (4#350 KCM + #3/0 GND., 4" C.)

C103 - 4 SETS (4#350 KCM + #3/0 GND., 4" C.)

C103X - TO METER PAN - 1-1/2" RIGID ALUMINUM NIPPLE CONDUCTORS BY POWER COMPANY.

C104 - 4 SETS (4#350 KCM + #3/0 GND., 3" C.) (THESE ARE SHORT 3" NIPPLES THRU THE WALL)

C105 - 4 SETS (4#350 KCM + #3/0 GND., 4" C.)

C106 - NOT USED

C107 - 3 #350 KCM + 1/0 GND., 3" C. BLOWER CONTROL PANEL #1

C108 - 3 #2 + #4 GND., 1-1/2" C. BLOWER CONTROL PANEL #3

C109 - 3 #350 KCM + 1/0 GND., 3" C. BLOWER CONTROL PANEL #2

C110 - 4 #4/0 + #2 GND., 2 1/2" C.

C111 - 3 #3 + #4 GND., 1 1/2" C.

C112 - 3 #3 + #4 GND., 1 1/2"C.

C113 - 4 #4/0 + #1/0 GND., 3" C. FEED TO FLOW EQUALIZATION PUMP CONTROL PANEL "FE"

C113A - 4 #4/0 + #1/0 GND., 3" C. UP TO PUMP CONTROL PANEL "FE" ON UPPER FLOW EQ. DECK

CL1-1 - SODIUM HYPOCHLORIDE SHED (FOR FEED PUMPS)
20/1, 2 #10 + #10 GND., 1" C. (120V)

CL1-2 - RECEPTACLES AT SAND FILTER, CLARIFIER #1, CLARIFIER #2
20/1, 2 #10 + #10 GND., 1" C. (120V)

C114 - EMPTY SCH. 80 PVC CONDUIT W/ PULL STRING, 3" C., FUTURE FEEDER

C115 - 4 #2 + #4 GND., 2" C. REFEED CLARIFIER #1 , 120/208V, 3PFW

C116 - 3 #10 + #10 GND., 1" C. EXISTING 30a, 480V/3 FEED TO CLARIFIER #2. THIS WILL BE ABANDONED AFTER THE NEW TEMPORARY FEED C118 FROM THE SAND FILTER IS ENERGIZED

C117 - TWO 480/3 FEEDERS TO SAND FILTER (3 #10 + G, 3 #6 + 1"G)

C118 - 3 #8 + #10 GND., 1" C. NEW TEMPORARY RE-FEED TO CLARIFIER #2.

CB101 - 3 # 3 + #4 GND., 1 1/2" C.

CB102 - 3 #3 + #4 GND., 1 1/2" C.

CB103 - 3 #2 + #4 GND., 1 1/2" C.

CB104 - 3 #3 + #4 GND., 1 1/2" C.

CB105 - 3 #3 + #4 GND., 1 1/2" C.

CB106 - 3 #10 + #10 GND., 3/4" C.

CB107 - 3 #10 + #10 GND., 3/4" C.

CB108 - 3 #10 + #10 GND., 3/4" C.

C201 - 3 #10 + #10 GND., 3/4" C.

C202 - 3 #10 + #10 GND., 3/4" C.

C203 - 3 #10 + #10 GND., 3/4" C.

C204 - 3 #10 + #10 GND., 3/4" C.

C205 - 4 #1/0 + #2 GND., 2" C.

CFE101 - 3 #8 + #10 GND. 1"C.

CFE102 - 3 #8 + #10 GND. 1"C.

CFE103 - 3 #8 + #10 GND. 1"C.

CFE104 - 2 #10 + #10 GND., 3/4" C.

CFE105 - 3 #6 + #8 GND., 1 1/4" C.

CFE106 - 2 #10 + #10 GND., 3/4" C.

CFE107 - 3 #12 + #12 GND., 3/4" C.

CFE108 - 2 #10 + #10 GND., 3/4" C.

CFE109 - 2 #12 + #12 GND., 3/4" C.

CFE110 - 3 #8 + #10 GND. 1" C. RE-FEED TO CLARIFIER #2

CFE114 - 16 #12, 1 1/2" C. FLOAT SWITCH WIRING FROM STILLWELL J.B. TO PCP "FE"

CFE111 - 2" ALUMINUM C., WITH POWER AND SENSOR PUMP CABLES AS SUPPLIED BY PUMP MFGR., FOR P1

CFE112 - 2" ALUMINUM C., WITH POWER AND SENSOR PUMP CABLES AS SUPPLIED BY PUMP MFGR., FOR P2

CFE113 - 2" ALUMINUM C., WITH POWER AND SENSOR PUMP CABLES AS SUPPLIED BY PUMP MFGR., FOR P3

CFE201 - 6 #12, 3/4 C.

CFE202 - 6 #12, 3/4 C.

CFE203 - 6 #12, 3/4 C.

CFE301 - 3 #8 + #10 GND., 3/4 C.

CFE302 - 3 #8 + #10 GND., 3/4 C.

CFE303 - 3 #8 + #10 GND., 3/4 C.

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:

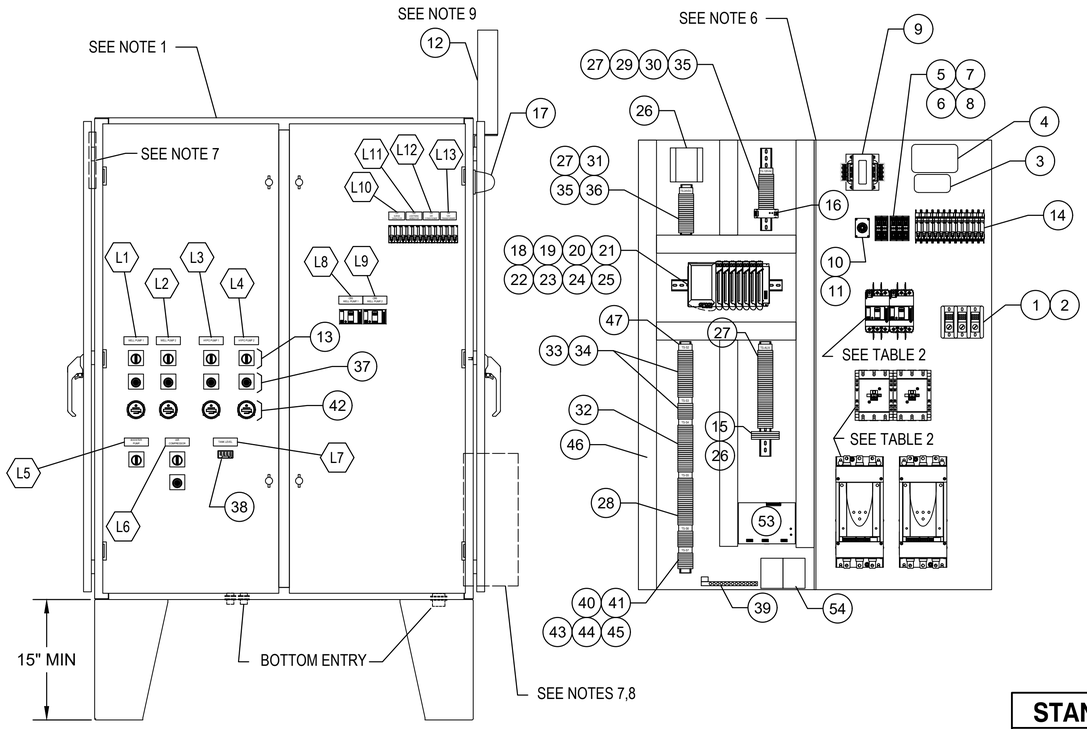
DESIGNED BY:	BB
DRAWN BY:	PW
CHECKED BY:	MH
SUBMITTED BY:	BBEC, LLC
PROJECT No.:	TU23000181
ISSUE DATE:	04/15/2024
APPROVED BY:	BB
SHEET SIZE:	ANSI D
SCALE:	N.T.S.

STATE OF LOUISIANA
BRUCE D. BARTON
PROFESSIONAL ENGINEER
03/10/24

DIVERSIFIED WATER WELL
PRETREATMENT SYSTEM
MADISONVILLE, LOUISIANA
PROJECT No.: TU23000181

CONDUIT WIRE LEGEND

SHEET NO.
E-016
SHEET 90 OF 92



DEAD FRONT PANELS

BACK PANEL

STANDARD DRAWING

THIS STANDARD DRAWING SHOWS COMBINED COMPONENTS AND CAPABILITY FOR A VARIETY OF WATER PRODUCTION SITE REQUIREMENTS. CONTRACTOR SHALL PROVIDE CONTROL PANEL WITH COMPONENTS AND CAPABILITY EDITED TO PROJECT SPECIFIC REQUIREMENTS, AND SHALL COMPLY WITH APPLICABLE PROVISIONS OF THIS STANDARD.

TABLE 1

ITEM	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
1	1	POWER DISTRIBUTION BLOCK	BUSSMAN	16378-3
2	1	POWER DISTRIBUTION COVER	BUSSMAN	163CPDB-3
3	1	LIGHTNING ARRESTOR	DELTA	LA-303
4	1	SURGE CAPACITOR	DELTA	CA-603
5	1	3 POLE FUSE BLOCK	BUSSMANN	BCM603-3S
6	1	2 POLE FUSE BLOCK	BUSSMANN	BCM603-2S
7	3	1A FUSE	BUSSMANN	KTK-R-1
8	2	8A FUSE	BUSSMANN	KTK-R-8
9	1	CONTROL POWER TRANSFORMER 300VA	SCHNEIDER	9070T500D95
10	1	PHASE MONITOR RELAY	AUTOMATION DIRECT	PMRU-1C-480A-TL
11	2	RELAY SOCKET	AUTOMATION DIRECT	70169-D
12	1	ANTENNA	SURECALL	SC-588W
13	6	3-POSITION, MAINTAINED, SELECTOR SWITCH	EATON	M22S-WRK3-K20
14	4	MINIATURE CIRCUIT BREAKER 3P 15A, 480/277VAC	EATON	FAZ-C15-3-NA
15	3	24VDC RELAY 1 CHANGEOVER CONTACT	PHOENIX CONTACT	2966171
16	1	24VDC POWER SUPPLY 150W OUTPUT	PHOENIX CONTACT	2904376
17	1	ENCLOSURE WARNING LIGHT - AMBER	FEDERAL SIGNAL	LP22LED-090-240A
18	1	PLC PROCESSOR WITH TOUCHSCREEN	OPTO 22	GRV-EPIC-PR2
19	1	24V POWER ADAPTER	OPTO 22	GRV-EPIC-PSDC
20	1	8-SLOT CHASSIS	OPTO 22	GRV-EPIC-CHS8
21	1	4-CHANNEL SERIAL COMMUNICATION MODULE	OPTO 22	GRV-CSERI-4
22	2	24-CHANNEL DISCRETE INPUT MODULE	OPTO 22	GRV-IDC-24
23	2	8-CHANNEL RELAY OUTPUT MODULE	OPTO 22	GRV-OMRIS-8
24	1	24-CHANNEL ANALOG INPUT MODULE	OPTO 22	GRV-IMA-24
25	1	8-CHANNEL ANALOG OUTPUT MODULE	OPTO 22	GRV-OVMALC-8
26	1	CELLULAR ROUTER	PEPWAVE	MAX-BR1-MINI
27	46	FEED THROUGH TERMINAL BLOCK UT 4	PHOENIX CONTACT	3044102
28	16	FEED THROUGH 2-LEVEL TERMINAL BLOCK UTTB 4	PHOENIX CONTACT	3044814
29	6	GROUND TERMINAL BLOCK UT 4-PE	PHOENIX CONTACT	3044128
30	6	FUSED TERMINAL BLOCK (5x20) 250VAC	PHOENIX CONTACT	3046100
31	10	FUSED TERMINAL BLOCK (5x20) 24VDC	PHOENIX CONTACT	3046090
32	48	FUSED 2-LEVEL TERMINAL BLOCK (5x20) 24VDC	PHOENIX CONTACT	3214366
33	32	FUSED 2-LEVEL TERMINAL BLOCK W/GND (5x20) 24VDC	PHOENIX CONTACT	3214321
34	72	0.5A FUSE 5MM X 20MM	BUSSMANN	GMA-5
35	15	2A FUSE 5MM X 20MM	BUSSMANN	GMA2
36	1	4A FUSE 5MM X 20MM	BUSSMANN	GMA4
37	5	INDICATING LIGHT RED LED	EATON	E22HL2X8
38	1	ANALOG SIGNAL DISPLAY	AUTOMATION DIRECT	DPM1-A-LP
39	1	GROUND BAR	EATON	GBK1420CS
40	A/R	TERMINAL BLOCK END CLAMP	PHOENIX CONTACT	0800886
41	A/R	TERMINAL MARKER STRIP	PHOENIX CONTACT	1051029
42	4	HOUR METER 120VAC	AUTOMATION DIRECT	722-0003
43	A/R	PLUG IN BRIDGE FBSR 5-6	PHOENIX CONTACT	3030349
44	A/R	DIN RAIL PERFORATED NS35/ 7,5 2M	PHOENIX CONTACT	804278
45	A/R	DIN RAIL SUPPORT BRACKET - ISOLATED	PHOENIX CONTACT	1201141
46	A/R	WIRING DUCT, PVC NARROW SLOTTED WITH COVER	PANDUIT	TYPE F
47	A/R	TERMINAL GROUP MARKERS	PHOENIX CONTACT	800307
48	A/R	AIR CONDITIONER 2000BTU 240V	HOFFMAN	N210226G051
49	A/R	AIR CONDITIONER 2000BTU 460V	HOFFMAN	N210246G051
50	A/R	THERMOSTAT RELAY	STEGO	011160-01
51	A/R	ENCLOSURE FAN	HOFFMAN	HF1016514
52	A/R	ENCLOSURE EXHAUST GRILLE	HOFFMAN	HG1000404
53	1	120V UPS 500VA	PHOENIX CONTACT	1067327
54	2	BATTERY 12V 7AH	POWER SONIC	PS-1270

TABLE 2

VOLTAGE(V)	MOTOR SIZE (HP)	BREAKER (SCHNEIDER #)	CONTACTOR (SCHNEIDER #)	SOFT STARTER (SCHNEIDER #)	CABLE SIZE
480	60 TO 100	JDL36175	LC1G185EHEA	ATS22C17S6U	1/0
480	30 TO 59	BDL36100	LC1D806G7	ATS22D88S6U	3
240		JDL36200	LC1G185EHEA	ATS22C17S6U	3/0
480	15 TO 29	BDL36050	LC1D50AG7	ATS22D47S6U	8
240		BDL36100	LC1D806G7	ATS22D88S6U	3

TABLE 3

LABEL	LINE 1	LINE 2	LINE 3	SIZE	LETTER SIZE	LABEL COLOR	LETTER COLOR
L1	WELL PUMP 1			1" X 3"	1/4"	WHITE	BLACK
L2	WELL PUMP 2			1" X 3"	1/4"	WHITE	BLACK
L3	HYPO PUMP 1			1" X 3"	1/4"	WHITE	BLACK
L4	HYPO PUMP 2			1" X 3"	1/4"	WHITE	BLACK
L5	BOOSTER	PUMP		1" X 3"	1/4"	WHITE	BLACK
L6	AIR	COMPRESSOR		1" X 3"	1/4"	WHITE	BLACK
L7	TANK LEVEL			1" X 3"	1/4"	WHITE	BLACK
L8	CB5	WELL PUMP 1		1" X 3"	1/4"	WHITE	BLACK
L9	CB6	WELL PUMP 2		1" X 3"	3/16"	WHITE	BLACK
L10	CB1	SURGE	CAPACITOR	1" X 2"	3/16"	WHITE	BLACK
L11	CB2	LIGHTNING	ARRESTOR	1" X 2"	3/16"	WHITE	BLACK
L12	CB3	AIR	CONDITIONER	1" X 2"	3/16"	WHITE	BLACK
L13	CB4	120V	TRANSFORMER	1" X 2"	3/16"	WHITE	BLACK

1. ENCLOSURE SHALL BE 48"W X 60"H X 12"D MIN., SELF-SUPPORTING NEMA 4X TYPE 304 STAINLESS STEEL, POWDER COATED (WHITE), WITH PADLOCKING HASP, WHITE STEEL BACKPLANE, 2-DOORS WITH DEAD FRONT INNER DOORS WITH 1/4 TURN HANDLE FASTENING, BOND BOTH DOORS TO ENCLOSURE GROUND BAR.
2. ALL PANEL ITEMS SHALL BE MOUNTED ON THE BACKPLANE EXCEPT AS NOTED OTHERWISE. ITEMS TO BE MOUNTED ON THE INNER SWING PANEL: INDICATOR LIGHTS, SELECTOR SWITCHES, PUSHBUTTONS, AND CIRCUIT BREAKER HANDLE OPENINGS.
3. PANEL TO BE RACK MOUNTED, OR LEG MOUNTED, ADJACENT TO MEANS OF DISCONNECT, CABLING TO BE BOTTOM ENTRY.
4. PRIOR TO ORDER, CONTRACTOR SHALL PROVIDE COMPLETE CONTROL AND WIRING DIAGRAMS IN SHOP DRAWING SUBMITTAL FROM PANEL MANUFACTURER FOR APPROVAL BY OWNER/ENGINEER.
5. CONTROL PANEL TO BE CONFIGURED FOR OPERATION OF 15-100HP WELL PUMP MOTORS. SEE TABLE 2 FOR REQUIRED HARDWARE BASED ON MOTOR SIZE AND INCOMING VOLTAGE.
6. FULL DEPTH INTERIOR PANEL DIVIDER FOR 480/240V SECTION ISOLATION.
7. FOR TEMPERATURE CONTROLLED INDOOR INSTALLATIONS (<85DEG F), PANEL TO INCLUDE THERMOSTAT RELAY, CIRCULATION FAN ON LOWER RIGHT PANEL, AND EXHAUST VENT ON UPPER LEFT PANEL. SEE TABLE 1, ITEMS 50-52.
8. FOR OUTDOOR INSTALLATIONS, PANEL TO INCLUDE 1/2" INSULATION SHEETS ON INTERNAL SURFACES AND AIR CONDITIONER, SEE TABLE 1, ITEMS 48-49.
9. INDOOR INSTALLATIONS REQUIRE REMOTE ANTENNA MOUNTING OUTDOORS
10. SEE TABLE 3 FOR NAMEPLATE ITEMS

PRINCIPAL Engineering

DEPT. OF UTILITIES
ST. TAMMANY PARISH GOVERNMENT
620 N. TYLER STREET
COVINGTON, LA 70433

No.	DESCRIPTION OF REVISION	DATE:
1	UPS AND BATTERY ADDED	04/25/24

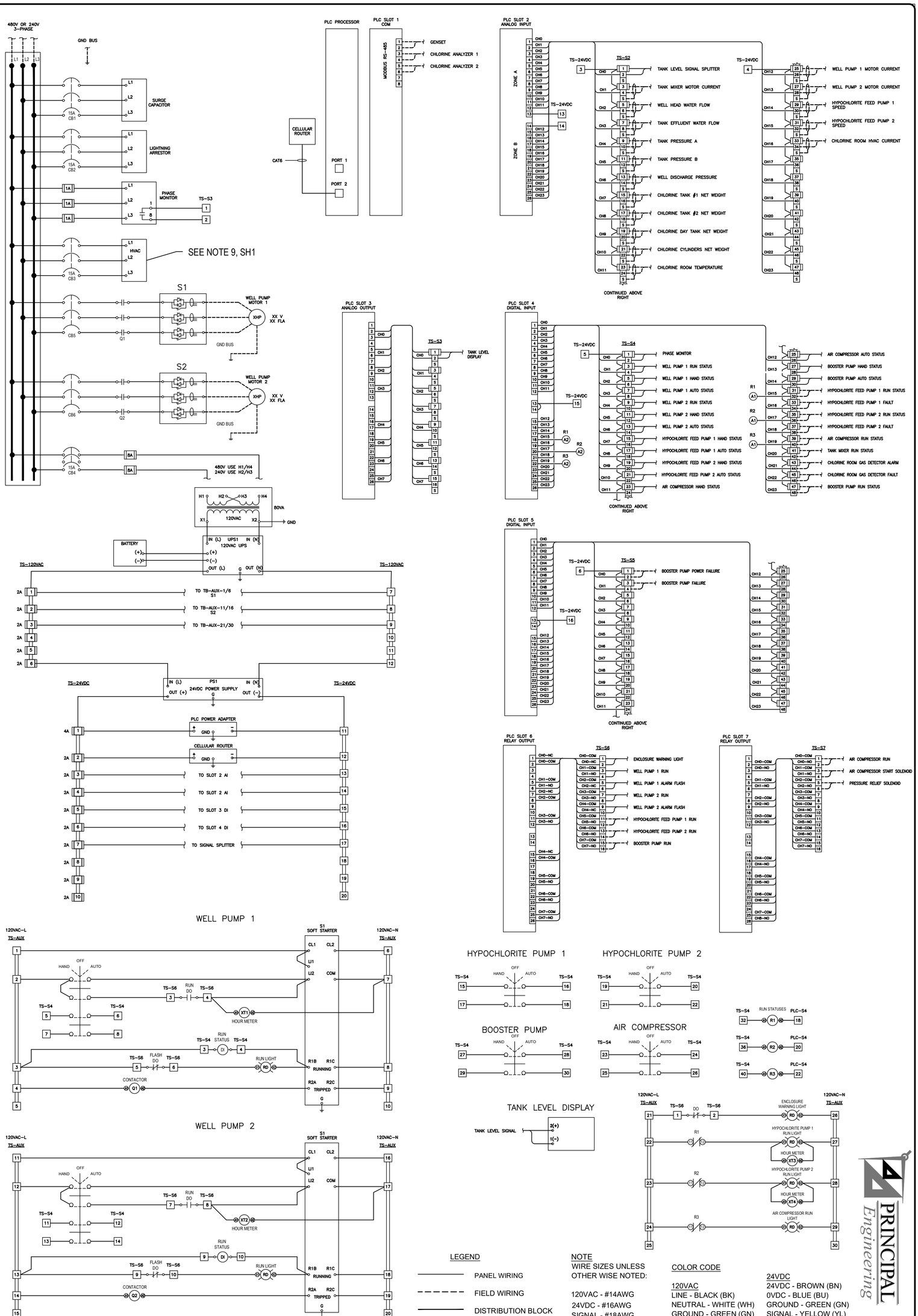
DESIGNED BY: RR
DRAWN BY: RR
CHECKED BY: SH
ISSUE DATE: 09-21-2023
APPROVED BY: --
SHEET SIZE: ANSI D
SCALE: NONE

STATE OF LOUISIANA
Nestor James Houghton
REG. NO. 22300
PROFESSIONAL ENGINEER
IN
ELECTRICAL ENGINEERING
04/25/24

WATER PRODUCTION SITE
STANDARD CONTROL PANEL
ST. TAMMANY PARISH, LOUISIANA

CONTROL PANEL SPECIFICATION
PANEL LAYOUT

SHEET NO.
CP-001
SHEET 1 OF 2



LEGEND

- PANEL WIRING
- FIELD WIRING
- DISTRIBUTION BLOCK

NOTE

WIRE SIZES UNLESS OTHER WISE NOTED:

120VAC - #14AWG
24VDC - #16AWG
SIGNAL - #18AWG

COLOR CODE

120VAC
LINE - BLACK (BK)
NEUTRAL - WHITE (WH)
GROUND - GREEN (GN)

24VDC
24VDC - BROWN (BN)
0VDC - BLUE (BU)
GROUND - GREEN (GN)
SIGNAL - YELLOW (YL)

PRINCIPAL Engineering

WATER PRODUCTION SITE STANDARD CONTROL PANEL ST. TAMMANY PARISH, LOUISIANA

CONTROL PANEL SPECIFICATION PANEL WIRING

SHEET NO. CP-002 SHEET 2 OF 2

STATE OF LOUISIANA — Meador Jeffrey Hughes — No. 39233 — PROFESSIONAL ENGINEER — 09-21-23

DESIGNED BY:	RR
DRAWN BY:	RR
CHECKED BY:	SH
ISSUE DATE:	09-21-2023
APPROVED BY:	---
SHEET SIZE:	ANSI D
SCALE:	NONE

No.	DESCRIPTION OF REVISION	DATE:
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