

RESOLUTION NO. 2022 - 469

A RESOLUTION BY THE BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA, AUTHORIZING THE AWARD OF BID NO. 23-10; CR 208 WATER BOOSTER PUMP STATION – ELECTRICAL WORK TO COGBURN BROS, INC., AS THE LOWEST, RESPONSIVE, RESPONSIBLE BIDDER, AND EXECUTION OF A CONTRACT FOR COMPLETION OF THE WORK IN ACCORDANCE WITH THE BID DOCUMENTS.

RECITALS

WHEREAS, the Utility Department has budgeted for the purchase materials and installation of electrical components for the electrical portion of the CR 208 Water Booster Pump Station project. The Contractor shall provide all labor, materials, equipment, supervision, tools, and permitting necessary for the installation of the electrical components for the CR 208 Water Booster Pump Station project in accordance with Bid No. 23-10; and

WHEREAS, through the County's formal Bid process, Cogburn Bros, Inc., submitted the lowest, responsive, responsible Bid at a price of \$949,000.00; and

WHEREAS, the County has finds that entering into a contract for completion of the work serves a public purpose; and

WHEREAS, the project will be funded by the County Utility System Connections Fees - Capital Projects.

NOW, THEREFORE BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA, as follows:

Section 1. The above Recitals are incorporated by reference into the body of this Resolution and such Recitals are adopted as finds of fact.

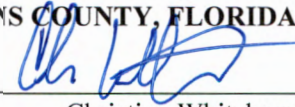
Section 2. Bid No. 23-10; CR 208 Water Booster Pump Station – Electrical Work is hereby approved for award to Cogburn Bros, Inc, as the lowest, responsive, responsible Bidder.

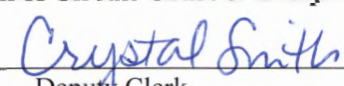
Section 3. Upon Board approval, a Contract shall be executed with Cogburn Bros, Inc. for completion of the Work as specifically provided in Bid No: 23-10.

Section 4. To the extent that there are typographical and/or administrative errors that do not change the tone, tenor, or concept of this Resolution, then this Resolution may be revised without subsequent approval by the Board of County Commissioners.

PASSED AND ADOPTED by the Board of County Commissioners of St. Johns County, Florida, on this 20th day of December, 2022.

BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA

By: 
Christian Whitehurst, Chair

ATTEST: Brandon J. Patty,
Clerk of Circuit Court & Comptroller
By: 
Deputy Clerk



Rendition Date DEC 20 2022



**MASTER CONSTRUCTION AGREEMENT
 BETWEEN
 ST. JOHNS COUNTY AND CONTRACTOR**

Master Construction Agreement No: 22-MCA-COG-17350

Table of Contents

ARTICLE I CONTRACT DOCUMENTS	4
1.1 The Contract Documents	4
1.2 Definitions.....	5
1.3 Ownership of Contract Documents	6
ARTICLE II THE WORK.....	7
2.1 Project Description.....	7
2.2 Labor and Materials	7
2.3 Project Sequencing/Arrangement.....	7
2.4 Payment of Costs	7
2.5 Cleaning the Jobsite	7
2.6 Reporting Requirements	7
2.7 Title and Risk of Loss	8
2.8 Access to Work	8
2.9 Utilities.....	8
2.10 Existing Utility Lines.....	8
2.11 Taxes.....	8
2.12 Publicity and Advertising.....	9
ARTICLE III CONTRACT TIME	9
3.1 Contract Time	9
3.2 Time is of the Essence	9
3.3 Substantial Completion.....	9
3.4 Final Inspection.....	10
3.5 Liquidated Damages	10
3.6 Disclaimer of Consequential Damages	10
ARTICLE IV CONTRACT PRICE AND PAYMENT.....	11
4.1 Contract Price.....	11
4.2 Schedule of Values.....	11
4.3 Measurement and Payment	11
4.4 Progress Payments	11
4.5 Application for Payment	12
4.6 Withheld Payment.....	13
4.7 Final Payment	14

ARTICLE V CONTRACTOR RESPONSIBILITIES 14

5.1 Performance 14

5.2 Authorized Representative 15

5.3 Environmental, Safety and Health 15

ARTICLE VI PROJECT MANAGER 16

6.1 Project Manager Responsibilities..... 16

6.2 Field Orders 17

ARTICLE VII SUBCONTRACTORS 17

7.1 Award of Subcontracts..... 17

ARTICLE VIII CONTRACT DISPUTES/CLAIMS 17

8.1 Contract Claims..... 17

ARTICLE ix CHANGES IN THE WORK..... 18

9.1 General..... 18

9.2 Changes in the Contract Time..... 18

9.3 Changes in the Contract Price 19

9.4 Acceptance of Change Orders..... 19

9.5 Notice to Sureties 20

9.6 Differing Site Conditions 20

ARTICLE X UNCOVERING WORK, STOPPING WORK, 20

AND ACCEPTING DEFECTIVE OR NONCONFORMING WORK 20

10.1 Uncovering Work..... 20

10.2 Right to Stop Work 20

10.3 County May Accept Defective or Nonconforming Work..... 21

ARTICLE XI CONTRACT SUSPENSION AND TERMINATION 21

11.1 Suspension 21

11.2 Termination..... 21

ARTICLE XII WARRANTY AND INDEMNITY 22

12.1 Warranty 22

12.2 Indemnity 23

ARTICLE XIII INSURANCE AND BONDS..... 24

13.1 Contractor’s Insurance Requirements 24

13.2 Additional Insured Endorsements and Certificate Holder 24

13.3 Workers Compensation..... 24

13.4 Commercial General Liability 24

13.5 Automobile Liability..... 24

13.6 Additional Coverages..... 24

13.7 Other Requirements 25

13.8 Payment and Performance Bonds 26

ARTICLE XIV MISCELLANEOUS 26

14.1 Independent Contractor..... 26

14.2	Examination of Contractor’s Records.....	26
14.3	Backcharges	26
14.4	Applicable Law	26
14.5	Governing Law & Venue.....	26
14.6	Assignment	27
14.7	Severability	27
14.8	Section Headings.....	27
14.9	Disclaimer of Third-Party Beneficiaries	27
14.10	Waiver; Course of Dealing	27
14.11	No Waiver of Sovereign Immunity.....	27
14.12	Execution in Counterparts.....	27
14.13	Entire Contract	27
14.14	Survival	27
14.15	Employment Eligibility and Mandatory Use of E-Verify.....	28
14.16	Equal Employment Opportunity	28
14.17	Public Records	29
14.18	Anti-Bribery.....	30
14.19	Convicted and Discriminatory Vendor Lists, and Scrutinized Companies.....	30
14.20	Written Notice.....	30
	CERTIFICATION OF PAYMENTS TO SUBCONTRACTORS	33
	CONTRACTOR'S FINAL RELEASE AND WAIVER OF LIEN	34

This Master Construction Agreement (“Contract”) is made this _____ day of _____, 2022 (the “Effective Date”) by and between **ST. JOHNS COUNTY** (“County”), a political subdivision of the State of Florida, whose principal offices are located at 500 San Sebastian View, St. Augustine, FL 32084; and **COGBURN BROS, INC.** (“Contractor”), a company authorized to do business in the State of Florida, with its principal offices located at: 3300 Faye Road, Jacksonville, FL 32226, Phone: 904-358-2805, and E-mail: dcogburn@cogburnbros.com, for **23-10 CR 208 WATER BOOSTER PUMP STATION – ELECTRICAL WORK** hereinafter referred to as the “Project”. When referenced together, the County and Contractor shall collectively be referred to as the Parties.

In consideration of the mutual promises and covenants contained herein, the parties hereby agree as follows:

ARTICLE I CONTRACT DOCUMENTS

1.1 The Contract Documents

1.1.1 The Contract Documents are the collective documents which form the Contract, and shall govern completion of the Work. The Contract Documents hereby include the following:

- a) Fully Executed Change Orders and Amendments to this Agreement;
- b) Field Orders signed by County’s Project Manager;
- c) Notice to Proceed;
- d) This Master Construction Agreement and all Exhibits and/or Attachments hereto:
 - i. EXHIBIT A - Project Technical Specifications
 - ii. EXHIBIT B - Construction Plans
- e) Bonds and Insurance furnished by the Contractor
- f) Bid Documents and Bid Forms with all addenda thereto for Bid No. 23-10

1.1.2 Documents not enumerated above are not Contract Documents and do not form part of this Contract. No terms, conditions, limitations or exclusions in Contractor’s submitted Bid or invoices shall be binding upon County or become part of the Contract Documents. In the event of discrepancies, the Contract Documents shall be interpreted in the order of precedence as listed above in Section 1.1.1. Additionally, Specifications shall govern over Drawings, electronic documents shall govern over hard-copy documents, numerical dimensions shall govern over dimensions acquired by scaling, and fully executed documents shall govern over unsigned drafts.

1.1.3 Shop Drawings, Product Data, Samples and similar submittals (hereafter “Submittals”) are not Contract Documents. The County will review and take action upon Contractor's submitted Submittals but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Review of Submittals is not conducted for the purpose of determining the accuracy and completeness of other details, such as dimensions and quantities, nor for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of Contractor.

1.1.4 All Submittals (whether in hard or soft copy) prepared by or on behalf of Contractor in the course of the Work shall be the exclusive property of the County. Ownership of any proprietary information or intellectual property contained in such Submittals shall remain with Contractor. Contractor grants the County a perpetual, royalty-free, license to use, copy and allow third parties to use such Submittals and all proprietary information contained in them as may be required for the County’s internal business purposes including without limitation tendering, installing, operating, repairing, maintaining, modifying, reconstructing, replacing and/or upgrading the Work. Such license shall be capable of transfer and/or sub-licensing in whole or part without notice to or further consent of Contractor. Contractor shall not be held liable for reuse of Contractor’s Submittals by the County for purposes other than originally intended as stated in the Contract Documents.

1.1.5 Contractor is solely responsible for requesting instructions, interpretations, or clarifications to the Contract Documents and is solely liable for any costs and/or expenses arising from its failure to do so. Contractor shall have a continuing duty to read, carefully study and compare each of the Contract Documents, the Submittals and shall give immediate written notice to the Project Manager and the County of any inconsistency, ambiguity, error or omission which Contractor may discover with respect to these documents before proceeding with the affected Work. The issuance, or the express or implied approval by the County or the Project Manager of the Contract Documents or Submittals shall not relieve any such approval by evidence of Contractor’s compliance with the Contract. The County has requested the Project

Manager to provide to Contractor documents for the Project, including the Drawings and Specifications for the Project, which are accurate, adequate, consistent, coordinated, and sufficient for construction. HOWEVER, THE COUNTY MAKES NO REPRESENTATION OR WARRANTY OF ANY NATURE WHATSOEVER TO CONTRACTOR CONCERNING SUCH DOCUMENTS. By the execution hereof, Contractor acknowledges and represents that it has received, reviewed and carefully examined such documents, has found them to be complete, accurate, adequate, consistent, coordinated and sufficient for construction, and that Contractor has not, does not, and shall not rely upon any representation or warranties by the County concerning such documents as no such representation or warranties have been or are hereby made.

1.1.6 Any dispute relating to the Contract Documents, shall be resolved through good faith efforts upon the part of the Contractor and the County. Should Contractor have any questions concerning interpretation or clarification of the Contract Documents, Contractor shall submit to the County's Project Manager, in writing, a request for clarification that clearly and concisely sets forth the issues for which such request is sought. Such request shall be submitted to the Project Manager by the Contractor within three (3) business days of receipt of the Contract Documents, or the direction, interpretation, or clarification thereof provided by the County. The County's Project Manager shall render a determination concerning such interpretation or clarification, which shall be considered final and conclusive unless Contractor files a written protest within fourteen (14) calendar days of receipt thereof. Contractor's protest shall be submitted to the Assistant Director of Purchasing & Contracts, and shall state clearly and in detail the basis thereof. Failure by the Contractor to protest the County Project Manager's rendered determination within the timeframe above, shall constitute a waiver by the Contractor of all its rights to further protest, judicial, or otherwise. The Assistant Director of Purchasing & Contracts shall consider the Contractor's protest and shall render a decision thereon, in writing, within ten (10) calendar days. If Contractor does not agree with the determination of the Assistant Director of Purchasing & Contracts, the Contractor shall deliver written notice to that effect to the County within three (3) business days of receipt of the determination by the Assistant Director of Purchasing & Contracts.

1.1.7 Unless otherwise directed in writing, Contractor shall at all times carry on with the Work and maintain its progress schedule in accordance with the requirements of the Contract and the determination of the County, pending resolution of any Contract Document dispute. In no event will a dispute, the filing of a protest, claim or appeal, or the resolution or litigation thereof, relieve Contractor from its obligation to timely perform the Work required by the Contract and to maintain the progress schedule in accordance with the Contract.

1.1.8 Any and all Contract Documents shall remain the property of the County. Contractor is granted a limited license to use and reproduce applicable portions of the Contract Documents issued by the County appropriate to, and for use in, execution of the Work. Contractor shall have the right to keep one record set of the Contract Documents upon completion of the Work; provided, however, that in no event shall Contractor and/or its subcontractors use, or permit to be used, any or all of such Contract Documents on other projects without the specific written consent of the County.

1.2 Definitions

Terms used within this Agreement shall have the meaning as set forth in the St. Johns County Purchasing Policy, or as provided herein. Terms defined herein for specific application to this Contract shall govern over definition of terms provided in the St. Johns County Purchasing Policy.

1.2.1 Acceptance of the Work: Written acceptance of the Work by the County and the County's Project Manager.

1.2.2 Applicable Laws: All local, state, and federal laws, statutes, codes, ordinances, rules and regulations in effect at the time Work and Warranty Work is performed under this Contract.

1.2.3 Claim: Any claim, liability, loss, demand, demand for arbitration, damage, lien, cause of action of any kind, obligation, responsibility, cost, expense, royalty, fee, assessment, penalty, fine, judgment, interest or award, pending or threatened, whether arising by law, contract, tort, voluntary settlement or otherwise.

1.2.4 Contract Price: The sum set forth in Article IV of this Contract shall constitute the Contract Price, as may be amended by Change Order. Unless otherwise approved by the County in writing, the Contract Price includes all taxes, including without limitation, income and withholding tax of any kind and sales tax imposed by the state or by the County and paid by Contractor or any Subcontractors with respect to sales of goods purchased for the performance of the Work.

- 1.2.5 **Contract Time:** The number of calendar days between commencement and completion of the Work, established in paragraph 3.1.1 of this Contract, as may be amended by Change Order.
- 1.2.6 **Design:** Those design services related to the Project prepared by the County or the County's consultants or other representatives, which shall, as may be required, be included in Contractor's Work.
- 1.2.7 **Drawings:** The graphic and pictorial portions of the Contract Documents, illustrating the design, location and dimensions of the Work, generally including but not limited to, plans, elevations, sections, details, general notes, schedules and diagrams.
- 1.2.8 **Final Completion:** Completion of all Work in compliance with the Contract Documents, as determined by the County, and issuance of a Final Certificate for Payment.
- 1.2.9 **Force Majeure Events:** Those events that are not reasonably foreseeable and are beyond the control of both the Contractor and the County, including acts of war, terrorist attacks, labor strikes, floods, earthquakes, epidemics, pandemics, riots, adverse weather conditions, and other acts of God.
- 1.2.10 **Jobsite:** Any physical location or other place on, under, in, at or through which any aspect of the Work is performed.
- 1.2.11 **Notice to Proceed:** A written notice given by the County to Contractor fixing the date on which the Contract Time will commence to run and identifying the corresponding Substantial Completion and Final Completion dates.
- 1.2.12 **Product Data:** Illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by Contractor to illustrate materials or equipment for some portion of the Work.
- 1.2.13 **Project:** The total undertaking to be accomplished for County by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
- 1.2.14 **Project Manager:** The County's representative assigned to the Project, or any part thereof, to observe the Work and perform certain other obligations of the County as defined in Article VI below.
- 1.2.15 **Shop Drawings:** Drawings, diagrams, schedules, and other data specially issued for the Work by Contractor or a Subcontractor, Sub-subcontractor, and material suppliers to illustrate some portion of the Work.
- 1.2.16 **Specifications:** That portion of the Contract Documents consisting of the written requirements for materials, standards, equipment, construction systems, and standards of workmanship for the Work, and performance of related services.
- 1.2.17 **Subcontractor:** A Subcontractor is an individual, partnership, corporation, association, joint-venture or any combination thereof, which has a direct or indirect contract with Contractor to perform a portion of the Work.
- 1.2.18 **Substantial Completion:** The stage in the progression of the Work when the Work is sufficiently complete in accordance with this Contract so that the County can enjoy beneficial use or occupancy of the Work and can utilize the Work for its intended purpose.
- 1.2.19 **Work:** Construction and services required by the Contract Documents, including all labor, materials, equipment and services as well as other deliverables provided, or to be provided, by Contractor to fulfill Contractor's obligations under this Contract. The Work may constitute the whole or part of the Project.

1.3 Ownership of Contract Documents

Any and all Contract Documents shall remain the property of the County. Contractor is granted a limited license to use and reproduce applicable portions of the Contract Documents issued by the County appropriate to, and for use in, execution of the Work. Contractor shall have the right to keep one record set of the Contract Documents upon completion of the Work; provided, however, that in no event shall Contractor and/or Contractor's subcontractors use, or permit to be used, any or all of such Contract Documents on other projects without the specific written consent of the County.

ARTICLE II THE WORK

2.1 Project Description

The project involves purchasing all materials and installing electrical components for the electrical portion of the CR 208 Water Booster Pump Station project. The awarded contractor will be responsible for coordinating with the general contractor that will be responsible for the construction of the CR 208 Water Booster Pump Station Facility. All work is to be performed in accordance with the specifications and plans provided within the solicitation.

2.2 Labor and Materials

2.2.1 Contractor shall perform all of the Work required, implied, or reasonably inferable from, the Contract Documents. Unless otherwise provided in the Contract Documents, Contractor shall provide and pay for all labor, supervision, materials, supplies, tools, transportation, storage, construction equipment and machinery, utilities (including but not limited to water, heat, fuel, light, and cooling), and all other services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Materials, articles and equipment furnished by Contractor for incorporation into the Work shall be new unless otherwise specified in the Contract Documents.

2.2.2 Contractor shall use only competent and skilled personnel to perform and supervise the Work and shall remove from such Work any person determined to be unfit, unqualified, or acting in violation of any obligation of Contractor under this Contract. In the event a person is removed from the Work, Contractor shall promptly replace such individual with another who is fully competent and skilled to perform the Work at Contractor's sole expense.

2.2.3 Except as otherwise required for the safety or protection of persons or the Work or property at the Jobsite or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Jobsite shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with the County's prior written consent, which will not be unreasonably withheld.

2.2.4 In addition, when the Work requires by Florida Statute, Contractor shall use only licensed, registered and/or certified personnel to perform the Work. Such Statutes may include, but are not limited to, Chapter 489 (Regulation of Professions and Occupations Contracting) and Chapter 633, Part III (Fire Protection and Suppression) of the Florida Statutes.

2.3 Project Sequencing/Arrangement

Contractor shall not be limited in the sequencing or staging of the Work except to the extent that the Contract Documents impose limitations. Neither the organization of any of the Contract Documents into divisions, sections, paragraphs, articles, (or other categories), nor the organization/arrangement of the Drawings or Design, shall control Contractor in dividing the Work or in establishing the extent or scope of Work to be performed by Subcontractors.

2.4 Payment of Costs

Except as otherwise expressly provided, Contractor shall pay directly all costs and expenses of the Work of any kind or nature whatsoever including but not limited to all costs of permitting, regulatory compliance, obtaining and maintaining required bonds and insurance pursuant to Article 12, payments due to Subcontractors and suppliers, legal, financial, sales, use and similar taxes on materials and equipment, transportation and storage of materials and equipment, preparation of schedules, budgets and reports and all other costs required to achieve Substantial Completion and Final Completion in accordance with the Contract Documents.

2.5 Cleaning the Jobsite

Contractor shall keep the Jobsite neat, secure and orderly during performance of the Work and shall clean up and remove all waste, rubbish and construction debris from the Jobsite as they accumulate. Upon Final Completion of the Work, Contractor shall remove all waste, rubbish and construction debris from and about the Jobsite as well as all tools, appliances, construction equipment, temporary utilities, temporary construction and machinery and surplus materials. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents.

2.6 Reporting Requirements

2.6.1 Daily Record. The Contractor shall keep a daily record of the Work at the Jobsite. At a minimum the Daily Record shall include weather conditions, number of workers (by trade) on the Jobsite, and material/equipment deliveries. Daily Records shall be submitted by close of business the following day.

2.6.2 Monthly Report. The Contractor shall prepare and submit a written monthly report by the tenth day of each calendar month. Monthly reports shall at a minimum describe Work completed in the prior month, planned Work for the current month, detailed explanations of any activity that is behind schedule, corrective actions taken to recover schedule, safety and environmental incidents and corrective actions taken.

2.7 Title and Risk of Loss

Title to the structures, improvements, fixtures, machinery, equipment and materials constituting the Work or the Project shall pass to the County no later than time of payment. Such transferred title shall in each case be good, free and clear of any and all security interests, liens or other encumbrances. Contractor shall, however, bear all risk of loss concerning such structures, improvements, fixtures, machinery, equipment and materials until Substantial Completion, regardless of the extent to which the loss was insured or the availability of insurance proceeds. The transfer of title does not imply acceptance by the County nor does it relieve Contractor from the responsibility for any loss or damage to items.

2.8 Access to Work

The County and the Project Manager, shall at all reasonable times have full access to all parts and locations of the Jobsite(s) from commencement of the Work through Final Completion. Contractor shall take whatever steps necessary to provide such access when requested.

2.9 Utilities

Contractor shall, at its expense, make all arrangements necessary to secure the availability of and maintain all temporary utilities required to construct and operate Contractor's Work as required by the Contract Documents. If the scope of Work requires, Contractor shall arrange for activating permanent power, water, and sanitary service to the Project prior to Substantial Completion. This includes legal sketches and descriptions for easement as well as record drawings requirements required by utility companies. The County will assume permanent utility costs at Substantial Completion.

2.10 Existing Utility Lines

2.10.1 When existing Utility Lines (e.g. conduits, pipelines, transmission mains and utility equipment and appurtenances) shown on the Drawings are to be removed or relocated, Contractor shall notify the Project Manager in ample time (but in no event less than five (5) business days) for taking measures for prevention of the interruption of any required services prior to the beginning of operations. Locations of existing utility lines shown on the Drawings are based on the best information available to the Project Manager, but shall not be considered exact either as to location or number of such lines.

2.10.2 Contractor shall protect Utility Lines constructed under terms of the Contract and those discovered or shown on Drawings to be existing. In the event that Contractor damages any existing Utility Lines, shown or not shown on the Drawings, Contractor shall immediately notify the Project Manager. Damage occurring to existing Utility Lines due to Contractor's failure to exercise reasonable care shall be repaired or replaced at no cost to the County.

2.11 Taxes

2.11.1 Contractor shall pay all taxes, levies, duties and assessments of every nature which may be applicable to any Work under this Contract. The Contract Price and any agreed variations thereof shall include all applicable taxes imposed by law. Contractor shall make any and all payroll deductions required by law. Contractor herein indemnifies and holds the County harmless from any liability on account of any and all such taxes, levies, duties, assessments and deductions. The indemnity provision of this section shall survive the expiration or earlier termination of this Contract. Contractor may not use County's tax-exempt status unless specifically authorized in writing in advance.

2.11.2 Foreign Entity Tax Withholding. Amounts due to certain foreign persons or entities may be subject to backup withholding taxes under federal law. If Contractor is a foreign person or entity that is required to complete Internal Revenue Service ("IRS") Form W-8ECI, Contractor shall provide County a copy of Contractor's current Form W-8ECI prior to issuance of any invoice or payment under this Contract. If Contractor fails to timely provide a completed, current Form W-8ECI, County will withhold all backup withholding taxes from the amounts due to the Contractor, remit such sums to the IRS, and pay Contractor only the remainder. County makes no representation regarding the tax treatment of amounts due to

Contractor, and Contractor releases and holds the County harmless from any claims or damages in any way relating to or arising from any tax withholding by County pursuant to this section.

2.12 Publicity and Advertising

2.12.1 Contractor shall not make any announcement or release any information or publish any photographs concerning this Contract, the Work or the Project or any part thereof to any member of the public, press or any official body, unless prior written consent is obtained from the County.

2.12.2 Use of the County Seal or County Logo is strictly prohibited. In accordance with, County Ordinance 92-2 and County Administrative Policy 101.3, Contractor may not manufacture, use, display, or otherwise use any facsimile or reproduction of the County Seal or Logo without express written approval of the Board of County Commissioners of St. Johns County, Florida.

2.13 County Furnished Items

2.13.1 The County shall furnish to Contractor, at the time of executing this Contract, written and tangible material concerning conditions below ground at the Jobsite. Such written and tangible material is furnished to Contractor only in order to make disclosure of such material and for no other purpose. By furnishing such material, the County does not represent, warrant, or guarantee its accuracy either in whole, in part, implicitly, or at all, and shall have no liability therefore. The County shall also furnish surveys, legal limitations and utility locations (if known), and a legal description of the Project's Jobsite.

2.13.2 Contractor shall obtain and pay for all permits, fees and licenses necessary and ordinary for the performance of the Work. Excluding such permits, fees and licenses, the County shall obtain all approvals, easements, and the like required for construction.

2.13.3 Subject to Paragraph 1.6 above, the County shall furnish Contractor electronic copies of the Contract Documents for execution of the Work. Hard copies of the Contract Documents shall be the responsibility of Contractor.

ARTICLE III CONTRACT TIME

3.1 Contract Time

3.1.1 Contractor shall commence the Work within ten (10) calendar days following receipt of the County's Notice to Proceed and shall substantially complete all Work within **five hundred forty (540)** consecutive calendar days as may be extended pursuant to Paragraph 8.2 of this Contract. Final Completion shall be reached within **thirty (30)** consecutive calendar days after Substantial Completion.

3.1.2 Contractor, prior to commencing the Work, shall submit to the Project Manager for his/her information, Contractor's schedule for completing the Work. Contractor's schedule shall be revised no less frequently than monthly (unless the parties otherwise agree in writing), and relate to the entire Work. By way of illustration and not exclusion, Contractor's schedule shall: (1) contain sufficient activities to assure adequate planning for the Work, (2) include approved changes to the Work that impact the schedule, (3) include a clearly defined critical path, and (4) include a unique description for each activity. In the event any schedule revision impacts the completion time as provided in Paragraph 3.1.1 above, Contractor shall submit a request for additional time, in accordance with procedures as provided in Paragraph 8.2 below. Failure by Contractor to strictly comply with the provisions of this Paragraph shall constitute a material breach of this Contract.

3.2 Time is of the Essence

Time is of the essence regarding each and every obligation of Contractor under this Contract. Each obligation is deemed material, and a breach of any such obligation (including a breach resulting from untimely performance) is a material breach.

3.3 Substantial Completion

3.3.1 When Contractor considers the Work is substantially complete, Contractor shall notify the Project Manager in writing and submit a comprehensive list of incomplete items to be completed or corrected prior to Final Completion. The Project Manager will promptly inspect the Work following receipt of Contractor's notice and attached list of incomplete items. The Project Manager may refuse to inspect the Work if the Work is obviously not substantially complete or when Contractor's list is not complete.

3.3.2 To the extent applicable to Contractor's specific Work scope, the following items shall be completed prior to Contractor's request for a Substantial Completion inspection.

- a) All general construction completed.
- b) Project Jobsite cleared of Contractor's excess equipment, storage shacks, trailers, and/or building supplies.
- c) Project record Drawings and Specifications submitted in accordance with the Contract Documents.
- d) Preliminary as-built drawings submitted.
- e) All applicable permits required for use provided.
- g) All operations and maintenance manuals, training literature, and software for all equipment provided.
- h) Manufacturers' certifications and warranties provided.
- i) All required spare parts and special tools provided.

3.3.3 If Substantial Completion is not obtained at the inspection called by Contractor, for reasons which are the fault of Contractor, the cost of any subsequent inspections requested by Contractor for the purpose of determining Substantial Completion shall be the responsibility of Contractor and shall be assessed against the final payment application.

3.3.4 Once Substantial Completion is achieved and within the time allowed by F.S. 218.70 et seq, the Project Manager will prepare the punch list required by the Local Government Prompt Payment Act. Unless otherwise mutually agreed, the punch list items shall be corrected by Contractor within thirty (30) calendar days and prior to any request for Final Inspection and Acceptance. The failure to include any corrective Work or pending items not yet completed on the list does not alter the responsibility of Contractor to complete the Work pursuant to this Contract.

3.4 Final Inspection

When all the Work is finally complete and Contractor is ready for a final inspection, Contractor shall provide written notice to the County and the Project Manager. The Project Manager, with Contractor's cooperation, will conduct such reviews, inspections and tests as may be reasonably required to satisfy the County that the Work, or identified portion of the Work, conforms to all requirements of the Contract Documents. If the Project Manager determines that the Work or any part of the Work is not complete or fails to conform to the Contract Document requirements, Contractor will be notified in writing of deficiencies. After correcting all deficiencies Contractor shall again initiate the procedures for final inspection as set forth above. The Project Manager will issue a Final Certificate for Payment following satisfactory inspection of the Work provided Contractor has delivered to the Project Manager the final corrected as-built Drawings and the final bill of materials, if any.

3.5 Liquidated Damages

3.5.1 Execution of this Contract by Contractor shall constitute Contractor's acknowledgment that the County will sustain damages in the amount identified in Paragraph 3.3.2 below for each and every calendar day during which completion of the Work required is delayed beyond Final Completion. Contractor and County agree that such damages shall be presumed to be the damages actually sustained by the County as defined below, and that because of the nature of the Project, it would be impracticable or impossible to determine or extremely difficult to fix the actual damages.

3.5.2 If Contractor fails to achieve Substantial Completion or Final Completion of the Work by its applicable date, then the County shall be entitled to withhold from any amounts otherwise due Contractor or to be paid as a debt due the sum of **\$1,500.00** per day for each and every calendar day of unexcused delay "Liquidated Damages". The parties agree that such Liquidated Damages are not a penalty but rather a genuine pre-estimate of monetary damages sustained by the County for loss of revenue and/or increased project administration expenses related to this Contract because Contractor failed to perform and complete Work within the time fixed for completion or additional time granted pursuant to the provisions hereof. The assessment of Liquidated Damages are without prejudice to the County's rights of termination and Contractor's obligation to complete the Work.

3.5.3 Should Contractor fall behind the approved Work schedule; the County reserves the right to deduct Liquidated Damages based on an estimated period of late completion. The County need not wait until completion of Work to withhold Liquidated Damages from Contractor's progress payments.

3.6 Disclaimer of Consequential Damages

The County shall not be liable to Contractor, whether in contract, tort, warranty or under any statute or on any other basis, for any consequential, incidental, indirect, special, punitive or exemplary damages suffered or incurred by Contractor in

connection with this Contract, even if the County has been advised of the possibility of such damages. Consequential damages shall include, by way of example and without limitation, opportunity costs, loss of use of facilities or other assets, consequential damage claims of subcontractors, lost profits, lost savings, lost business, lost bonding capacity, lost financing, lost reputation or lost goodwill.

ARTICLE IV CONTRACT PRICE AND PAYMENT

4.1 Contract Price

4.1.1 This Contract is a LUMP SUM Contract. As compensation for satisfactory performance of the Work, the County shall compensate, and Contractor shall accept, as full and complete compensation for all the Work required herein a total Lump Sum price of **Nine Hundred Forty-Nine Thousand Dollars and Zero Cents (\$949,000.00)**, the “Contract Price”. The cost of any item of Work not covered by a specific Lump Sum shall be included in the Lump Sum price to which the item is most applicable.

4.1.2 If required by the County, Contractor shall have included unit prices in the base Lump Sum. Such unit prices shall apply to revisions to the Work as directed by the County in accordance with Article IX. Unit prices are “all-inclusive”, including labor, material, supervision, tools, equipment, insurance, taxes, fringe benefits, coordination, engineering, overhead, profit, performance and payment bonds, and all other things necessary. Unit prices are fixed for the duration of the Contract and are not subject to escalation for any cause.

4.2 Schedule of Values

4.2.1 Prior to the commencement of Work, Contractor shall submit to the County and to the Project Manager a Schedule of Values allocating the Contract Price to the various portions of the Work. Contractor’s Schedule of Values shall be prepared in such form, with such detail, and supported by such data as the Project Manager or the County may require to substantiate its accuracy. Contractor shall not imbalance the Schedule of Values nor artificially inflate any element thereof. The violation of this provision by Contractor shall constitute a material breach of this Contract.

4.2.2 Upon approval by the County the Schedule of Values shall be used as a basis for Contractor’s Application for Payment. The total of all payments in the Schedule of Values must at all times be equal to the Contract Price. No progress payment shall be made to Contractor until an acceptable Schedule of Values is submitted.

4.2.3 General conditions costs may be considered as a line item for the following items (break down required) (collectively the following shall be known as the General Conditions Costs):

- a) Contractor’s field office personnel (full-time on-site)
- b) Construction office and storage facilities
- c) Utilities required to sustain field office and sanitary facilities
- d) Electrical power and water for construction
- e) Bonds and Insurance

4.2.4 Progress payments for general conditions costs will be based on the percentage of Work completed to date, except bonds and insurance which may be requested in full. Separate payments for Shop Drawings and deposits for materials will not be allowed.

4.3 Measurement and Payment

4.3.1 Contractor shall make all surveys necessary for determining all quantities of Work to be paid under this Contract. Copies of field notes, computations and other records made by Contractor for the purpose of determining quantities shall be furnished to the Project Manager upon request. Contractor shall notify the Project Manager prior to the time such surveys are made. The Project Manager may but shall have no obligation to witness and verify such surveys. Measurements and computations shall be made by such methods as the County may consider appropriate for the class of work measured. The dividing limits, lines or planes between adjacent items or classes of excavation, concrete, or other types of Work where not definitely indicated on the Drawings or in the Specifications shall be as determined by the County.

4.3.2 No payments of invoices (or portions thereof) shall, at any time, constitute approval or acceptance of the Work under this Contract, nor be a waiver by the County of any of the terms contained herein.

4.4 Progress Payments

4.4.1 Prior to Contractor's submittal of the initial Application for Payment, Contractor shall have delivered the following documents. The County will not make any payment to Contractor until Contractor has complied with these requirements.

- a) Schedule of Values
- b) Project Schedule
- c) Certified copy of recorded bond
- d) Insurance Certificates

4.4.2 On or before the tenth (10th) day of each calendar month, Contractor shall submit an Application for Payment to the Project Manager in such form and manner, and with such supporting data and content, as the Project Manager may require. Such Application for Payment shall be based on the amount of Work done or completed during the payment period which is defined as the first day of the preceding calendar month through the last day of the preceding calendar month. The Project Manager will review the Application for Payment to determine whether the quantity and quality of the Work is as represented in the Application for Payment and thereafter confirm to the County the amount properly owing to Contractor. Upon receipt by the County of the Project Manager's recommendation for payment, payments will be made in accordance with the Local Government Prompt Payment Act (Sections 218.70-218.80 of the Florida Statutes) less such amounts, if any, otherwise owing by Contractor to the County or which the County shall have the right to withhold. Any Application for Payment determined by the County not to be suitable for payment shall be modified and processed in accordance with the County's assessment.

4.4.3 In the event any dispute with respect to any payment or Application for Payment cannot be resolved between Contractor and the County's Project staff, Contractor may demand in writing a meeting with and review by the County's Assistant Director of Purchasing and Contracts. Such meeting and review shall occur within ten (10) business days of receipt by the County of Contractor's written demand. The Assistant Director of Purchasing and Contracts shall issue a written decision on the dispute within ten (10) business days of such meeting. This decision shall be deemed the County's final decision for the purpose of the Local Government Prompt Payment Act.

4.4.4 The County may withhold from each progress payment made to Contractor an amount not to exceed five (5%) percent of payment as retainage until final acceptance of all Work in accordance with Section 255.078 of the Florida Statutes. Any interest earned on retainage shall accrue to the benefit of the County. The County shall make prompt payment to Contractor, unless in accordance with Section 255.078(6) of the Florida Statutes, such funds are the subject of a good faith dispute, claim or demand by the County or Contractor.

4.4.5 Contractor warrants and guarantees that title to Work, materials, and equipment covered in any Application for Payment, whether incorporated in the Project or not, shall pass to the County no later than the time of payment and shall be free and clear of liens, claims, security interests or other encumbrances.

4.5 Application for Payment

4.5.1 Contractor may make Application for Payment, at intervals of not more than once a month for Work satisfactorily completed during the Project. Contractor shall submit with each Application for Payment an updated Project schedule acceptable to the Project Manager. Each Application for Payment shall clearly include:

- a) Contract Number;
- b) A unique Application for Payment number;
- c) Contractor's legal name and address;
- d) Taxpayer identification number (Contractor's federal employer identification number);
- e) Brief description of the completed Work, in accordance with Contractor's Schedule of Values;
- f) Original Contract Price including approved Change Order amounts; and,
- g) Preferred remittance address, if different from the mailing address.

The County may require any other information from Contractor that the County deems necessary to verify Contractor's Application for Payment. No later than ten (10) days after execution of this Contract or Notice to Proceed has been issued, the County will identify in a separate written notice the submittal requirements for Contractor's payment requests.

4.5.2 Delivered, stored or stockpiled materials may be included in an Application for Payment provided Contractor meets the following conditions:

- a) Materials are suitably and securely stored at the Jobsite or a bonded warehouse (acceptable to the County);
- b) An applicable purchase order or supplier's invoice is provided listing the materials in detail, cost of materials and identifying this specific Project by name; and
- c) The material is insured against loss or damage (from whatever source) or disappearance prior to incorporation into the Work.

Payments for such materials shall be at the sole discretion of the Project Manager, shall be based only upon the actual cost of the materials to Contractor, and shall not include any overhead or profit to Contractor.

4.5.3 Each Application for Payment shall be signed by Contractor and shall constitute Contractor's representation that the Work has progressed to the level for which payment is requested, that the Work has been properly installed or performed in full accordance with this Contract, and that Contractor knows of no reason why payment should not be made as requested. Contractor's final Application for Payment shall also be accompanied by a full and complete release and/or waiver of all liens complying with Section 713.20 of the Florida Statutes.

4.5.4 Contractor must remit undisputed payment due for labor, services, or materials furnished by Subcontractors and suppliers hired by Contractor, within ten (10) days after receipt of each progress payment from the County pursuant to Section 218.735 of the Florida Statutes. If necessary for the protection of the County, the County shall have the right, at its sole option, to make payment by joint check or by direct check to Contractor's Subcontractors or suppliers without advance notice to or consent of Contractor. If joint checks are issued following claims by Contractor's Subcontractors or suppliers, the County shall be entitled to an administrative fee of \$50.00 per check for the expense of processing each joint check. Any amounts paid directly to a Subcontractor or supplier will be deducted from payments made to, or amounts due or that may become due to, Contractor. The issuance of a joint check shall create no rights in favor of any person or entity beyond the right of the named payees to payment of the check and shall not be deemed to commit the County to repeat the procedure in the future.

4.5.5 No progress payment, nor any use or occupancy of the Project by the County, shall be interpreted to constitute approval or acceptance of any Work under this Contract, nor be considered a waiver by Contractor of any of the terms of this Contract.

4.5.6 The County's performance and obligation to pay under this Contract is contingent upon an appropriation of lawfully available funds by the Board of County Commissioners. The County shall promptly notify Contractor if the necessary appropriation is not made.

4.6 Withheld Payment

4.6.1 The County may decline to make payment, may withhold funds otherwise payable and, if necessary, may demand the return of some or all of the amounts previously paid to Contractor, if:

- a) Any Claims are made against Contractor by the County or third parties, including Claims for liquidated damages or if reasonable evidence indicates the probability of the making of any such Claim;
- b) Any Claims are made against the County, the County's property or any other party indemnified hereunder which is or might be covered by Contractors Indemnification obligations under Section 11.2 below;
- c) Contractor fails to pay Subcontractors or others in full and on-time;
- d) Contractor fails to submit schedules, reports, or other information required under the Contract;
- e) Contractor fails to diligently prosecute the Work and maintain progress to assure completion within the Contract Time;
- f) Contractor persistently fails to fully and timely perform the Work in accordance with the Contract Documents;
- g) Defective or nonconforming Work is not remedied; or
- h) Contractor is in default of any other representation, warranty, covenant or performance obligation of this Contract.

4.6.2 If Claims or liens filed against Contractor or property of the County connected with performance under this Contract are not promptly removed by Contractor after receipt of written notice from the County to do so, the County may remove such Claims or liens and all costs in connection with such removal shall be deducted from withheld payments or other monies due, or which may become due, to Contractor. If the amount of such withheld payments or other monies due

Contractor under the Contract is insufficient to meet such cost, or if any Claim or lien against Contractor is discharged by the County after final payment is made, Contractor and its surety or sureties shall promptly pay the County all costs (including attorney's fees) incurred thereby regardless of when such Claim or lien arose.

4.7 Final Payment

4.7.1 Upon Contractor's receipt of the Final Certificate for Payment, Contractor may submit a final invoice provided the following has been completed or submitted with such final invoice:

- a) Complete all items applicable to the Work identified in Paragraph 3.3.2;
- b) Complete all Work listed on the punch list prepared in accordance with Paragraph 3.3.4;
- c) Consent of Surety for final payment and/or retainage;
- d) Final Waiver and Release of Claim signed by Contractor;
- e) Submittal of final corrected as-built (record) Drawings;
- f) Settlement of Liquidated Damages, as applicable; and
- g) Settlement of liens and Claims, if any.

4.7.2 Acceptance of Final Payment shall constitute a waiver of all Claims against the County by Contractor except for those Claims previously made in writing against the County by Contractor, pending at the time of Final Payment, and identified in writing by Contractor as unsettled at the time of its request for Final Payment.

4.7.3 In the event Contractor fails to make a Request for Final Payment, or to resubmit a final Application for Payment within ninety (90) days after being requested to do so, the County may deem any and all retained funds to be abandoned property and shall give notice of abandonment to Contractor. The County may set off against the final payment any amounts due to County from Contractor arising out of or under this or any other Contract or Contract between them.

ARTICLE V CONTRACTOR RESPONSIBILITIES

5.1 Performance

5.1.1 Contractor warrants that, to the best of its knowledge, there is no pending or threatened action, proceeding, or investigation, or any other legal or financial condition, that would in any way prohibit, restrain, or diminish Contractor's ability to satisfy its contractual obligations hereunder.

5.1.2 Contractor shall perform no part of the Work at any time without adequate Contract Documents or, as appropriate, approved Shop Drawings, Product Data or samples for such portion of the Work. If Contractor performs any portion of the Work where Contractor knows or should know such Work involves a recognized error, inconsistency or omission in the Contract Documents without notice to the Project Manager and the County, Contractor shall bear responsibility for such performance and shall bear the cost of correction.

5.1.3 Contractor shall perform the Work strictly in accordance with this Contract.

5.1.4 Contractor shall confine its operations to the Jobsite or such other land and areas identified in and permitted by the Contract Documents. Contractor shall assume full responsibility for any damage to any such land or area, to the County or occupant thereof, or of any adjacent land or areas, resulting from the performance of the Work. Should any Claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the Claim by other dispute resolution proceeding or at law. Contractor shall, to the fullest extent permitted by Applicable Law, indemnify and hold harmless the County, and its officers, directors, agents and employees and anyone directly or indirectly employed by them from and against Claims, costs, losses, and damages arising out of or resulting from any Claim or action, legal or equitable, brought by any such owner or occupant against the County or any other party indemnified hereunder to the extent caused by or based upon Contractor's or a Subcontractor's performance of the Work.

5.1.5 Contractor is solely and exclusively responsible for supervising all workers at the Jobsite. Contractor shall supervise and direct the Work using Contractor's best skill, effort and attention. Contractor shall be responsible to the County for any and all acts or omissions of Contractor, its employees and others engaged in the Work on behalf of Contractor.

5.1.6 Contractor and the Work must comply with all Applicable Law and the requirements of any applicable grant agreements.

5.2 Authorized Representative

5.2.1 Prior to commencing Work, Contractor shall designate in writing a competent, authorized representative(s) acceptable to the County to represent and act for Contractor (“Authorized Representative”). Absent such written designation, Contractor’s Jobsite superintendent shall be deemed Contractor’s Authorized Representative and s/he shall be authorized to receive and accept any and all communications from the County or the County’s Project Manager. All communications given to the Authorized Representative shall be binding upon Contractor. An Authorized Representative may be added, removed or changed upon prior written notice given pursuant to Section 13.18 titled “Written Notice”.

5.2.2 At all times while performing the Work and Warranty Work, Contractor shall have one or more Authorized Representatives present on the Jobsite. Such Authorized Representative shall be capable to effectively communicate with the County or the County’s Project Manager, execute and enforce applicable Contract Documents and address Jobsite safety and environmental requirements.

5.3 Environmental, Safety and Health

5.3.1 Safety and Protection. Contractor shall be solely and exclusively responsible for conducting operations under this Contract to avoid risk of harm to the health and safety of persons and property and for inspecting, supervising and monitoring all equipment, materials (whether in storage on or off the Jobsite), work practices and safety precautions (including but not limited to adequate maintenance of traffic) used in the Work to ensure compliance with its obligations under this Contract. Contractor shall provide or cause to be provided necessary training and furnish all safety construction equipment/tools, including OSHA compliant and ANSI certified personal protective equipment as appropriate and necessary for the performance of the Work, to its subcontractors of every tier and enforce the use of such training and safety construction equipment/tools.

5.3.2 Compliance. Contractor shall comply with all Applicable Laws bearing on the safety of persons or property, or their protection from damage, injury or loss including compliance with applicable permits, Project plans and approvals. To the extent allowed by law, Contractor shall assume all responsibility and liability with respect to all matters regarding the safety and health of its employees and the employees of Contractor’s subcontractors and suppliers of any tier, with respect to the Work.

5.3.3 Stop Work Authority. Notwithstanding the foregoing, the County reserves the right to direct Contractor to stop Work and correct an unsafe condition at any time that any person present at the Jobsite identifies any unsafe condition or action. For this purpose only, any person at the Jobsite is authorized to act on behalf of the County.

5.3.4 Safety Representative. Prior to commencing Work, Contractor shall designate in writing a member(s) of its Jobsite construction team as its Safety Representative. Such Safety Representative shall be acceptable to the County and shall have responsibility for implementing all safety procedures, including OSHA, responsibility for the prevention of accidents, authority for monitoring safety of the Work, authority to correct unsafe conditions or acts by its employees or Subcontractors, the ability to oversee compliance with and address environmental requirements, and coordinate with other on-site contractors and subcontractors on safety and environmental matters required for the Work. In the absence of the required written designation, this person shall be Contractor’s Superintendent.

5.3.5 Safety Reporting Requirements. Contractor shall maintain accident and injury records as required by Applicable Law. Such records will be made available to the County upon request. Contractor shall immediately report to the County any death, injury or damage to property incurred or caused by Contractor’s employees and employees of Contractor’s subcontractors and suppliers of any tier.

5.3.6 Drug Free Workplace. By signing this Contract, Contractor agrees to maintain a healthy and productive workforce and safe working conditions thru compliance with the Drug-Free Workplace Act (Chapter 112, Florida State Statutes). Contractor’s personnel shall not possess, use, manufacture, distribute or be under the influence of while on the Jobsite (or any other location where the provisions of this Contract applies) alcoholic beverages and/or illegal drugs or any other “Drug” as such term is defined in the Drug-Free Workplace Act.

5.3.7 Occupational Safety and Health Act (OSHA). Contractor warrants that all materials, equipment, services, etc., delivered or provided to the County shall conform in all respects to the standards set forth in the Occupational Safety and Health Act (OSHA) of 1970 as amended and the failure to comply will be considered a breach of this Contract. Contractor

further certifies that if material, equipment, service, etc., delivered or provided to the County is subsequently found to be deficient in any OSHA requirement in effect on date of delivery or service fulfillment date, all costs necessary to bring the material, equipment, service, etc., into compliance with the aforementioned requirements shall be borne by Contractor.

5.3.8 Toxic Substances/Federal Hazard Communication “Right to Know and Understand” Regulations

The Federal “Right to Know and Understand” Regulation (also known as the Hazard Communication / Globally Harmonized System of Classification and Labeling of Chemicals (GHS) implemented by OSHA requires employers to inform their employees of any toxic substances to which they may be exposed in the workplace, and to provide training in safe chemical storage, labeling, handling practices and emergency procedures.

Accordingly, Contractor is required to provide completed Safety Data Sheets (SDS) for each hazardous substance provided to the County under this Contract. This includes hazardous substances that are not directly included in the Contract Documents, but are included in the goods or services provided by Contractor to the County. The SDS for each substance must be sent to the County’s Project Manager and must also be sent to:

St. Johns County, a political subdivision of the State of Florida
500 San Sebastian View
St. Augustine, FL 32084
Attn: Risk Management

In the event that hazardous material is improperly handled or stored by Contractor, its subcontractors, any sub-subcontractors, or any employee or agent of any of the aforementioned which results in contamination of the Jobsite, Contractor shall immediately notify the County and the appropriate governmental authority and shall take whatever action is necessary or desirable to remediate the contamination at Contractor’s sole cost and expense. Further, Contractor shall indemnify and hold harmless the County from any and all cost, expense, action, or liability whatsoever resulting from such contamination and/or remedial activities. The indemnity provisions of this section shall survive the expiration or earlier termination of this Contract.

ARTICLE VI PROJECT MANAGER

6.1 Project Manager Responsibilities

6.1.1 The County shall designate as its representative a Project Manager who shall be fully acquainted with the Project. The Project Manager shall be the County’s representative from the Effective Date of this Contract until final payment has been made. The Project Manager shall be authorized to act on behalf of the County only to the extent provided in this Article VI.

6.1.2 The County and Contractor shall communicate with each other in the first instance through the Project Manager.

6.1.3 The Project Manager shall be the initial interpreter of the requirements of the Drawings and Specifications and the judge of the performance there under by Contractor. The Project Manager shall render written or graphic interpretations necessary for the proper execution or progress of the Work with reasonable promptness on request of Contractor.

6.1.4 The Project Manager shall review Contractor’s Applications for Payment and shall confirm to the County for payment to Contractor, those amounts then due to Contractor as provided in this Contract.

6.1.5 The Project Manager shall have authority to reject Work, which is defective or does not conform to the requirements of this Contract. If the Project Manager deems it necessary or advisable, the Project Manager shall have authority to require additional inspection or testing of the Work for compliance with Contract requirements at Contractor’s expense.

6.1.6 The Project Manager shall review and accept, or take other appropriate action as necessary, concerning Contractor’s submittals including but not limited to Shop Drawings, Product Data and Samples. Such review, acceptance or other action shall be for the sole purpose of determining conformance with the design concept and information given through the Contract Documents.

6.1.7 The Project Manager may authorize minor changes in the Work by field order as provided elsewhere herein. The Project Manager does not have authority to approve adjustments to the Contract Price or Contract Time. If at any time

Contractor believes that acts or omissions of the County constitute a change to the Work, Contractor shall submit a written notice in accordance with the requirements of Article VIII.

6.1.8 The Project Manager shall, upon written request from Contractor, conduct inspections to determine the date of Substantial Completion and the date of Final Completion, shall receive and forward to the County for the County's review and records, written warranties and related documents required by this Contract and shall issue a Final Certificate for Payment upon compliance with the requirements of this Contract.

6.1.9 The Project Manager's decision in matters relating to aesthetic effect shall be final if consistent with the intent of this Contract.

6.2 Field Orders

The Project Manager shall have authority to order minor changes in the Work not involving a change in the Contract Price or Contract Time and not inconsistent with the intent of this Contract. Such changes shall be affected by written field order and shall be binding upon Contractor. Contractor shall carry out such field orders promptly.

ARTICLE VII SUBCONTRACTORS

7.1 Award of Subcontracts

7.1.1 Contractor shall be responsible for all Work performed under the Contract Documents. All persons engaged in the Work of the Project are the responsibility and under the control of Contractor. Contractor shall furnish the Project Manager, in writing, the names of persons or entities proposed by Contractor to act as a Subcontractor on the Project. The Project Manager shall promptly reply to Contractor, in writing, stating any objections the Project Manager may have to such proposed Subcontractor. Contractor shall not enter into a Subcontract with a proposed Subcontractor with reference to whom the Project Manager has made a timely objection.

7.1.2 Contractor shall give personal attention to fulfillment of the Contract and shall keep the Work under Contractor's control. When any Subcontractor fails to execute a portion of the Work in a manner satisfactory to the County, Contractor shall remove such Subcontractor immediately upon written request from the County, and the Subcontractor shall not again be employed on the Project. The County will not entertain requests to arbitrate disputes among Subcontractors or between Contractor and Subcontractor(s) concerning responsibility for performing any part of the Work.

ARTICLE VIII CONTRACT DISPUTES/CLAIMS

8.1 Contract Claims

8.1.1 If any dispute between the County and Contractor arises under this Contract and such dispute cannot be resolved by good faith negotiations at the field level between the Project Managers of the Contractor and County, such dispute shall be promptly escalated to the Senior Representatives of the Parties, upon request of either party, who shall meet as soon as conveniently possible, but in no case later than fourteen (14) calendar days after such a request is made, to attempt to resolve such dispute or disagreement. Five (5) calendar days prior to any meetings between the Senior Representatives, the parties will exchange relevant information that will assist the parties in resolving the dispute or disagreement.

8.1.1.1 The Senior Representative for the County shall be the Director, or designee, of the County's Public Works Department.

8.1.1.2 The Senior Representative for the Contractor shall be the supervisor of the Project Manager, or a principal of the Contractor.

8.1.2 If after meeting, the Senior Representatives determine that the dispute or disagreement cannot be resolved on terms satisfactory to both parties, the Contractor shall submit a Contract Claim as provided herein.

8.1.3 Prior to filing a Contract Claim, Contractor shall first exhaust all remedies set forth in the Contract Documents. Claims arising from this Contract shall be filed with the Assistant Director of Purchasing & Contracts within five (5) business days of exhausting all remedies set forth above. Pending final resolution of a dispute or claim, unless otherwise agreed in writing by both parties, the Contractor is required to proceed with performance of the Work and maintain effective progress to complete the Work within the Contract Time set forth herein. The Contract Claim shall include, at a minimum,

the following:

- a) The name and address of the Contractor and any legal counsel; and
- b) The Contractor's address to which the County's rendered decisions shall be sent; and
- c) Identification, and a copy, of the final adverse decision or document that is the subject of the Contract Claim and any exhibits, evidence or documents which the Contractor deems applicable to the issues raised in the Claim; and
- d) Identification of the administrative remedies provided for in the Contract that were pursued prior to the Claim and the outcome; and
- e) A statement of the grounds for each issue raised in the Contract Claim to be reviewed and the applicable provisions of the Contract, as well as any applicable Laws, or other legal authorities which the Contractor deems applicable to the Claim.

8.1.4 During the Assistant Director of Purchasing & Contracts' review of the Contract Claim, the Assistant Director of Purchasing & Contracts may request additional information from the project team of both parties. The parties must provide the requested information within the time period set forth in the request. Failure of either party to timely comply may result in resolution of the Claim without consideration of the requested information.

8.1.5 The Assistant Director of Purchasing & Contracts shall render a decision on the Contract Claim within twenty-one (21) calendar days of the deadline for receipt of all requested information. The written decision of the Assistant Director of Purchasing & Contracts shall be sent to the Contractor at the address provided in the Contract Claim, or as otherwise agreed to by the parties.

8.1.6 The decision for any Contract Claim by the Assistant Director of Purchasing & Contracts may be appealed by the Contractor to the County Administrator. Contractor must submit their appeal to the County Administrator, including any and all information, documentation, backup data, or other supplemental facts or figures within five (5) business days of receipt of the Assistant Director of Purchasing & Contracts' decision. Failure by the Contractor to submit an appeal within the prescribed timeframe shall be a waiver of a right to appeal the rendered decision. The appeal shall include any and all information, documentation, and data relative to the Contract Claim and subsequent appeal. The County Administrator shall render a decision within thirty (30) calendar days of receipt of all information. The County Administrator's decision shall be considered final, unless Contractor takes legal action in Circuit Court.

ARTICLE IX CHANGES IN THE WORK

9.1 General

9.1.1 The County may, at any time, without invalidating this Contract and without notice to sureties, direct changes in the Work within the general scope of this Contract, consisting of additions, deletions, revisions, or any combination thereof, by Change Order or by field order. Contractor agrees to promptly comply with such orders and proceed with the Work, which shall be performed under the applicable requirements of the Contract Documents. Contract Time and Contract Price will be adjusted, in accordance with Sections 8.2 and 8.3 below, by written Change Order for changes which materially increase or decrease the cost of or time for performance of the Work.

9.1.2 If at any time Contractor believes that acts or omissions of the County constitute a change to the Work, Contractor shall submit a written notice to the Project Manager explaining in detail the basis for the change request. Contractor's written notice must be furnished within five (5) days of the commencement of the event giving rise to the claim or Contractor's knowledge of the claim, and the notice shall state the general nature and cause of the claim. Thereafter, within twenty (20) days after the termination of the event giving rise to the claim or Contractor's knowledge of the claim, Contractor shall submit written notice of the extent of the claim with supporting information and documentation to the Project Manager and County. **IT IS EXPRESSLY AND SPECIFICALLY AGREED THAT ANY AND ALL CLAIMS FOR CHANGES TO THE CONTRACT TIME OR CONTRACT PRICE SHALL BE WAIVED IF NOT SUBMITTED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THIS SECTION.** Pending final resolution of any such claim request, Contractor shall diligently proceed with performance of this Contract regardless of any dispute concerning performance of the Work or the amount Contractor is to be paid for such Work.

9.2 Changes in the Contract Time

9.2.1 The Contract Time will be extended by Change Order in an amount equal to time lost on critical Work items due to delays beyond the control of and through no fault or negligence of Contractor if a claim for an extension is submitted in

accordance with Section 8.1.2 above.

9.2.2 If Contractor is delayed in progressing any task which at the time of the delay is then critical or which during the delay becomes critical, as a direct result of unusually adverse weather conditions not reasonably anticipated, or any other causes beyond Contractor's reasonable control and not attributable to Contractor or Contractor's Subcontractor's actions or failure to act, then the date for achieving Substantial Completion of the Work may be extended for such reasonable time as the Project Manager may determine. An extension of Contract Time shall be Contractor's sole and exclusive remedy for delay unless the delay is solely caused by fraud, bad faith or active interference on the part of the County or its representatives. In no event shall Contractor be compensated for interim delays that do not extend the Contract Time.

9.2.3 Extensions to the Contract Time for delays caused by the effects of inclement weather shall be submitted as a request for a change in the Contract Time pursuant to paragraph 8.1.2 above. Time extensions are justified only when rain, other inclement weather conditions, or related adverse soil conditions result in Contractor's inability to work at least fifty percent (50%) of the normal workday on controlling items of Work identified on the accepted schedule or updates to that schedule.

9.2.4 Contractor shall, at no cost to the County, take all precautions necessary to secure the Project Jobsite from any damage that may be caused by all threatened storm events, regardless of whether the County has given notice of same. Compliance with any specific storm event precautions will not constitute additional work. Suspension of the Work caused by a threatened or actual storm event, regardless of whether the County has directed such suspension, will entitle Contractor to additional Contract Time only and shall not give rise to a claim for a change in the Contract Price.

9.3 Changes in the Contract Price

9.3.1 In connection with any claim by Contractor against the County for compensation in excess of the Contract Price, any liability of the County for Contractor's costs shall be strictly limited to direct costs incurred by Contractor and shall in no event include indirect costs or consequential damages of Contractor.

9.3.2 Any change in the Contract Price resulting from a Change Order shall be determined as follows:

- a) By mutual acceptance of a lump sum increase or decrease in costs. Upon the Project Manager's request, Contractor shall furnish a detailed estimate of increased or decreased costs, together with cost breakdowns and other support data as the Project Manager may reasonably request.
- b) By Unit Prices stated in the Contract Documents, or subsequently agreed upon payment.
- c) By a manner or method mutually agreed by the County and Contractor.

9.3.3 If no mutual agreement occurs between the County and Contractor, then the change in the Contract Price, if any, shall than be determined by the Project Manager on the basis of the reasonable expenditures or savings of those performing, deleting or revising the Work attributable to the change, including, in the case of an increase or decrease in the Contract Price, a reasonable allowance for direct job site overhead and profit. In such case, Contractor shall present, in such form and with such content as the County or the Project Manager requires, an itemized accounting of such expenditures or savings shall be limited to the following: reasonable costs of materials, supplies, or equipment including delivery costs, reasonable costs of labor, including social security, unemployment insurance, fringe benefits required by a pre-existing Contract or by custom, and workers' compensation insurance, reasonable costs of premiums for all bonds and insurance, permit fees, and sales, use or other taxes paid by Contractor that are directly attributable to the changed Work. In no event shall any expenditure or savings associated with Contractor's home office or other non-Jobsite overhead expenses be included in any change in the Contract Price. Pending final determination of reasonable expenditures or savings to the County, payments shall be made to Contractor based on the Project Manager's recommendation for payment.

9.3.4 Costs which will not be allowed or paid in Change Orders or other claims under this Contract include, but are not limited to, the costs of preparing or reviewing change request/claims or proposed Change Orders, change request/claim consulting costs; lost revenues; lost profits; lost income or earnings; interest cost of any type other than those mandated by statute; rescheduling costs; lost earnings; loss of other business; or the costs of Contractor representatives visiting the Jobsite or participating in meetings with the County. The County shall not be liable to Contractor for claims of third parties, including Subcontractors, unless and until liability of Contractor has been established therefore in a court of competent jurisdiction.

9.4 Acceptance of Change Orders

Contractor's written acceptance of a Change Order shall constitute a final and binding Contract to the provisions thereof and a waiver of all claims in connection therewith, whether direct, indirect, or consequential in nature.

9.5 Notice to Sureties

Contractor shall notify and obtain the timely consent and approval of Contractor's surety with reference to all Change Orders if such notice, consent or approval is required by Contractor's surety or by law. Contractor represents and warrants to County that Contractor is solely liable and responsible to so notify and obtain any such consent or approval.

9.6 Differing Site Conditions

If during the course of the Work, Contractor encounters (1) subsurface or concealed conditions at the Project's Jobsite that differ materially from those shown in the Contract Documents and from those ordinarily encountered and generally recognized as inherent in work of the character called for in this Contract; or (2) unknown physical conditions of the Project's Jobsite, of an unusual nature, which differ materially from that ordinarily encountered and generally recognized as inherent in work of the character called for in this Contract, then Contractor, without disturbing the conditions and before performing any Work affected by such conditions, shall, within twenty-four (24) hours of their discovery, notify the Project Manager in writing of the existence of the aforesaid conditions. The Project Manager shall, within two (2) business days after receipt of Contractor's written notice, investigate the site conditions identified by Contractor. If, in the sole opinion of the Project Manager, the conditions do materially so differ and cause an increase or decrease in Contractor's cost of, or the time required for, the performance of any part of the Work, whether or not charged as a result of the conditions, the Project Manager may recommend an equitable adjustment to the Contract Price, or the Contract Time, or both. If Project Manager and Contractor cannot agree on an adjustment in the Contract Price or Contract Time, the adjustment shall be referred to the Assistant Director of Purchasing and Contracts for determination in accordance with the provisions of Paragraph 1.5. No request by Contractor for an equitable adjustment to this Contract under this provision shall be allowed unless Contractor has given written notice to the Project Manager in strict accordance with the provisions of this Article. **No request for an equitable adjustment or change to the Contract Price or Contract Time for differing site conditions shall be allowed if made after the date certified by the Project Manager as the date of Substantial Completion.**

The failure by Contractor to provide written notice as provided in this Paragraph 8.6 shall constitute a waiver by Contractor of any Claim arising out of or relating to such concealed or unknown condition.

ARTICLE X UNCOVERING WORK, STOPPING WORK, AND ACCEPTING DEFECTIVE OR NONCONFORMING WORK

10.1 Uncovering Work

10.1.1 No Work or portion of Work shall be covered until inspected by the County as required by the Contract Documents. If any of the Work is covered contrary to the request or direction of the County or the Project Manager or contrary to the requirements of the Contract Documents, Contractor shall, upon written request, uncover it for the Project Manager's inspection and subsequently cover the Work in accordance with the Contract Documents without adjustment to the Contract Time or Contract Price. The provisions and obligations set forth herein shall apply even if the County ultimately determines (after uncovering and inspection) that the underlying Work in question conforms to the requirements of the Contract Documents.

10.1.2 Should the County wish to either (i) re-inspect a portion of the Work that has been covered by Contractor in compliance with Paragraph 9.1.1, above, or (ii) inspect a portion of the Work that has been covered by Contractor which is not required by the Contract Documents to be observed or inspected prior to its being covered and which the County did not specifically request to observe prior to its being covered, Contractor shall uncover the applicable portion of the Work upon written request. If the County determines that the Work uncovered conforms to the requirements of the Contract Documents, then the County will pay the costs of uncovering and replacement of the cover through a Change Order and will adjust the Contract Time by Change Order if the uncovering and replacement Work extends the most current Substantial Completion or Final Completion date, as applicable. If, however, the County determines that the Work uncovered does not conform to the requirements of the Contract Documents, then Contractor shall pay the costs of uncovering and replacement and shall not be entitled to an adjustment of the Contract Price.

10.2 Right to Stop Work

If the Work is defective, or Contractor fails to supply sufficient skilled workers, suitable materials, or equipment or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, the County,

acting through the Project Manager, may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated. The County's right to stop Work, or any portion thereof, shall not give rise to any duty on the part of the County to exercise this right for the benefit of Contractor or any other party.

10.3 County May Accept Defective or Nonconforming Work

If the County chooses to accept defective or nonconforming Work, the County may do so. In such events, the Contract Price shall be reduced by the greater of (a) the reasonable cost of removing and correcting the defective or nonconforming Work, and (b) the difference between the fair market value of the Work had it not been constructed in such manner as to include defective or nonconforming Work. If the remaining portion of the unpaid Contract Price, if any, is insufficient to compensate the County for its acceptance of defective or nonconforming Work, Contractor shall, pay the County such remaining compensation for accepting defective or nonconforming Work.

ARTICLE XI CONTRACT SUSPENSION AND TERMINATION

11.1 Suspension

The County may, by written notice, order Contractor to suspend, delay or interrupt Work, in whole or in part, for a period of time as the County may determine. If such suspension delays Contractor's ability to meet the authorized Contract Time, Contractor will be granted an extension of time as reasonably agreed by both parties. Contractor shall not be entitled to an adjustment to the Contract Time to the extent that performance is, was or would have been so suspended, delayed or interrupted by another cause, act or omission for which Contractor is responsible. Notwithstanding anything to the contrary in this Contract and, in the event any such suspension exceeds ninety (90) days, Contractor may, upon ten (10) days written notice to the County, terminate performance under this Contract and recover from the County an equitable adjustment in accordance with Section 8.3 above.

11.2 Termination

11.2.1 The County may by written notice to Contractor terminate the Work under this Contract in whole or in part at any time for the County's convenience or for the default of Contractor.

11.2.2 The County may terminate this Contract, in whole or in part, for its convenience upon thirty (30) calendar days written notice to the Contractor. If the termination is for the convenience of the County, an equitable adjustment in the compensation to be paid to the Contractor may be made based upon the cost for completed Work, Work in progress, and the substantiated, reasonable and actually incurred costs associated with termination, including demobilization costs and amounts due in settlement of terminated contracts with Subcontractors. No amount shall be allowed for anticipated profit or unperformed work.

11.2.3 Contractor may terminate this Contract, for any reason up to sixty (60) calendar days written notice, provided that any outstanding Work is completed by Contractor, or Contractor's Subcontractors. Contractor further agrees to cooperate fully and assist the County, upon request, in order to complete any Work under this Project. In such event, the County shall compensate the Contractor as mutually agreed in writing for any such Work after termination.

11.2.4 The County may terminate this Contract, in whole or in part, for cause (or "default"). In the event of Contractor's default, the County shall issue a Notice of Default to the Contractor, articulating the items which the County finds to be in default of the requirements of this Agreement. Contractor shall have ten (10) calendar days from receipt of the Notice of Default to remedy deficiencies or submit, in writing, an acceptable plan for remedying the deficiencies identified in said notice. If Contractor fails to remedy such deficiencies, or to submit an acceptable plan for remedying such deficiencies, to the satisfaction of the County within the stated time period, the County shall issue a Notice of Termination, and take over and prosecute the Work to completion. In such case, Contractor shall be liable to the County for all reasonable additional costs incurred by the County in completion of the Work.

11.2.5 Upon receipt of such termination notice Contractor shall immediately stop all Work and shall immediately cause any and all of its Subcontractors and material suppliers at any tier, to immediately stop all work, leaving the construction Site in a safe and secured condition. Contractor shall not be paid for any work performed or costs incurred after the termination date that reasonably could have been avoided. The County may direct Contractor to assign Contractor's right, title and interest under terminated orders or subcontracts to its designee.

11.2.6 Contractor shall not remove from the construction Jobsite any materials, equipment, plant or tools that have been

paid for by County pursuant to this Contract. Contractor hereby grants the County a free and unimpeded right of access to Contractor's facilities, which shall survive any termination of the Contract, for the purpose of permitting the County to take control of and remove any Work, including but not limited to any Work for which title has vested in the County.

11.2.7 For purposes of this Termination provision, Contractor shall be deemed in default if Contractor (1) persistently or repeatedly refuses or fails to perform the Work in a timely manner, (2) fails to supply enough properly skilled Workers, supervisory personnel or proper equipment or materials, (3) fails to make prompt payment to Subcontractors, or for materials or labor, (4) becomes insolvent or becomes the subject of voluntary or involuntary bankruptcy proceedings, (5) persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or (6) breaches or violates a material provision of this Contract. If the termination is attributable to the default of Contractor, the County shall have the right, without prejudice to any other right or remedy, to take possession of the construction Jobsite and of all materials, equipment, tools, construction equipment and machinery thereon owned by Contractor and may finish the Work by whatever methods it may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished.

11.2.8 If the unpaid balance of the Contract Price less any liquidated damages due under this Contract, exceeds the cost of finishing the Work, including compensation for the Project Manager's additional services and expenses made necessary thereby, Contractor shall pay the difference to the County. This obligation for payment shall survive the termination of the Contract.

11.2.9 If, after termination by the County for Contractor's default, it is determined by a Court of competent jurisdiction that Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties, including adjustment of the Contract Price, will be the same as if the termination had been issued for the convenience of the County, as provided under Paragraph 10.2.4 above.

ARTICLE XII WARRANTY AND INDEMNITY

12.1 Warranty

12.1.1 Contractor warrants and guarantees to the County that all labor furnished to progress the Work under this Contract shall be competent to perform the tasks undertaken and that the product of such labor shall yield only first-class results and that all materials and equipment furnished under this Contract shall be of good quality, free from faults and defects and in strict conformance with the Contract Documents.

12.1.2 Contractor warrants all materials, equipment and labor it furnishes or performs under this Contract against all defects in design, materials and workmanship for a period of one year (or the period of time in any guarantee or warranty provided by any manufacturer or supplier of equipment or materials incorporated into the Work, whichever is later) from and after the date of Final Completion. Contractor shall within ten (10) Days after being notified in writing by the County of any defect in the Work or non-conformance of the Work (Warranty Work), commence and prosecute with due diligence all Work necessary to fulfill the terms of the warranty at its sole cost and expense. Contractor shall act sooner as requested by the County in response to an emergency. In addition, Contractor shall, at its sole cost and expense, repair and replace any portions of the Work (or work of other contractors) damaged by its Warranty Work or which becomes damaged in the course of repairing or replacing Warranty Work. For any Work so corrected, Contractor's obligation hereunder to correct Warranty Work shall be reinstated for an additional one-year period, commencing with the date of acceptance of such corrected Work.

12.1.3 Contractor shall perform such tests as the County may require to verify that any corrective actions, including, without limitation, redesign, repairs, and replacements comply with the requirements of the Contract Documents. All costs associated with such corrective actions and testing, including the removal, replacement, and reinstatement of equipment and materials necessary to gain access, shall be the sole responsibility of Contractor.

12.1.4 All warranties and guarantees of subcontractors, suppliers and manufacturers with respect to any portion of the Work, whether express or implied, are deemed to be obtained by Contractor for the benefit of the County, regardless of whether or not such warranties and guarantees have been transferred or assigned to the County by separate Contract and Contractor agrees to enforce such warranties and guarantees, if necessary, on behalf of the County.

12.1.5 In the event that Contractor fails to perform its obligations under this Warranty Section, or under any other warranty or guaranty under this Contract, to the reasonable satisfaction of the County, the County shall have the right to correct and replace any defective or non-conforming Work and any work damaged by such work or the replacement or correction thereof at Contractor's sole expense. Contractor shall be obligated to fully reimburse the County for any expenses incurred hereunder upon demand.

12.1.6 Failure on the part of the County to reject defective, non-conforming or unauthorized Work shall not release Contractor from its contractual obligations, be construed to mean acceptance of such Work or material by the County, or, after Final Completion, bar the County from recovering damages or obtaining such other remedies as may be permitted by law.

12.1.7 No adjustment in the Contract Time or Contract Price will be allowed because of delays in the performance of the Work as a result of correcting defective, non-conforming or unauthorized Work.

12.1.8 County and Contractor agree that the provisions of Florida Statute Chapter 558 shall not apply to this Contract.

12.2 Indemnity

12.2.1 Contractor shall indemnify and hold harmless the County and its officers and employees ("Indemnified Party"), from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor and persons employed or utilized by Contractor in the performance of this Contract.

12.2.2 To the extent permitted by, and in accordance with Section 725.06 of the Florida Statutes, Contractor further agrees that "damages, losses and costs", includes fines, citations, court judgments, insurance claims, restoration costs or other liability, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor and persons employed or utilized by Contractor in the performance of this Contract.

12.2.3 To the extent permitted by, and in accordance with Section 725.06 of the Florida Statutes, for purposes of indemnity, the "persons employed or utilized by Contractor" shall be construed to include, but not be limited to, Contractor, its staff, employees, subcontractors, all deliverers, suppliers, furnishers of materials or services or anyone acting for, on behalf of, or at the request of Contractor.

12.2.4 In Claims against any person or entity indemnified hereunder by an employee of Contractor, any Subcontractor, or subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Section 11.2 shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any Subcontractor or subcontractor under any workers' compensation acts, disability benefits acts or other employee benefit acts.

12.2.5 Contractor's indemnity and hold harmless obligations hereunder shall extend to all Claims against the County by any third party or third-party beneficiary of this Contract and all liabilities, damages, losses and costs related thereto.

12.2.6 This indemnification will not be valid in the instance where the loss is caused by the gross negligence, or willful, wanton or intentional misconduct of any Indemnified Party.

12.2.7 If any provision(s), or portion(s) of a provision(s) of this Section, or the application thereof to any person or circumstance shall, to any extent, be held to be invalid, illegal or unenforceable for any reason whatsoever, the validity, legality and enforceability of the remaining provision(s), or part of the provision(s), shall not in any way be affected or impaired thereby; and shall be interpreted to the fullest extent possible to be enforceable and to give effect to the intent manifested by the provision(s), or portion(s) thereof, held invalid, illegal or unenforceable.

12.2.8 Contractor shall further indemnify and hold harmless the County its officers and employees from and against all Claims arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents and shall defend such Claims in connection with any alleged infringement of such rights.

12.2.9 The indemnification provisions of this Section 11.2 shall survive expiration or earlier termination of this Contract.

ARTICLE XIII INSURANCE AND BONDS

13.1 Contractor's Insurance Requirements

13.1.1 All insurance policies shall be satisfactory to the County and be issued by companies authorized and duly licensed to transact business in the State of Florida. Contractor shall furnish proof of insurance to the County prior to execution of this Contract. No Work shall commence under this Contract until Contractor has obtained all insurance coverages required under this section. Certificates of insurance shall clearly indicate Contractor has obtained insurance of the type, amount, and classification as required by this Contract. Required insurance coverage shall be maintained in force, including coverage for Additional Insureds, until Final Completion of all Work including Warranty Work.

13.1.2 No less than ten (10) days written notice shall be provided to the County prior to cancellation, non-renewal or any material change of required insurance policies. Yearly renewal certificates shall be provided to the County within thirty (30) days of expiration of the current policy.

13.1.3 The types and amounts of insurance required under this Contract do not in any way limit the liability of Contractor including under any warranty or indemnity provision of this Contract or any other obligation whatsoever Contractor may have to the County or others. Nothing in this Contract limits Contractor to the minimum required insurance coverages found in this Article XII.

13.2 Additional Insured Endorsements and Certificate Holder

The term "Additional Insured", as used in this Contract, shall mean St. John's County, its elected officials, officers, employees, agents and representatives. Certificates of insurance shall specifically name each Additional Insured for all policies of insurance except Workers' Compensation and Professional Liability. A copy of the endorsement showing the required coverages must accompany the certificate of insurance.

Certificate Holder Address: St. Johns County, a political subdivision of the State of Florida
500 San Sebastian View
St. Augustine, FL 32084
Attn: Purchasing Division

13.3 Workers Compensation

Contractor shall procure and maintain during the life of this Contract, adequate Workers' Compensation Insurance in at least such amounts as is required by law for all of its employees per Florida Statute 440.02.

13.4 Commercial General Liability

Contractor shall procure and maintain during the life of this Contract, Comprehensive General Liability Insurance with minimum limits of \$1,000,000 per occurrence, \$2,000,000 aggregate, including bodily injury (including wrongful death), property damage, products, personal & advertising injury, and completed operations. This insurance must provide coverage for all Claims that may arise from the services and/or operations completed under this Contract, whether such services or operations are by Contractor or anyone directly or indirectly employed by them. Such insurance(s) shall also be primary and non-contributory with regard to insurance carried by the Additional Insureds.

13.5 Automobile Liability

Contractor shall procure and maintain during the life of this Contract, Comprehensive Automobile Liability Insurance with minimum limits of \$2,000,000 combined single limit for bodily injury and property damage liability and insuring liability arising out of or in any way related directly or indirectly to the ownership, maintenance or use of any owned, non-owned or rented/hired automobiles.

13.6 Additional Coverages

ONLY THE SUBSECTIONS CORRESPONDING TO ANY CHECKED BOX IN THIS PARAGRAPH 12.6 WILL APPLY TO THIS CONTRACT.

13.6.1 Professional Liability.

13.6.1.1 Contractor shall procure and maintain, during the life of this Contract, Professional Liability or Errors and

Omissions Insurance with minimum limits of \$1,000,000 with 10-year tail coverage starting upon Final Completion. Contractor's professional liability policy should not have an exclusion for environmental compliance management or construction management professionals.

13.6.1.2 In the event that Contractor employs professional engineering or land surveyor services for performing field engineering or preparing design calculations, plans, and specifications, Contractor shall require the retained engineers and land surveyors to carry professional liability insurance with limits not less than \$1,000,000 each claim with respect to negligent acts, errors, or omissions in connection with professional services to be provided under this Contract.

13.6.2 Builders Risk.

a. Contractor shall procure and maintain Builder's Risk ("all risk") insurance on a replacement cost basis. The amount of coverage shall be equal to the full replacement cost on a completed value basis, including periodic increases or decreases in values through change orders.

13.6.2.2 The Builder's Risk policy shall identify the County as the sole loss payee. The policy shall name as insured the County, Contractor and its subcontractors of every tier. Each insured shall waive all rights of subrogation against each of the other insured to the extent that the loss is covered by the Builder's Risk Insurance. The Builder's Risk policy shall be primary and any self-insurance maintained by the County in not contributory. The Builder's Risk policy shall not include a co-insurance clause. This coverage shall not be lapsed or cancelled because of partial occupancy by the County prior to Final Completion of the Work.

13.6.2.3 The Builder's Risk insurance shall:

- a. insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal including demolition as may be reasonably necessary; and water damage (other than that caused by flood).
- b. cover, as insured property, at least the following: (i) the Work and all appurtenances, materials, supplies, fixtures, machinery, apparatus, equipment and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work including County furnished or assigned property; (ii) spare parts inventory required within the scope of the Contract; and (iii) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Jobsite, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
- c. extend to cover damage or loss to insured property (i) while in transit; and (ii) while in temporary storage at the Jobsite or in a storage location outside the Jobsite (but not including property stored at the premises of a manufacturer or supplier).
- d. include (i) performance/start-up and hot testing; (ii) soft costs (e.g. design and engineering fees, code updates, permits, bonds, insurances, and inspection costs); and (iii) costs of funding or financing when a covered risk causes delay in completing the Work.

13.6.3 The Builder's Risk Insurance may have a deductible clause. Contractor shall be responsible for paying any and all deductible costs. Notwithstanding anything to the contrary set forth above, the deductible for coverage of all perils and causes of loss enumerated in subparagraph 12.6.2.3 above shall not exceed \$250,000.

13.7 Other Requirements

The required insurance limits identified in Sections 12.4, 12.5, and 12.6 above may be satisfied by a combination of a primary policy and/or Umbrella or Excess Liability Insurance policy. Contractor shall require each lower-tier subcontractor to comply with all insurance requirements appropriate for its scope of work, and any deficiency shall not relieve Contractor of its responsibility herein. Upon written request, Contractor shall provide County with copies of lower-tier subcontractor certificates of insurance.

Providing and maintaining adequate insurance coverage is a material obligation of Contractor. County has no obligation or duty to advise Contractor of any non-compliance with the insurance requirements contained in this Section. If Contractor fails to obtain and maintain all of the insurance coverages required herein, Contractor shall indemnify and hold harmless the Additional Insureds from and against any and all Claims that would have been covered by such insurance had Contractor complied with its obligations herein.

County reserves the right to adjust the above minimum insurance requirements or require additional insurance coverages to address other insurable hazards.

13.8 Payment and Performance Bonds

Contractor shall execute, furnish the County with, and record in the public records of St. John's County, a Payment and Performance Bond in accordance with the provisions of Sections 255.05 and 287.0935 Florida Statutes, in an amount no less than the Contract Price. Such Payment and Performance Bond shall be conditioned upon the successful completion of all work, labor, services, equipment and materials to be provided and furnished hereunder, and the payment of all subcontractors, materialmen, and laborers. Said bond shall be subject to the approval of the Board of County Commissioners of St. John's County, Florida. In accordance with Section 255.05, F.S., the County may not make a payment to Contractor until Contractor has provided the County a certified copy of the recorded bond.

ARTICLE XIV MISCELLANEOUS

14.1 Independent Contractor

Contractor represents that it is fully experienced and properly qualified, licensed, equipped, organized, and financed to perform the Work under this Contract. Contractor shall act as an independent contractor and not as an agent in performing this Contract and shall maintain complete control over its employees and all of its Subcontractors and suppliers of any tier. Nothing contained in this Contract or any lower-tier subcontract or purchase order awarded by Contractor shall create any contractual relationship between any such subcontractor or supplier and the County. Contractor shall perform all Work in accordance with the requirements of this Contract and in accordance with its own methods subject to compliance with this Contract.

14.2 Examination of Contractor's Records

The County or its authorized representative shall, until the expiration of five (5) years after final payment under this Contract, have access to, and the right to examine any directly pertinent books, documents, papers and records of Contractor involving transactions relating to this Contract, and to make copies, excerpts and transcriptions thereof. If any such examination reveals that Contractor has overstated any component of the Contract Price, Change Order, Claim, or any other County payment obligation arising out of this Contract, then Contractor shall, at the election of the County, either immediately reimburse to the County or offset against payments otherwise due Contractor, the overstated amount plus interest. The foregoing remedy shall be in addition to any other rights or remedies the County may have.

14.3 Backcharges

Upon the County's notification to undertake or complete unperformed Work such as cleanup or to correct defective or non-conforming services, equipment, or material (Backcharge Work), if Contractor states or by its actions indicates it is unable or is unwilling to immediately proceed and/or complete the Backcharge Work in an agreed time; the County may perform such Backcharge Work by the most expeditious means available and backcharge Contractor for any and all costs thereby incurred by the County.

The County shall separately invoice or deduct and retain from payments otherwise due to Contractor the costs for Backcharge Work. The County's right to backcharge is in addition to any and all other rights and remedies provided in this Contract or by law. The County's performance of the Backcharge Work shall not relieve Contractor of any of its responsibilities under this Contract and Contractor shall be responsible for the Backcharge Work as if it were its own.

14.4 Applicable Law

Contractor and the Work must comply with all Applicable Law and the requirements of any applicable grant agreements.

14.5 Governing Law & Venue

The Contract shall be governed by the laws of the State of Florida. Venue for any administrative and/or legal action arising under the Contract shall be St. Johns County, Florida.

14.6 Assignment

Contractor shall not sell, assign or transfer any of its rights, duties or obligations under the Contract, or under any Change Order issued pursuant to the Contract or make an assignment or transfer of any amounts payable to Contractor under the Contract, without the prior written consent of the County. In the event of any assignment, Contractor remains secondarily liable for performance of the Contract, unless the County expressly waives such secondary liability. The County may assign the Contract with prior written notice to Contractor of its intent to do so. This Contract may be assumed by and shall inure to the benefit of the County's successors and assigns without the consent of Contractor.

14.7 Severability

If a court deems any provision of the Contract void, invalid or unenforceable, that provision shall be enforced only to the extent that it is not in violation of law or is not otherwise unenforceable and all other provisions shall remain in full force and effect.

14.8 Section Headings

The section and other headings contained in this Contract are for reference purposes only and shall not affect the meaning or interpretation of this Contract.

14.9 Disclaimer of Third-Party Beneficiaries

This Contract is solely for the benefit of County and Contractor and no right or cause of action shall accrue to or for the benefit of any third party not a formal party hereto. Nothing in this Contract, expressed or implied, is intended or shall be construed to confer upon or give any person or entity other than County and Contractor, any right, remedy, or Claim under or by reason of this Contract or any provisions or conditions hereof; and all of the provisions, representations, covenants and conditions herein contained shall inure to the sole benefit of and shall be binding upon County and Contractor.

14.10 Waiver; Course of Dealing

The delay or failure by the County to exercise or enforce any of its rights or remedies under this Contract shall not constitute or be deemed a waiver of the County's right thereafter to enforce those rights or remedies, nor shall any single or partial exercise of any such right or remedy preclude any other or further exercise thereof or the exercise of any other right or remedy. The conduct of the parties to this Contract after the Effective Date shall not be deemed a waiver or modification of this Contract.

14.11 No Waiver of Sovereign Immunity

Nothing herein is intended to serve as a waiver of sovereign immunity by any agency or political subdivision to which sovereign immunity may be applicable or of any rights or limits to liability existing under Section 768.28, Florida Statutes. This section shall survive the termination of all performance and obligations under this Contract and shall be fully binding until such time as any proceeding brought on account of this Contract is barred by any applicable statute of limitations.

14.12 Execution in Counterparts

This Contract may be executed in counterparts, each of which shall be an original document, and all of which together shall constitute a single instrument. The parties may deliver executed counterparts by e-mail transmission, which shall be binding. In the event this Contract is executed through a County-approved electronic signature or online digital signature service (such as DocuSign), such execution shall be valid, effective and binding upon the party so executing. Execution and delivery of an executed counterpart of this Contract and/or a signature page of this Contract by electronic image scan transmission (such as a "pdf" file) or through a County approved electronic signature service will be valid and effective as delivery of a manually executed counterpart of this Contract.

14.13 Entire Contract

This Contract for the Work, comprised of the Contract Documents enumerated herein, constitutes the entire Contract between the Parties relating to the subject matter hereof and supersedes all prior or contemporaneous Contracts, negotiations, discussions and understandings, oral or written. This Contract may not be amended or modified except in writing, as provided herein and signed by authorized representatives of both parties.

14.14 Survival

The provisions of the Contract Documents which by their nature survive termination of the Contract, including without limitation all warranties, indemnities, insurance, payment obligations, and the County's right to audit Contractor's books

and records, shall in all cases survive the expiration or earlier termination of this Contract.

14.15 Employment Eligibility and Mandatory Use of E-Verify

As a condition precedent to entering into this Contract, and in accordance with section 448.095, F.S., Contractor and its subcontractors shall register with and use the E-Verify system to verify the work authorization status of all employees hired on or after January 1, 2021.

- a. Contractor shall require each of its subcontractors to provide Contractor with an affidavit stating that the subcontractor does not employ, contract with, or subcontract with an unauthorized alien. Contractor shall maintain a copy of such affidavit for the duration of this Contract.
- b. The County, Contractor, or any subcontractor who has a good faith belief that a person or entity with which it is contracting has knowingly violated section 448.09(1), F.S. or these provisions regarding employment eligibility shall terminate the contract with the person or entity.
- c. The County, upon good faith belief that a subcontractor knowingly violated these provisions regarding employment eligibility, but Contractor otherwise complied, shall promptly notify Contractor and Contractor shall immediately terminate the contract with the subcontractor.
- d. The County and Contractor hereby acknowledge and mutually agree that, a contract terminated pursuant to these provisions regarding employment eligibility is not a breach of contract and may not be considered as such. Any contract terminated pursuant to these provisions regarding employment eligibility may be challenged in accordance with section 448.095(2)(d), F.S.
- e. Contractor acknowledges that, in the event that the County terminates this Contract for Contractor's breach of these provisions regarding employment eligibility, then Contractor may not be awarded a public contract for at least one (1) year after such termination. Contractor further acknowledges that Contractor is liable for any additional costs incurred by the County as a result of the County's termination of this Contract for breach of these provisions regarding employment eligibility.
- f. Contractor shall incorporate in all subcontracts made pursuant to this Contract the provisions contained herein regarding employment eligibility.

14.16 Equal Employment Opportunity

During the performance of this Contract, Contractor agrees as follows:

14.16.1 Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, disability, age, sex (including sexual orientation and gender identity/expression), national origin (including limited English proficiency), marital status, or familial status. Contractor will take affirmative action to ensure that applicants and employees are treated during employment without regard to their race, color, religion, disability, sex, age, national origin, ancestry, marital status, sexual orientation, gender identity or expression, familial status, genetic information or political affiliation. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertisement, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.

14.16.2 Contractor will, in all solicitations or advertisements for employees placed for, by, or on behalf of Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, disability, sex, age, national origin, ancestry, marital status, sexual orientation, gender identity or expression, familial status, or genetic information.

14.16.3 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 Contractor's legal duty to furnish information.

14.16.4 Contractor will send to each labor union or representatives of workers with which it has a collective bargaining Contract or other contract or understanding, a notice to be provided by the County, advising the labor union or workers' representative of Contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

14.16.5 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.

14.16.6 Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the County and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

14.16.7 In the event of Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, this Contract may be cancelled, terminated or suspended in whole or in part and Contractor may be declared ineligible for further 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.

14.16.8 Contractor will include the provisions of paragraphs 13.15.1 through 13.15.8 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. Contractor will take such action with respect to any subcontractor or vendor as may be directed to the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, Contractor may request the United States to enter into such litigation to protect the interest of the United States.

14.17 Public Records

14.17.1 Contractor shall comply and shall require all of its Subcontractors to comply with the State of Florida's Public Records Statute (Chapter 119), specifically to:

- (1) Keep and maintain public records that ordinarily and necessarily would be required by the County in order to perform the Services;
- (2) Upon request from the County's custodian of public records, provide the County with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost as provided in Chapter 119, Florida Statutes, or as otherwise provided by Applicable Law;
- (3) Ensure that public records related to this Contract that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by Applicable Law for the duration of this Contract and following expiration of this Contract, or earlier termination thereof, if Contractor does not transfer the records to the County; and
- (4) Upon completion of this Contract, or earlier termination thereof, transfer, at no cost, to the County all public records in possession of Contractor or keep and maintain for inspection and copying all public records required by the County to perform the Work.

14.17.2 If Contractor, upon expiration of this Contract or earlier termination thereof i) transfers all public records to the County, Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements; and ii) keeps and maintains public records, Contractor shall meet all Applicable Law and requirements for retaining public records. All records stored electronically must be provided to the County, upon request from the County's custodian of public records, in a format that is compatible with the County's information technology

systems.

14.17.3 Failure by Contractor to comply with the requirements of this section shall be grounds for immediate, unilateral termination of this Contract by the County.

IF CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO ITS DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT: (904) 209-0805, PUBLICRECORDS@SJCFL.US, [500 SAN SEBASTIAN VIEW, ST. AUGUSTINE, FLORIDA 32084](#)

14.18 Anti-Bribery

Contractor and its Subcontractors shall at all times during the term of this Contract comply with all anti-bribery and corruption laws that are applicable to the performance of this Contract. Contractor represents that it has not, directly or indirectly, taken any action which would cause it to be in violation of Chapter 838 of the Florida Statutes. Contractor shall immediately notify the County of any violation (or alleged violation) of this provision.

14.19 Convicted and Discriminatory Vendor Lists, and Scrutinized Companies

14.19.1 Contractor warrants that neither it nor any Subcontractor is currently on the convicted vendor list or the discriminatory vendor list maintained pursuant to Sections 287.133 and 287.134 of the Florida Statutes, or on any similar list maintained by any other state or the federal government. Contractor shall immediately notify the County in writing if its ability to perform is compromised in any manner during the term of the Contract.

14.19.2 Section 287.135 of the Florida Statutes prohibits agencies from contracting with companies for goods or services that are on the Scrutinized Companies that Boycott Israel List, or with companies that are engaged in a boycott of Israel, and from contracting with companies for goods or services of \$1,000,000 or more that are on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or are engaged in business operations in Cuba or Syria. The lists are created pursuant to §215.473 and §215.4725, F.S. By execution of this Contract, Contractor certifies that it is not listed on the Scrutinized Companies that Boycott Israel List, the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, and is not engaged in a boycott of Israel or engaged in business operations in Cuba or Syria, and understands that pursuant to §287.135, F.S., the submission of a false certification may subject Contractor to civil penalties, attorney's fees, and/or costs. In accordance with §287.135, F.S., the County may terminate this Contract if a false certification has been made, or the Contractor is subsequently placed on any of these lists, or engages in a boycott of Israel or is engaged in business operations in Cuba or Syria.

14.20 Written Notice

Any and all notices, requests, consents, approvals, demands, determinations, instructions, and other forms of written communication under this Contract shall be validly given when delivered as follows:

- i. Hand delivered to Contractor's Authorized Representative or hand delivered during normal business hours and addressed as shown below, or
- ii. Delivered by U.S. Mail, electronic mail or commercial express carrier, (postage prepaid, delivery receipt requested), to the following addresses:

St. Johns County
500 San Sebastian View
St. Augustine, FL 32084
Attn: Leigh A. Daniels
Email Address: ldaniels@sjcfl.us

Cogburn Bros, Inc.
Address: 3300 Faye Road
Jacksonville, FL 32226
Attn: Doug Cogburn, Vice President
Email Address: dcogburn@cogburnbros.com

With a copy to:

St. Johns County
Office of the County Attorney
500 San Sebastian View
St. Augustine, FL 32084
Email Address: jferguson@sjcfl.us

Notices shall be deemed to have been given on the date of delivery to the location listed above without regard to actual receipt by the named addressee. County and Contractor may each change the above addresses at any time upon prior written notice to the other party.

The authorized representatives hereto have executed this Contract effective as of the Effective Date. Contractor's authorized representative executing this Contract represents that he or she is duly authorized to execute this Contract on behalf of Contractor.

County:

St. Johns County _____ (Seal)
(Typed Name)

By: _____
(Signature of Authorized Representative)

(Printed Name)

(Title)

(Date of Execution)

Contractor:

_____ (Seal)
(Typed Name)

By: _____
(Signature of Authorized Representative)

(Printed Name)

(Title)

(Date of Execution)

ATTEST:
St. Johns County, FL
Clerk of Circuit Court & Comptroller

By: _____
(Deputy Clerk)

(Date of Execution)

Legally Sufficient:

(Office of County Attorney)

(Date of Execution)

FORM 1
CERTIFICATION OF PAYMENTS TO SUBCONTRACTORS

Contract No.	22-MCA-COG-17350
Project Title:	Bid No: 23-10; CR 208 Water Booster Pump Station – Electrical Work

The undersigned Contractor hereby swears under penalty of perjury that:

1. Contractor has paid all Subcontractors all undisputed contract obligations for labor, services, or materials provided on this Project within the time period set forth in Sections 218.73 and 218.735, Florida Statutes, as applicable.

2. The following Subcontractors have not been paid because of disputed contractual obligations; a copy of the notification sent to each, explaining the good cause why payment has not been made, is attached to this form:

Subcontractor Name and Address	Date of Disputed Invoice	Amount in Dispute

Contractor’s Authorized Representative executing this Certification of Payments to Subcontractors represents that he or she is duly authorized to execute this Certificate, or if executing on behalf of another, is authorized to do so and that such Authorized Representative is legally bound.

Dated _____, 20__ Contractor _____
 By: _____
 (Signature)
 By: _____
 (Name and Title)

STATE OF _____)
) SS.
 COUNTY OF _____)

The foregoing instrument was acknowledged before me, by means of physical presence or online notarization, this _____ day of _____, 20__, by _____, who is personally known to me or who has produced _____ as identification and who did (did not) take an oath.

NOTARY PUBLIC:
 Signature: _____
 Print Name: _____

(NOTARY SEAL)
 My commission expires:

FORM 2

CONTRACTOR'S FINAL RELEASE AND WAIVER OF LIEN

Owner: St. Johns County (hereafter "County")	County Department/Division:
Contract No.: 22-MCA-COG-17350	Contractor Name: Cogburn Bros, Inc.
Project:	Contractor Address: 3300 Faye Road, Jacksonville, Fl 32226
Project Address:	Contractor License No.:
Payment Amount:	Amount of Disputed Claims:

The undersigned has been paid in full for all labor, work, services, materials, equipment, and/or supplies furnished to the Project or to the County and does hereby waive and release any notice of lien, any right to mechanic's lien, any bond right, any claim for payment and any rights under any similar ordinance, rule or statute related to a claim or payment rights the undersigned has on the above described Project, except for the payment of Disputed Claims, if any, described below.

The undersigned warrants that he or she either has already paid or will use the monies received from this final payment to promptly pay in full all of its laborers, subcontractors, materialmen and suppliers for all labor, work, services, materials, equipment, or supplies provided for or to the above referenced Project.

Before any recipient of this document relies on it, the recipient should verify evidence of payment to the undersigned.

Disputed Claims: The following invoices, pay applications, retention, or extra work are reserved by undersigned from this final payment (if there are no Disputed Claims enter "**None**"): _____

None

Signed this ___ day of _____, 20__

Contractor/Company Name

By:

Signature

Printed Name

Title

NOTICE: THIS DOCUMENT WAIVES RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT TO THE EXTENT OF THE PAYMENT AMOUNT OR THE AMOUNT RECEIVED.



St. Johns County Board of County Commissioners

Purchasing Division

NOTICE OF INTENT TO AWARD

December 8, 2022

Bid No: 23-10; CR 208 Water Booster Pump Station – Electrical Work

St. Johns County hereby issues this Notice of Intent to Award Cogburn Bros, Inc. as the lowest, responsive, responsible Bidder under the above referenced Invitation for Bids.

Any actual Bidder, Proposer or Supplier who is aggrieved in connection with the Notice of Intent to Award a Contract, where such grievance is asserted to be the result of a violation of the requirements of the St. Johns County Purchasing Policy and associated procedures, or any applicable provision of law by the officers, agents, or employees of the County, may file a Protest to the Assistant Director of Purchasing & Contracts. The Protest must be made in writing and filed by 4:00PM on the fifth business day following the date of the posting of the Notice of Intent to Award, and must be submitted in accordance with Section 13, SJC Purchasing Policy.

Should no Protest be received in response to this Notice the County will proceed with award of a Contract in accordance with SJC Purchasing Policy.

Please forward all correspondence, requests or inquiries directly to Bryan Matus, Senior Purchasing Coordinator, via email at bmatus@sjcfl.us or phone at 904.209.0148.

St. Johns County, FL
Board of County Commissioners
Purchasing Division

A handwritten signature in black ink, appearing to read "Leigh Daniels", is written over a horizontal line.

Leigh Daniels, CPPB
Purchasing Manager
ldaniels@sjcfl.us
(904) 209-0154 - Direct

Date: _____

12/8/22



ST. JOHNS COUNTY, FL
BID TABULATION

BID NO./TITLE: 23-10 – CR 208 WATER BOOSTER PUMP STATION
– ELECTRICAL WORK

OPENING DATE: 12/7/2022
OPENED BY: Bryan Matus *[Signature]*
VERIFIED BY: Justin Tahilramani *[Signature]*
POSTING DATE: 12/7/2022

BIDDERS	TOTAL BID PRICE						
Cogburn Bros., Inc.	\$949,000.00						
Chinchor Electric, Inc.	\$1,325,000.00						

Any actual Bidder who is aggrieved in connection with the Notice of Intent to Award, where such grievance is asserted to be the result of a violation of the requirements of the County's Purchasing Policy and associated procedures, or any applicable provision of law by the officers, agents, or employees of the County, may file a Protest with the Assistant Director of Purchasing & Contracts. The Protest must be submitted in writing, accompanied by a security in the form of a Protest Bond, by 4:00PM on the fifth business day following the date of the posting of the Notice of Intent to Award.

All public records shall become available for inspection and copying pursuant to Chapter 119, Florida Statutes.

BID NO: 23-10

OFFICIAL COUNTY BID FORM
ST. JOHNS COUNTY, FLORIDA

TO: THE BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA

DATE SUBMITTED: December 7, 2022

BID PROPOSAL OF

Cogburn Bros., Inc.

Full Legal Company Name of Bidder

3300 Faye Road, Jacksonville, FL 32226

904-358-7344

904-358-2805

Mailing Address

Telephone Number

Fax Number

Bidders: Having become familiar with requirements of the project, and having carefully examined the Bid Documents entitled for **Bid No: 23-10, CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK** in St. Johns County, Florida, the undersigned proposes to furnish all materials, labor and equipment, supervision and all other requirements necessary to complete the required Work for the following Total Bid Price:

LUMP SUM BID PRICE: All cost for all labor, materials, equipment, supplies, taxes, other miscellaneous costs, profit, and overhead, both direct and indirect, for completion of all Work except for those Bid Items herein listed separately.

\$ 929,000.00

Lump Sum Bid Price (Written in Numerals)

\$ nine hundred twenty-nine thousand dollars and no cents /Dollars

Lump Sum Bid Price (Written in Words)

ALLOWANCE: Allowance for FPL Service to Site and Coordination of New Electrical –

\$ 20,000.00

TOTAL BID PRICE: Lump Sum Bid Price + Allowance

\$ 949,000.00

Total Bid Price (Written in Numerals)

\$ nine hundred forty-nine thousand dollars and no cents /Dollars

Total Bid Price (Written in Words)

Bidder shall insert the Lump Sum Bid Price and the Total Bid Price above, in numerals and in words. The Total Bid Price shall consist of the lump sum price for the project and allowance.

During the preparation of the Bid, the following addenda, if any, were received:

No.: <u>1</u>	Date Received: <u>11/22/2022</u>	No.: _____	Date Received: _____
No.: _____	Date Received: _____	No.: _____	Date Received: _____
No.: _____	Date Received: _____	No.: _____	Date Received: _____

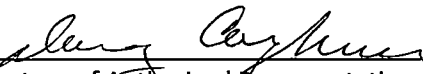
The Undersigned hereby declares that no person or persons, firm, or corporation, other than the undersigned are interested in this submitted Bid, as principals, and that this Bid is made without collusion with any person, firm, or corporation, and the undersigned has carefully examined, is thoroughly familiar with, and has incorporated the requirements and specifications of the Bid Documents in this submitted Bid.

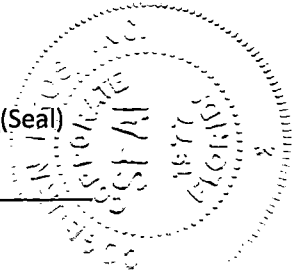
The Undersigned certifies that a full examination of the locations of the required work and the sources of supply of materials has been completed, and agrees to furnish all necessary labor, equipment and materials, fully understanding that any quantities shown herein are approximate only, and will fully complete all work in accordance with all requirements specified in the Bid Documents.

The Undersigned declares that the statements and representations made in this Bid are true in every respect and that the Bid is, in all respects, fair and made without collusion or fraud, and that no member of the St. Johns County Board, or any other agent or employee of the County, directly or indirectly, is interested in this Bid or in any profits expected to accrue therefrom.

CORPORATE/COMPANY

Full Legal Company Name: Cogburn Bros., Inc. (Seal)

By:  Doug Cogburn, Vice President
 Signature of Authorized Representative (Name & Title typed or printed)



Address: 3300 Faye Road, Jacksonville, FL 32226

Telephone No.: (904) 358-7344 Fax No.: (904) 358-2805

Email Address for Authorized Company Representative: dcogburn@cogburnbros.com

Federal I.D. Tax Number: 59-1742857 DUNS #: 085089258
(If applicable)

INDIVIDUAL

Name: _____
(Signature) (Name typed or printed) (Title)

Address: _____

Telephone No.: (____) _____ Fax No.: _____

Email Address: _____

Federal I.D. Tax Number: _____

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

**ATTACHMENT "A"
ST. JOHNS COUNTY AFFIDAVIT**

Bidder hereby issues the sworn statement below, which must be incorporated into the submitted Bid. This sworn statement shall be an affidavit in the following form, executed by an officer of the firm, association, or corporation submitting the Bid, and shall be sworn to before a person who is authorized by law to administer oaths.

STATE OF Florida

COUNTY OF Duval

The Undersigned authority, Doug Cogburn ("Affiant"), who being duly sworn, deposes and states that he/she is the Vice President (Title) of the firm of Cogburn Bros., Inc. (Full Legal Name of Bidder) submitting the attached Bid for the completion of work specified in the Bid Documents for Bid No: 23-10 CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK, in St. Johns County, Florida.

The Affiant further states that no more than one Bid will be submitted in response to the above IFB from the Affiant, the bidding firm, or corporation under the same or different name, and that such Bidder has no financial interest in any other bidding firm submitting a Bid in response to the above IFB. That neither the Affiant, his/her firm, association, nor corporation has either directly or indirectly entered into any agreement, participated in any collusion, nor otherwise taken any action in restraint of free competitive bidding in connection with this Bid. Furthermore, neither the Bidder nor any of its officers are barred from participating in public contract lettings in the State of Florida or any other state.


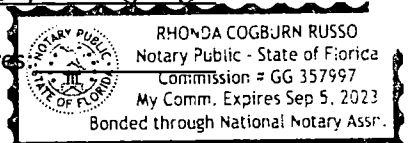
DATED this 7th day of December, 2022.


Signature of Affiant

Doug Cogburn, Vice President
Printed Name & Title of Affiant

Cogburn Bros., Inc.
Full Legal Name of Bidder

Sworn to (or affirmed) and subscribed before me by means of physical presence or online notarization, this _____ day of December 7, 2022, by Affiant who is personally known to me or has produced _____ as identification. Type and number of I.D. produced: _____.


Notary Public
My Commission Expires _____


BIDDER MUST EXECUTE AND ATTACH THIS AFFADAVIT TO SUBMITTED BID.

ATTACHMENT "B"
CERTIFICATE AS TO CORPORATE PRINCIPAL

I, Kathy Wise, certify that I am the Secretary of the corporation named as Principal in the foregoing; that Doug Cogburn, (Authorized Representative of Bidder) who signed the Bond(s) on behalf of the Bidder, was then Vice President (Title) of said corporation; that I know his/her signature; and his/her signature thereto is genuine; and that said bond(s) was duly signed, sealed, and attested to on behalf of said corporation by authority of its governing body.

Kathy M. Wise
Signature of Secretary

Cogburn Bros., Inc.
Full Legal Name of Bidder

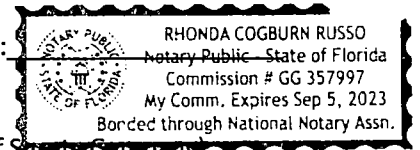
STATE OF Florida

COUNTY OF Duval

Before and by me, a Notary Public duly commissioned, qualified and acting personally, being duly sworn upon oath by means of physical presence or online notarization, Doug Cogburn (Authorized Representative of Bidder) states that he/she is authorized to execute the foregoing Bid Bond on behalf of the Bidder named therein in favor of St. Johns County, Florida.

Subscribed and sworn to me on this 7th day of December, 2022, by the Authorized Representative of Bidder, who is personally known to me or has produced _____ as identification. Type and Number of I.D. produced: _____.

Rhonda Russo
Notary Public
My Commission Expires: _____



(Attach Power of Attorney to original Bid Bond and Financial Statement of Surety Company)

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

**ATTACHMENT "C"
LICENSE / CERTIFICATION LIST**

Bidder shall list all **current** licenses and certifications held by the firm and/or Key Personnel of the Bidder. Failure to demonstrate any required licenses or certifications which are stated as a minimum qualification, shall be grounds for disqualification and removal from further consideration. A copy of each license or associated document(s) shall be attached to this form and submitted with the Bid.

License Name	License #	Issuing Agency	Expiration Date
State of Florida Business License	1963	Duval County Tax Collector	9/30/2023
FL Certified General Contractor's License	CGC1520255	State of Florida	8/31/2024
FL Certified Electrical Contractor's License	EC13008916	State of Florida	8/31/2024

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

**ATTACHMENT "D"
LIST OF PROPOSED SUB-CONTRACTORS / SUPPLIER LIST**

Bidder shall submit any and all proposed sub-contractors and major material suppliers below for review/approval by the County. Bidder shall attach any and all licenses or certifications required for the proposed sub-contractor to perform the intended portion of the Work as stated below. All subcontractors and major materials suppliers are subject to approval of County.

Company Name	Division/Discipline	Primary Contact Name	Contact Number and Email Address

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

**ATTACHMENT "E"
CONFLICT OF INTEREST DISCLOSURE FORM**

Project (BID) Number/Description: Bid No: 23-10 CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

The term "conflict of interest" refers to situations in which financial or other considerations may adversely affect, or have the appearance of adversely affecting a Bidder's professional judgment in completing work for the benefit of St. Johns County ("County"). The bias such conflicts could conceivably impart may inappropriately affect the goals, processes, methods of analysis or outcomes desired by the County.

Contractors are expected to safeguard their ability to make objective, fair, and impartial decisions when performing work for the benefit of the County. Contractors, therefore must there avoid situations in which financial or other considerations may adversely affect, or have the appearance of adversely affecting the consultant's/contractor's professional judgement when completing work for the benefit of the County.

The mere appearance of a conflict may be as serious and potentially damaging as an actual distortion of goals, processes, methods of analysis or outcomes. Reports of conflicts based upon appearances can undermine public trust in ways that may not be adequately restored even when the mitigating facts of a situation are brought to light. Apparent conflicts, therefore, should be disclosed and evaluated with the same vigor as actual conflicts.

It is expressly understood that failure to disclose conflicts of interest as described herein may result in immediate disqualification from evaluation or immediate termination from work for the County.

Please check the appropriate statement:



I hereby attest that the undersigned Bidder has no actual or potential conflict of interest due to any other clients, contracts, or property interests for completing work on the above referenced project.



The undersigned Bidder, by attachment to this form, submits information which may be a potential conflict of interest due to other clients, contracts or property interests for completing work on the above referenced project.

Full Legal Name of Bidder:

Cogburn Bros., Inc.

Authorized Representative(s):

Doug Cogburn
Signature

Doug Cogburn, Vice President

Print Name/Title

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

**ATTACHMENT "F"
CONTRACTOR'S QUALIFICATIONS FORM**

Bidder certifies, and has attached to the submitted Bid proof of current and valid licensure to perform the Work in the State of Florida and St. Johns County, and as specified in the Bid Documents. Any material misrepresentation, as determined by the County, shall result in disqualification.

By: Cogburn Bros., Inc.

Full Legal Name of Bidder

Steve Cogburn
Authorized Representative Signature

12/7/2022
Date

Contractor's Project Experience

Bidder must be fully licensed to do business in the State of Florida and hold a current Certified General Contractor's or Certified Electrical Contractor's license at the time the bid is due. Bidders must have successfully completed, as a Prime Contractor or Sub-Contractor, at least three (3) projects, in the past five (5) years, of similar type, size with electrical work and dollar value of the project described herein.

Contractor's Project Experience Details Project No. 1	
Name of Project:	Argyle Pump Station
Project Manager Name:	Chad Walker
Superintendent Name:	Bill Newman
Project Description:	Electrical installation of new 1200A service, 1200A ATS, 500kw generator, 1200A MCCs and 2-140 hp VFDs
Owner Information	
Name:	Jacksonville Electric Authority
Address:	21 West Church Street, Jacksonville, FL 32202
Contact Person:	
Telephone Number:	904-665-5260
Engineer/Architect Information	
Name:	CDM Smith
Address:	8381 Dix Ellis Trail, Suite 400 Jacksonville, FL 32256
Contact Person:	
Telephone Number:	904-731-7109
Contract Dates	
Started:	March 11, 2019

Contractor's Project Experience Details	
Project No. 1	
Original Contractual Completion:	
Final Contractual Completion:	
Actual Completion:	9/28/2020
Contract Value	
Original Contract Value:	\$405,000.00
Final Contract Value:	432,331.26
Value of Change Orders to Date:	27,331.26
Value of Outstanding Claims to Date:	0
Bonding Company Information	
Name:	No Bond
Address:	
Contact Person:	
Telephone Number:	
Major Subcontractor Information	
Name:	N/A
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	

Contractor's Project Experience Details	
Project No. 2	
Name of Project:	Buffalo Pump Station
Project Manager Name:	Chad Walker
Superintendent Name:	Damien Thibodeaux
Project Description:	Electrical installation of new 600A service, 600A ATS, 400kw generator 600A MCCs and 3-50hp VFDs
Owner Information	
Name:	Jacksonville Electric Authority
Address:	21 W. Church Street, Jacksonville, FL 32202
Contact Person:	
Telephone Number:	904-665-5260
Engineer/Architect Information	
Name:	Constantine Engineering
Address:	100 Center Creek Road, Suite 108, St. Augustine 32084
Contact Person:	
Telephone Number:	904-562-2185
Contract Dates	
Started:	10/24/2019
Original Contractual Completion:	
Final Contractual Completion:	
Actual Completion:	5/17/2021
Contract Value	
Original Contract Value:	\$352,844.00
Final Contract Value:	\$431,719.00
Value of Change Orders to Date:	\$78,875.00
Value of Outstanding Claims to Date:	0
Bonding Company Information	
Name:	No Bond
Address:	
Contact Person:	
Telephone Number:	

**Contractor's Project Experience Details
Project No. 2**

Major Subcontractor Information

Name:	N/A
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	

Contractor's Project Experience Details Project No. 3	
Name of Project:	Otter Creek Retrofit
Project Manager Name:	Chad Walker
Superintendent Name:	Chris Medina
Project Description:	Electrical installation of new 1200A service, 1200A ATS, 300kw generator 1200A Switchboard and 4-50hp VFDs
Owner Information	
Name:	Wakulla County Board of County Commissioners
Address:	3093 Crawfordville Highway, Crawfordville, FL 32327
Contact Person:	
Telephone Number:	850-926-0919
Engineer/Architect Information	
Name:	Baskerville - Donovan, Inc.
Address:	449 West Main Street, Pensacola, FL 32502
Contact Person:	
Telephone Number:	850-438-9661
Contract Dates	
Started:	12/23/2019
Original Contractual Completion:	
Final Contractual Completion:	
Actual Completion:	5/27/2021
Contract Value	
Original Contract Value:	\$559,500.00
Final Contract Value:	\$581,122.00
Value of Change Orders to Date:	\$21,622.00
Value of Outstanding Claims to Date:	0
Bonding Company Information	
Name:	No Bond
Address:	
Contact Person:	
Telephone Number:	

Contractor's Project Experience Details**Project No. 3****Major Subcontractor Information**

Name:	R & B Contracting, Inc.
Address:	4857 Beacon Drive East, Jacksonville, FL 32225
Contact Person:	Donna Brooks
Telephone Number:	904-646-3551
Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK


ATTACHMENT "G"
DRUG-FREE WORKPLACE FORM

The undersigned firm, in accordance with Florida Statute 287.087 hereby certifies that

Cogburn Bros., Inc. does:
Name of Firm

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the danger of drug abuse in the workplace, the business' policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, employee assistance programs and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the contractual services that are described in St. Johns County's request for proposals to provide bond underwriter services a copy of the statement specified in paragraph 1.
4. In the statement specified in paragraph 1, notify the employees that, as a condition of working on the contractual services described in paragraph 3, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Florida Statute 893, as amended, or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction or plea.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community by, any employee who is so convicted.
6. Consistent with applicable provisions with State or Federal law, rule, or regulation, make a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs 1 through 5.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.


Signature

12/7/2022
Date

ATTACHMENT "H"
CLAIMS, LIENS, LITIGATION HISTORY
(Complete and Submit)

1. Within the past 7 years, has your organization filed suit or a formal claim against a project owner (as a prime or subconsultant) or been sued by or had a formal claim filed by an owner, subconsultant or supplier resulting from a construction dispute? Yes ___ No If yes, please attach additional sheet(s) to include:

Description of every action Captions of the Litigation or Arbitration

Amount at issue: _____ Name (s) of the attorneys representing all parties:

Amount actually recovered, if any: _____

Name(s) of the project owner(s)/manager(s) to include address and phone number:

2. List all pending litigation and or arbitration.

N/A

3. List and explain all litigation and arbitration within the past seven (7) years - pending, resolved, dismissed, etc.

N/A

4. Within the past 7 years, please list all Liens, including Federal, State and Local, which have been filed against your Company. List in detail the type of Lien, date, amount and current status of each Lien.

N/A

5. Have you ever abandoned a job, been terminated or had a performance/surety bond called to complete a job?

Yes ___ No If yes, please explain in detail:

6. For all claims filed against your company within the past five (5) years, have all been resolved satisfactorily with final judgment in favor of your company within 90 days of the date the judgment became final? Yes ___ No___ If no, please explain why?

N/A

7. List the status of all pending claims currently filed against your company:

N/A

Liquidated Damages

1. Has a project owner ever withheld retainage, issued liquidated damages or made a claim against any Performance and Payment Bonds? Yes _____ No If yes, please explain in detail:

(Use additional or supplemental pages as needed)

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

ATTACHMENT "I"
E-VERIFY AFFIDAVIT

STATE OF Florida
COUNTY OF Duval

I, Doug Cogburn ("Affiant"), being duly authorized by and on behalf of Cogburn Bros., Inc. ("Bidder") hereby swears or affirms as follows:

1. Bidder understands that E-Verify, authorized by Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), is a web-based system provided by the United States Department of Homeland Security, through which employers electronically confirm the employment eligibility of their employees.
2. For the duration of Contract No. _____ (hereinafter "Agreement"), in accordance with section 448.095, F.S., Bidder shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Bidder and shall expressly require any subcontractors performing work or providing services pursuant to the Agreement to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor.
3. Bidder shall comply with all applicable provisions of section 448.095, F.S., and will incorporate in all subcontracts the obligation to comply with section 448.095, F.S.
4. Bidder understands and agrees that its failure to comply with all applicable provisions of section 448.095, F.S. or its failure to ensure that all employees and subcontractors performing work under the Agreement are legally authorized to work in the United States and the State of Florida constitute a breach of the Agreement for which St. Johns County may immediately terminate the Agreement without notice and without penalty. The Bidder further understands and agrees that in the event of such termination, Bidder shall be liable to the St. Johns County for any costs incurred by the St. Johns County resulting from Bidder's breach.

DATED this 7th day of December, 2022.

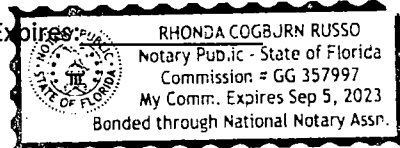
Doug Cogburn
Signature of Affiant

Doug Cogburn, Vice President
Printed Name & Title of Affiant

Cogburn Bros., Inc.
Full Legal Name of Bidder

Sworn to (or affirmed) and subscribed before me by means of physical presence or online notarization, this 7th day of December 2022, by Affiant, who is personally known to me or has produced _____ as identification.

Rhonda Russo
Notary Public
My Commission Expires _____



BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

ATTACHMENT "J"
LOCAL PREFERENCE

Any Bidder that meets the criteria of a Local Business, in accordance with Section 16.3 of the SJC Purchasing Policy, must complete and sign this form to indicate their qualification to receive local preference. All required documentation to demonstrate that the Bidder meets all qualification criteria as a local business must be included in the submitted Bid.

In order to qualify for local preference Respondent must provide sufficient documentation to demonstrate:

- A physical, brick and mortar place of business located within the geographic boundaries of St. Johns County, with a valid mailing address, in an area zoned for the conduct of such business, from which the Supplier has operated or performed business on a day-to-day basis that is substantially similar to those specified in the solicitation for a period of at least one (1) calendar year prior to the issuance of the solicitation. No PO Boxes shall be accepted.
- Local address above must be registered as the Supplier's principal place of business with the Divisions of Corporations Florida Department of State for at least one (1) calendar year prior to the issuance of this BID.
- Submit current and valid Local Business Tax Receipt, and must have Local Business Tax Receipts issued by the St. Johns County Tax Collector from at least one (1) calendar year prior to issuance of this BID.
- Must qualify as a local business as shown above **AND** self-perform a minimum of fifty percent (50%) of all services under the awarded Contract, or must have a minimum of fifty percent (50%) of all services performed by qualified local businesses as sub-contractors or sub-consultants.

If qualifying for local preference through the use of qualified local sub-contractors, Bidder must submit all required documentation to demonstrate the above requirements of all proposed sub-contractors and sub-consultants for local preference consideration with the submitted proposal.

Bidder is a Local Business as defined in Section 16.3, SJC Purchasing Policy

Bidder is **not** a Local Business as defined in Section 16.3, SJC Purchasing Policy

_____ ✓ _____

Doug Cogburn
Signature – Authorized Respondent Representative

Doug Cogburn, Vice President
Printed Name & Title

12/7/2022
Date of Signature

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

BID BOND

STATE OF Florida

COUNTY OF St. Johns

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned Cogburn Bros., Inc. (Full Legal Name of Bidder) as Principal, at 3300 Faye Road, Jacksonville, FL 32226-2329 (Address) and Western Surety Company as Surety, hereby hold and firmly bind ourselves, our heirs, executors, administrators, and successors and assigns, jointly and severally, by these presents, unto St. Johns County, Florida, as Obligees, in the penal sum of five percent (5%) of the Total Bid Price, or *** FIVE PERCENT OF AMOUNT BID *** Dollars (\$ ---5%---) lawful money of the United States.

WHEREAS, the Principal has submitted a Bid for **Bid No: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK** dated December 7, 2022:

- (a) If the Principal shall not withdraw said Bid within ninety (90) days of the opening of Bids by the Owner, and shall enter into a written Contract with the County within ten (10) business days after prescribed forms are provided to Principal for signature, in accordance with the Bid Documents, and give Bond with good and sufficient Surety or Sureties, as may be required, for the faithful performance and proper fulfillment of such Contract, then the above obligations shall be void and of no effect, otherwise to remain in full force and effect.
- (b) In the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such Bond within the time specified, the Principal shall pay the County the lesser of the following amounts: 1) the amount of this bond as hereinabove set forth, of 2) the difference between the amount specified in the Principal's Bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid including the administrative costs to effect such contract, then this obligation shall be void and of no effect, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the above bound parties have signed and sealed this instrument under their several seals, on this 7th day of December, 2022, the name and corporate seal of Principal and Surety being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESSES:

Rhonda Russo
Kristin Kencade
Gimbury Sapp

PRINCIPAL:

Cogburn Bros., Inc.
Full Legal Name of Principal

Stan Brandies
Signature of Authorized Officer

Stan Brandies, Sr. Vice President
Printed Name & Title of Signing Officer

3300 Faye Road
Mailing Address

Jacksonville, FL 32226-2329
City, State, Zip Code

SBrandies@coburnbros.com
Email Address of Signing Officer

SURETY:

Western Surety Company
Full Legal Name of Surety

Allyson Foss Wing
Signature of Authorized Surety Agent , Allyson Foss Wing

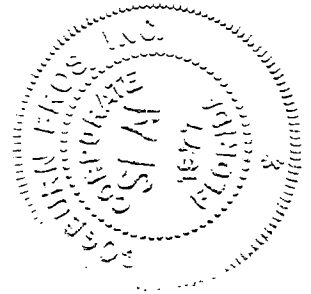
1904 Boothe Circle
Mailing Address of Local Agency

Longwood, FL 32750
City, State, Zip Code

allyson@guignardcompany.com
Email Address of Surety Agent

Allyson Foss Wing
Attorney-In-Fact Signature , Allyson Foss Wing

Inquiries: (407) 834-0022



Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Bryce R Guignard, M Gary Francis, April L Lively, Paul J Ciambriello, Jennifer L Hindley, Margie L Morris, Allyson Foss Wing, Deborah Ann Defoe, Christine A Morton, Kelly Phelan, David R Turcios, Individually

of Longwood, FL, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 22nd day of March, 2022.

WESTERN SURETY COMPANY



Paul T. Bruflat

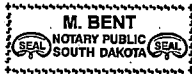
Paul T. Bruflat, Vice President

State of South Dakota }
County of Minnehaha } ss

On this 22nd day of March, 2022, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires

March 2, 2026



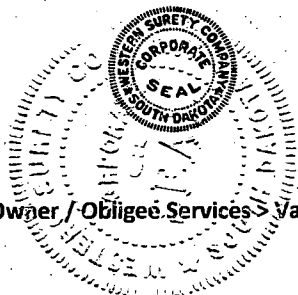
M. Bent

M. Bent, Notary Public

CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 7th day of December, 2022

WESTERN SURETY COMPANY



L. Nelson

L. Nelson, Assistant Secretary

Form F4280-7-2012

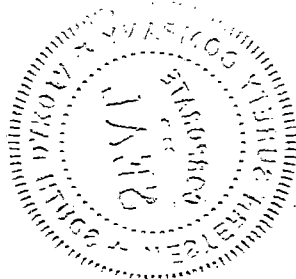
Go to www.cnasurety.com > Owner / Obligor Services > Validate Bond Coverage, if you want to verify bond authenticity.

Authorizing By-Law

ADOPTED BY THE SHAREHOLDERS OF WESTERN SURETY COMPANY

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the shareholders of the Company.

Section 7. All bonds, policies, undertakings, Powers of Attorney, or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, and Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or agents who shall have authority to issue bonds, policies, or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile.





2022 - 2023 LOCAL BUSINESS TAX RECEIPT

JIM OVERTON, DUVAL COUNTY TAX COLLECTOR

231 E. Forsyth Street, Suite 130, Jacksonville, FL 32202-3370

Phone: (904) 255-5700, option 3 Fax: (904) 255-8403

<https://taxcollector.coj.net/>

Note – A penalty is imposed for failure to keep this receipt exhibited conspicuously at your place of business. This business tax receipt is furnished pursuant to Municipal Ordinance Code, Chapters 770-772, for the period October 01, 2022 through September 30, 2023 .

COGBURN BROS, INC
3300 FAYE RD
JACKSONVILLE, FL 32226

ACCOUNT NUMBER: 1963
BUSINESS NAME: COGBURN BROS, INC
PHYSICAL ADDRESS: 3300 FAYE RD
JACKSONVILLE, FL 32226

CLASSIFICATION CODE: 309001 CONTRACTOR - ALL TYPES

STATE LICENSE NO: MULTIPLE

COUNTY TAX: 468.75
MUNICIPAL TAX: 1031.25
COUNTY LATE PENALTY: 0.00
MUNICIPAL LATE PENALTY: 0.00
TOTAL TAX: 1500.00

RENEWAL

VALID UNTIL September 30, 2023

***** ATTENTION *****

**THIS RECEIPT IS FOR BUSINESS TAX RECEIPT ONLY.
CERTAIN BUSINESSES MAY REQUIRE ADDITIONAL STATE LICENSING.**

This is a business tax receipt only. It does not permit the receipt holder to violate any existing regulatory or zoning laws of the County or City. It does not exempt the receipt holder from any other license or permit required by law. This is not a certification of the receipt holder's qualifications.

JIM OVERTON, TAX COLLECTOR

THIS BECOMES A RECEIPT AFTER VALIDATION.

Paid INT-23-00596682 08/15/2022 \$ 1500.00



Ron DeSantis, Governor

Melanie S. Griffin, Secretary



**STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**

CONSTRUCTION INDUSTRY LICENSING BOARD

THE GENERAL CONTRACTOR HEREIN IS CERTIFIED UNDER THE
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES

SMITH, RAYMOND H

COGBURN BROS, INC
3300 FAYE ROAD
COGBURN BROS INC
JACKSONVILLE FL 32226

LICENSE NUMBER: CGC1520255

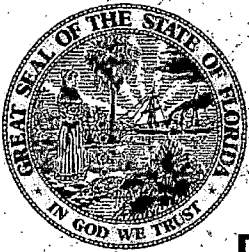
EXPIRATION DATE: AUGUST 31, 2024

Always verify licenses online at MyFloridaLicense.com



Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.



Ron DeSantis, Governor

Melanie S. Griffin, Secretary



**STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**

ELECTRICAL CONTRACTORS' LICENSING BOARD

THE ELECTRICAL CONTRACTOR HEREIN IS CERTIFIED UNDER THE
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES

WALKER, ROBBIE CHAD

COGBURN BROS, INC.
3300 FAYE ROAD
JACKSONVILLE FL 32226

LICENSE NUMBER: EC13008916

EXPIRATION DATE: AUGUST 31, 2024

Always verify licenses online at MyFloridaLicense.com



Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 12/07/2021

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.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement.

Table with 2 main columns: PRODUCER (USI Insurance Services, LLC) and CONTACT NAME (Kathy Harper). Includes insurer details like Travelers Indemnity Co of America and NAIC #.

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.

Main coverage table with columns: INSR LTR, TYPE OF INSURANCE, POLICY NUMBER, POLICY EFF, POLICY EXP, LIMITS. Includes Commercial General Liability, Automobile Liability, Umbrella Liab, Workers Compensation, etc.

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required) Proof of Insurance.

CERTIFICATE HOLDER (Cogburn Bros., Inc.) and 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.)

Request for Taxpayer Identification Number and Certification

**Give Form to the
requester. Do not
send to the IRS.**

▶ Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type.
See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank. COGBURN BROS., INC.	
2 Business name/disregarded entity name, if different from above	
3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes. <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input checked="" type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner. <input type="checkbox"/> Other (see instructions) ▶ _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <small>(Applies to accounts maintained outside the U.S.)</small>
5 Address (number, street, and apt. or suite no.) See instructions. 3300FAYE ROAD	Requester's name and address (optional)
6 City, state, and ZIP code JACKSONVILLE, FL 32226	
7 List account number(s) here (optional)	

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number													
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5	9		-	1	7	4	2	8	5	7			

Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding; or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person ▶	Date ▶ <u>2/14/22</u>
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

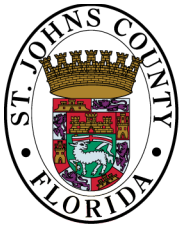
Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)
Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.
If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.



St. Johns County Board of County Commissioners

Purchasing Division

November 22, 2022

ADDENDUM #1

To: Prospective Respondent

From: St. Johns County Purchasing Department

Subject: Bid No. 23-10 CR 208 Water Booster Pump Station – Electrical Work

This Addendum #1 is issued for further Respondent's information and is hereby incorporated into the Bid Documents. Each Respondent will ascertain before submitting a Proposal that he/she has received all Addenda, and **return an original copy of this signed Addendum with the submitted proposal** as provided in the Bid Documents

Changes to the Specifications

Section 01010: Summary of Work

1. Paragraph 1.02 D. 2., add "d." as follows "d. Stabilized construction entrance to the site".

Section 01014: Construction Sequence

1. Paragraph 1.08 B.2, delete the contact information and replace with the following:
"Mike DeHaven (FPL)
303 Hastings Rd
St Augustine, FL 32084
(386) 329-5102
Michael.DeHaven@fpl.com"
2. Paragraph 1.08 B. 3., in the first sentence delete "Chris Wrenn" and replace with "Mike DeHaven" and in the second sentence delete "Chris" and replace with "Mike".

Section 16900

1. Paragraph 1.02.B – Replace the paragraph in its entirety with the following: "The Instrumentation System Supplier shall be an OWNER approved SCADA system integrator: GCS or Revere Control Systems."

Changes to the Drawings

E-5: INSTRUMENTATION CONTROL PANEL DETAILS

1. Instrumentation Control Panel "ICP" Detail: Change the model number for the operator interface terminal to: "CMT2158X".

E-8: ELECTRICAL PLAN BOOSTER PUMP STATION

1. Lighting Plan: Add note as follows - "One Type A light fixture in the electrical room shall be equipped with an option ELTZ emergency lighting battery pack, and two Type B light fixtures in the pump room shall be equipped with an option E10WMCP emergency lighting battery pack."

Questions/Answers

1. Should temporary power for the site be included in the electrical work bid? If so, will this also include temp power for contractor job trailers and any possible temp power requirements for the tank contractor?

Answer: The Electrical Contractor shall provide temporary power required for the electrical scope including temporary power for the Electrical Contractor job trailers. Temporary power for the General Contractor scope and the Tank Contractor scope shall be included individually within those bid projects.

2. Is the start up of the generator already covered by the owner or is that to be included in the electrical contractor's bid amount?

Answer: Startup of the generator set by the generator manufacturer is included in the generator scope furnished by Owner.

3. The detail on sheet E-9 shows the type T light fixture being supported from a cast aluminum conduit. Is the conduit rated to support the weight of the fixture and meet wind load requirements?

Answer: The tank light installation shown on E-9 does not require wind load rating confirmation.

4. Will the 2" aluminum conduit for the site light on top of the tank be mounted to the handrail for support?

Answer: No, the aluminum conduit used for the tank light shall be mounted to the thickened boss on the side of the tank.

5. Will the general contractor be responsible for installing the instrumentation that is provided by the I&C and EC? Typically, the EC handles installation of the instrument displays, wiring, and termination, but not the installation of the instruments themselves.

Answer: All instrumentation installation shall be included within the Electrical Contractor scope except the following:

- The installation of the magnetic flow meter flow tubes into the pipelines shall be included in the General Contractor scope.
- The installation of the pressure transmitter sensing piping shall be included in the General Contractor scope.

6. Will each contractor be responsible for providing temporary toilets?

Answer: Yes.

7. Are any electric heat trace systems needed for this project? Who is responsible for providing and installing the heat trace systems?

Answer: There are no electric heat trace systems needed for this project.

8. Does this project require Davis Bacon Wages or American Iron and Steel?

Answer: No.

9. Will the above ground piping need to be coated with a Tnemec or other brand of coating?

Answer: Acceptable coatings are specified in Section 09900 and 13216 of the technical specifications.

10. CEC Controls (a Wood business) is pleased to submit this prequalification package to the St. Johns County Utility Department for the CR-208 Ground Storage Tank and Booster Pump Station opportunity.

Answer: Per Specification Section 16900 1.02 B., the Instrumentation System Supplier (ISS) shall be an Owner approved SCADA system integrator as listed or pre-approved equal. Based upon the submitted prequalification package to be considered an owner pre-approved, the Owner is denying the request from CEC Controls (a Wood business) for the following reasons:

- The package did not provide any information on the ability to program Motorola PLC, specifically the ACE3600, which St. Johns County uses as noted throughout the specifications. Project References included do not indicate programming of the PLC manufacturer that the County designs around and uses throughout its system.

11. Will all of the plant equipment submittals be available for the awarded electrical contractor to complete their studies and submittals?

Answer: Yes. The selected Electrical contractor will work with all the selected contractors and have access to all equipment submittals relative to completing the work.

12. Do you require a Quantity Take-off for the project "Water Booster Pump Station-Electric Work" and we will deliver a detailed and accurate QTO for the project.

Answer: No. An outside quantity take-off is not required.

ATTACHMENTS

1. Scope of work for the Owner purchased generator and ATS.

THE BID DUE DATE REMAINS: December 7, 2022 AT 2:00 P.M.

Respondent Acknowledgment

Signature and Date

Printed Name/Title

Company Name (Print)

END OF ADDENDUM NO. 1

Ring Power®



**OLYMPIAN™
GENERATORS**

Your North and Central Florida Caterpillar Dealer

ST. AUGUSTINE
500 World Commerce Pkwy
St. Augustine, FL 32092
904-737-7730

TALLAHASSEE
32000 Blue Star Hwy
Midway, FL 32343
850-562-1622

OCALA
6202 N US 301/441
Ocala, FL 34475
352-732-4600

ORLANDO
9901 Ringhaver Dr.
Orlando, FL 32824
407-855-6195

TAMPA
9797 Gibsonton Dr
Riverview, FL 33569
813-671-3700

SALES

SERVICE

PARTS

LEASING

RENTALS

QUOTATION / SALES AGREEMENT / SECURITY AGREEMENT

DATE: 10/5/2022

QUOTATION NO: BM2022_E220714BW

CUSTOMER NAME: St Johns County Utility Department
ADDRESS: 1205 State Road 16
CITY/STATE/ZIP: St Augustine, Florida 32084
PHONE: 904.209.2652 Office
CONTACT NAME: Scott Trigg

ESTIMATED SHIPPING LEAD TIME: **36-42 Weeks**
SHIPPING VIA/FOB: RPC/Jobsite
ESTIMATED SUBMITTAL LEAD TIME: 4 Weeks
JOBSITE ADDRESS: TBD
CITY/STATE/ZIP: St Augustine FL 32084
PROJECT NAME: SJCUD CR208 Booster Pump Station

TERMS: Full payment is due from buyer within 10 days of delivery or pickup of the equipment.

DESCRIPTION OF MATERIAL	UNIT PRICE	EXTENSION
One (1) New Caterpillar C13 Diesel Engine Generator Set, 350 Kw Rated Standby, 277/480Volt, 3 Phase, Tier 3 Equipped as Follows: <ul style="list-style-type: none"> Generator Control Panel – Shutdowns include Low Oil Pressure, High Coolant Temperature, Overspeed, Overcrank UL2200 Listed Generator Integrated Voltage Regulator Qty. (2) 800Amp UL 100% Rated Breakers w/Solid Neutral, LSI, Mold Case Shunt Trip & Auxiliary Contact Anti-Condensation Heater Low Coolant Alarm Lead Acid Battery 		

Quotation Accepted By: _____ Date: _____ Tax No.: _____

Customer: _____ Salesman's Signature: Brian Martinez

Brian Martinez – EPG Sales NE FL

TERMS

- This offer to sell is made subject to buyer's acceptance within ten **(10) days** from this date (noted above).
- All quoted prices are subject to change without notice. Those in effect on the date of shipment shall prevail.
- Subject to credit approval.
- Used equipment is subject to prior sale.
- A 25% restocking fee will be assessed for all canceled orders or returned materials.
- No retainage to be withheld. Ring Power Systems is an equipment supplier and is not a sub-contractor. Our terms are Net 10 days.
- No sales tax is included.
- Buyer grants to seller a security interest in all equipment as described in this agreement until such time as payment is made in full in accordance with the terms and conditions of this agreement and in accord with the seller's credit application.
- Ring Power requires a purchase order to secure this sales agreement.

DESCRIPTION OF MATERIAL	UNIT PRICE
<ul style="list-style-type: none"> • 10 Amp Dual Rate Battery Charger 110VAC • Jacket Water Heater • <u>4 Year Caterpillar Platinum ESC</u> 	
TOTAL NET COST FOR ABOVE	
SOURCEWELL Discount – 37% Off of List Price Total List Price with SOURCEWELL Discount	
<u>Sourced Good and Support Service SOURCEWELL Discount</u> <u>CAT Dealer Additions – All Receive 5% Off List Price per SOURCEWELL</u> Aluminum Enclosure 150 MPH Wind Rated. Asco 7000 series Automatic Transfer Switch 800amp 480V Nema 1 Btm Lugs Stand-Alone Fuel Tank (Diesel) Convault 2,000-gallon UL 2085 Fuel Tank Stair (For Fill Purposes) Freight <u>Startup and Commissioning</u>	
Total List Price for Above Sourced Goods and Service Items 5% Off List CAT Dealer Additions Total List Price with SOURCEWELL Discount	
TOTAL NET COST FOR ABOVE	
<u>Option 1</u> <u>Service Promotion First Year inspection and Oil Change (No load test included)</u>	

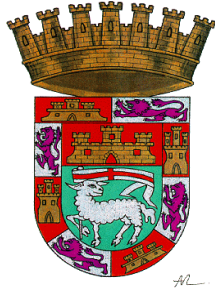
Quoted under:

SOURCEWELL – Sourcewell Contract #120617 – CAT

St Johns County Florida SOURCEWELL Contract Account Number # 20998 & 64415

NOTES:

1. NO DIESEL FUEL IS INCLUDED UNLESS QUOTED.
2. FREIGHT TO THE JOB SITE IS INCLUDED, OFFLOADING IS INCLUDED.
3. LIMITED SPECIFICATIONS WERE GIVEN FOR THIS QUOTE.
4. GENERAL EXCEPTION IS TAKEN TO ANY REQUIREMENT NOT PROVIDED AT THE TIME OF THIS PROPOSAL.
5. CURRENT PRODUCT LEAD TIME IS NOTED ABOVE IN WEEKS BUT IS SUBJECT TO CHANGE ACCORDING TO FACTORY AVAILABILITY.
6. ALL WORK BY RPC TECHNICIANS WILL BE PERFORMED DURING NORMAL WORKING HOURS. MONDAY-FRIDAY 7:30AM TO 4:00PM
7. FDEP & EPA NOTICES OF DELIVERY, PERMITTING, AND REGISTRATION ARE NOT INCLUDED. THIS IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR AND/OR OWNER.
8. ALL START-UP AND TESTING INCLUDED IN THIS PROPOSAL WILL BE PERFORMED BY RING POWER TECHNICIANS. ANY REQUIRED THIRD-PARTY TESTING SHALL BE PROVIDED BY OTHERS.
9. Under no circumstances does Ring Power accept any flow down provisions without specific written agreement between Ring Power and Buyer".
10. "The Seller shall not be responsible for any failure to perform, or delay in performance of, its obligations resulting from the COVID-19 pandemic or any future epidemic, and Buyer shall not be entitled to any damages resulting thereof."
11. "The Seller has provided product lead times based upon the information provided to Seller from its suppliers at the time of quotation. The Buyer accepts that lead times for products can change without notice and due to reasons, that are beyond any control of the Seller. As such, the Seller shall not be responsible for any failure to perform, or delay in performance of, its obligations resulting from lead times that extend past those originally quoted, and Buyer shall not be entitled to any damages resulting thereof
12. CREDIT TERMS TO BE DETERMINED AT THE TIME OF ORDER.
 - a. 95% Due at time of equipment delivery
 - b. 5% Due at completion of startup and commissioning
13. Providing a 2022 Model New Caterpillar Generator in-bound Stock pre ordered.
(All stock generators are subject to prior sale without notice)



**Board of County Commissioners
St. Johns County, Florida**

INVITATIONS FOR BID NO: 23-10

**CR 208 WATER BOOSTER PUMP STATION –
ELECTRICAL WORK**

**St. Johns County Purchasing Division
500 San Sebastian View
St. Augustine FL 32084
904.209.0150
www.sjcfl.us/Purchasing/index.aspx**

FINAL: 10/31/22

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

TABLE OF CONTENTS

- I. General Terms and Conditions
- II. Official County Bid Form
- III. Attachments:

- Attachment "A" – St Johns County Board of County Commissioners Affidavit
- Attachment "B" – Certificate as to Corporate Principal
- Attachment "C" – License/Certification List
- Attachment "D" – List of Proposed Sub-Contractors/Suppliers
- Attachment "E" – Conflict of Interest Disclosure Form
- Attachment "F" – Contractor's Qualifications Form
- Attachment "G" – Drug Free Workplace Form
- Attachment "H" – Claims, Liens, Litigation History
- Attachment "I" – E-Verify Affidavit
- Attachment "J" – Local Preference
- Bid Bond
- Sealed Bid Mailing Label

SEPARATE DOCUMENTS:

- EXHIBIT A - Project Technical Specifications
- EXHIBIT B - Construction Plans

End of Table of Contents

PART I – GENERAL TERMS AND CONDITIONS

1) DEFINITIONS

Terms used within this Invitation for Bids (“IFB”) shall have the meaning as set forth in the St. Johns County Purchasing Policy (“Policy”), or as otherwise defined herein. Any definition provided herein, shall govern over the definitions provided in the Policy.

2) COMPLIANCE WITH ST. JOHNS COUNTY PURCHASING POLICY

All provisions of the Policy and associated procedures are incorporated into the Bid Documents by reference, and are fully binding. Bidders are required to submit their Bids, and to conduct their activities in accordance with the Policy and associated procedures.

3) BIDDER’S REPRESENTATION

By submitting a Bid, each Bidder represents and warrants that Bidder has read and understands all information and requirements provided herein, and that Bidder is familiar with and understands all conditions related to the work specified herein, and the submitted Bid is based upon all necessary considerations to perform the work in accordance with all specifications and requirements provided herein, or as otherwise provided in an Addendum. Bidder also represents that any and all costs associated with performing the specified work are included in the submitted Bid.

4) BID DOCUMENTS

The Bid Documents are those documents which shall govern the solicitation, submittal, consideration and award of submitted Bid(s), which generally includes, but is not limited to: IFB Documents, Specifications, Plans, Drawings, and all issued Addenda.

Bid Documents may be obtained from www.demandstar.com or SJC Purchasing Division. The Bid Documents shall be used by Bidders to prepare their Bid for submittal. St. Johns County (“County”) shall not assume any responsibility for errors or misrepresentations resulting from the use of complete or incomplete sets of Bid Documents. The County, in making the Bid Documents available, do so only for the purpose of obtaining Bids for the specified purpose and do not confer a license or grant for any other use.

5) INTERPRETATION OR CORRECTION OF BID DOCUMENTS

Bidders shall promptly notify the Designated Point of Contact of any ambiguity, inconsistency, or error which they may discover upon examination of the Bid Documents or of the site and local conditions. Bidders requiring clarification or interpretation of the Bid Documents shall make a written request to the Designated Point of Contact by or before the deadline for questions as provided herein.

An interpretation, correction or change of the Bid Documents will be made by Addendum. Interpretations, corrections, or changes of the Bid Documents made in any other manner will not be binding, and Bidders must not rely upon such interpretations, corrections, or changes. No change will be made to the Bid Documents by the County less than seven (7) days prior to the submittal deadline for Bids. The County, however, reserves the right to issue addendums at any time prior to the submittal deadline for Bids in order to serve the best interest of the County.

6) SUBSTITUTIONS

The materials, products and equipment described in the Bid Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution. No substitution will be considered unless written request for approval has been received by the Designated Point of Contact at least fourteen (14) calendar days prior to the submittal deadline for Bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute, including

drawings, cuts, performance and testing data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or work that incorporation of the substitute would require must also be included. The burden of proof of the merit of the proposed substitute is upon the proposer of the substitute. The Project Manager's approval or disapproval of a proposed substitution shall be final.

If County Staff approves any proposed substitution, such approval will be set forth in an Addendum. Bidders must not rely upon approval made in any other manner.

7) DESIGNATED POINT OF CONTACT

The County's Designated Point of Contact for this IFB is Bryan Matus, Senior Procurement Coordinator, St. Johns County Purchasing Division. Any and all questions and/or inquiries shall be directed, *in writing*, via email to bmatus@sjcfl.us. In the event the Designated Point of Contact is absent or otherwise unavailable for more than three (3) business days, firms may contact Justin Tahilramani, Senior Procurement Coordinator, at jtahilramani@sjcfl.us.

8) LOBBYING PROHIBITION

In accordance with Section 9 of the Policy, Bidders **SHALL NOT** contact any staff member of the County, including members of the Board of County Commissioners, except the above referenced Designated Point of Contact with regard to this Invitation for Bids. Any such communication is a violation of the Policy and shall result in disqualification and removal from consideration for award under this IFB.

9) PRE-BID MEETING

The County will hold a **NON-MANDATORY** Pre-Bid Meeting on **Wednesday, November 9, 2022, at 9:00AM EST** at the St. Johns County Utility Department, 1205 State Road 16, St. Augustine, FL 32084. Attendance at the Pre-Bid Meeting is highly recommended for Bidders. Attendees are requested not to park in designated Customer Service parking spots.

10) QUESTIONS

Any and all questions related to this project shall be directed, *in writing*, to the Designated Point of Contact. Questions are due no later than four o'clock (4:00PM EST) on **Wednesday, November 23, 2022**, so that any necessary addenda may be issued in a timely manner. Any questions received after the above deadline will not be answered unless previously approved by the SJC Purchasing Manager or other designated County Representative.

11) ADDENDA

Any change, clarification, revision, deletion, additional documents or information provided by the County after broadcast of this IFB will be provided via Addendum, and posted to Demandstar (www.demandstar.com) with the Bid Documents. All planholders for this IFB will be notified of the posted addendum by Demandstar. Planholders may access and download issued Addenda for inclusion in their submitted Bid. Bidders may also request issued addenda from the Designated Point of Contact, in writing. It is the responsibility of the Bidder to acquire any addenda issued by the County. The County is not responsible for a Bidder's failure to obtain any issued Addendum.

Bidders are responsible for incorporating any and all changes, clarifications, revisions, deletions, additional documents and information provided by Addendum into the submitted Bid. Failure by the Bidder to appropriately consider and incorporate the addenda into their submitted Bid may cause the submitted Bid to be considered non-responsive and removed from further consideration. It shall be the sole discretion of the Purchasing Manager or Assistant Director of Purchasing and Contracts to determine whether or not an Addendum is material to the submitted Bid, resulting in disqualification and removal from consideration for award.

Each Bidder shall acknowledge all issued Addenda in the submitted Bid in the space provided on the Official County Bid Form, and provide a copy of each Addendum, signed by the Bidder's authorized representative.

12) BID SUBMITTAL REQUIREMENTS

The submittal deadline for Bids shall be no later than **2:00PM EST on Wednesday, December 7, 2022**. Bids must be submitted to:

SJC Purchasing Division
500 San Sebastian View
St. Augustine, FL 32084

Each Bidder must submit one (1) original hard copy, and one (1) duplicate of their Bid, in a sealed envelope or container, and plainly marked with the Bidder's full legal company name, mailing address, and recite: "Bid No: 23-10; CR 208 Water Booster Pump Station – Electrical Work". A mailing label has been provided herein for Bidders to use to identify their Bid.

All required forms and attachments, including the Official County Bid Form, must be completed, and all required information provided. Information must be typewritten or manually written in blue or black ink. Each Bid must include the Bidder's full legal company name, mailing address, telephone number, and must identify whether the Bidder is a sole proprietor, partnership, corporation or other legal entity. **The submitted Bid should NOT include a fully copy of the Bid Documents.**

Bidder shall assume full responsibility for timely delivery of their submitted Bid at the location designated above for receipt of Bids. Bids shall be delivered to the designated location prior to the submittal deadline provided above, or as revised by addendum. Bids received after the submittal deadline for Bids will not be considered and will be returned to the sender unopened.

Bidders must only submit (1) Bid in response to this IFB. Oral, telephonic, telegraphic, or electronic Bids are invalid and will not receive consideration.

Where so indicated by the makeup of the Bid Form, sums shall be expressed in both words and numerals, and in the case of a discrepancy between the two, the amount expressed in words shall govern. Additionally, where there are unit prices and extended prices, the unit prices shall govern over extended pricing.

Any interlineations, alterations, or erasures by the Bidder on the Bid Form must be initialed by the signer of the Bid. Failure to do so may cause the Bid to be considered non-responsive.

Bidder shall make no stipulation on the Bid Form, nor qualify the submitted Bid in any manner. To do so will classify the Bid as being non-responsive.

Any submitted Bid must be signed by an authorized representative of the Bidder, legally authorized to bind the Bidder to a contract. In the event the Bid is signed by a representative who is not a principal of the Bidder, a Delegation of Authority Letter must be submitted with the Bid, stating the delegation of authority by principal(s), owner(s), or officer(s) of the Bidder for the signing representative. The delegation of authority must be signed by the principal/owner/officer of the Bidder, and must state the limits and duration of the delegation to the signing representative.

A Bid submitted by an agent must have a current Power of Attorney attached, certifying the agent's authority to bind the Bidder.

All Bids submitted in response to this IFB shall become the property of the County and will not be returned to the Bidders. In the event of an award, all documentation produced as part of the award shall become exclusive property of the County.

13) BID POSTPONEMENT/CANCELLATION

The County may, at its sole and absolute discretion, postpone or cancel this IFB, and/or resolicit Bids in order to serve the best interest of the County.

14) MODIFICATION OR WITHDRAWAL OF BID

A submitted Bid may not be modified, withdrawn or canceled by the Bidder after the submittal deadline specified herein.

Prior to the submittal deadline for Bids, a Bid submitted early may be modified or withdrawn only by written notice to the Designated Point of Contact. Upon notice from a Bidder to modify or withdraw a submitted Bid, provided such notice is received prior to the submittal deadline for Bids, the County shall return the Bid to the Bidder unopened. Any modified Bids must be submitted prior to the submittal deadline specified herein, in order to be considered.

15) COSTS INCURRED BY BIDDERS

Bidders are responsible for any and all costs associated with developing and submitting a Bid in response to this IFB. Additionally, Bidders are solely responsible for any and all costs associated with providing any subsequent information requested by the County, attending any meetings with the County, and any other activities related to this solicitation and subsequent award proceedings. It is expressly understood, no Bidder may seek or claim any award and/or reimbursement from the County for any expenses, costs, and/or fees (including attorney's fees) borne by any Bidder, during the IFB process. Such expenses, costs, and/or fees (including attorney's fees) are the sole responsibility of the Bidder.

16) CONSIDERATION OF BIDS

Opening of Bids: Unless stated otherwise in an Addendum, Bids received by or before the submittal deadline will be opened publicly, immediately after the submittal deadline provided herein. The Bid Tabulation shall be posted to DemandStar, upon verification of Bids and all information.

Rejection of Bids: The County reserves the right to reject any or all Bids that are not materially responsive to the requirements provided herein, or if it is determined to be in the best interest of the County. The County may also waive any minor formality or irregularity of any submitted Bid, provided the minor formality or irregularity does not materially impact the submitted Bid.

Bid Award: It is the intent of the County to award to the lowest, responsive, responsible Bidder, or lowest responsive, responsible Local Bidder, based upon the Total Bid Price.

If an award is made, it will be made within a minimum of ninety (90) days from the date of the Bid opening, unless stated otherwise in an Addendum. Submitted Bids must remain valid for a minimum of ninety (90) days from the date of the Bid opening, and shall be irrevocable during this time unless otherwise agreed to by the County.

If only one (1) Bid is received, the County reserves the right to negotiate with the responding Bidder, if the submitted Bid is responsive to the requirements provided herein. The Bid may also be rejected and the Bid re-advertised, in order to best serve the needs of the County.

17) LOCAL PREFERENCE

The County shall review all submitted Bids to determine whether or not there is a Local Business which submitted a Bid that is within ten percent (10%) of the responsive, responsible, low Bid, provided the low Bid is not from a verified Local Business. If so, the County shall verify the qualification requirements to validate the Bidder as a Local Business, in accordance with Section 16.3 of the Policy. If the lowest Bid from a responsible Local Business is responsive, and the Bid is within ten percent (10%) of the low Bid, the Local Bidder shall have forty-eight (48) hours from notification by the County, to agree, in writing, to match the low Bid amount. If the Local Bidder agrees

to match the low Bid amount within the timeframe provided, the Local Bidder shall be awarded, provided they meet any and all other requirements of the County. If the Local Bidder refuses, or fails to agree to match the low Bid within the timeframe specified, the County shall consider the non-local low Bid for award.

18) BID SECURITY

Each submitted Bid must be accompanied by a Bid Security, submitted on the Bid Bond Form provided herein, or in the form of a certified or cashier's check, in the amount of five percent (5%) of the Total Bid Price submitted on the Official County Bid Form, pledging that the Bidder will enter into a contract with the County on the terms stated in the Bid and will, if required, furnish bonds as described hereunder covering the faithful performance of the Contract and the payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds to the County, if required, the amount of the Bid Security shall be forfeited, not as penalty, but as liquidated damages.

A Bid Security in the form of a certified or cashier's check must be made payable to the Board of County Commissioners of St. Johns County.

A Bid Security in the form of a Bid Bond shall be written on the form provided herein, with an acceptable surety, and the Attorney-in-Fact, who shall execute the bond on behalf of the Surety shall affix to the bond, a certified and current copy of the Power of Attorney. The Surety Company shall meet all requirements as provided below. Any Bidder submitting a Bid Bond (not a certified or cashier's check) must also submit **Attachment "B" – Certificate as to Corporate Principal**.

The County shall have the right to retain the Bid Security until either (a) a Contract is executed and bonds, if required, have been furnished, or (b) the County has rejected all Bids, or (c) the period of time for which Bids are irrevocable has elapsed, so that Bids may be withdrawn.

If this Bid is not accepted within ninety (90) consecutive calendar days of the submittal deadline for Bids, or if the Undersigned delivers the executed Contract, all required documents and the required Bond, as provided in the Bid Documents, the Security shall be returned to the Bidder within seven (7) business days of issuance of Notice to Proceed.

19) BID BOND INSTRUCTIONS

A Bid Bond submitted, on the form provided herein, must be completed as follows:

- Type or Print Bidder's and Surety's names, mailing addresses, in the same language as in the Bid Documents;
- Have authorized representatives of the Bidder and Surety/Surety's Agent sign in the designated spaces;
- Attach a copy of Surety agent's Power of Attorney with an original signature of the Secretary or Assistant Secretary of Surety certifying the copy, unless the Power of Attorney has been recorded in St. Johns County. If it has been recorded, provide book and page number.
- Submit one (1) original and one (1) duplicate, as prescribed herein for Submittal of Bids.

20) SURETY REQUIREMENTS

Any Surety issuing a Bond to the County, must meet the following requirements:

- Surety must be licensed to do business in the State of Florida;
- Surety must have a record of successful continuous operations for at least three (3) years;
- Surety shall not have exposed itself to any loss on any one risk in an amount exceeding twenty percent (20%) of its surplus to policyholders;
- Surety must have fulfilled all of its obligations on all other bonds given to the County;
- Surety must have good underwriting, economic management, adequate reserves for undisclosed liabilities, and net resources for unusual stock and sound investment.

21) TAXES

Federal Excise and Florida Sales Tax, as well as any other applicable taxes, levies, duties, and assessments which Bidder is required to pay, must be included in the submitted Bids.

22) FORCE MAJEURE

Bidder pledges to perform the specified work barring any delays due to Force Majeure events, which are those events not reasonably foreseeable and beyond the control of both the Bidder and the County, including acts of war, terrorist attacks, labor strikes, floods, earthquakes, epidemics, pandemics, riots, adverse weather conditions, natural disasters, and other acts of God.

23) MINIMUM QUALIFICATION REQUIREMENTS

Bidders must be fully licensed and authorized to do business in the State of Florida, must be registered with the State of Florida, Division of Corporations, and must be currently licensed as a Certified General Contractor or Certified Electrical Contractor as of the submittal deadline for Bids.

Bidders must have successfully completed, as a Prime Contractor or Sub-Contractor, at least three (3) projects within the past five (5) years, of similar type, size, and scope as specified herein. This includes installation of electrical gear such as MCCs, VFDs, ATS, control panels, RTUs, control valves, flow meters, underground conduit, and wiring, ground and lightning protection.

Bidders shall provide proof of qualifications by completing and submitting **Attachment "F" – Contractor's Qualification Form** and **Attachment "C" – Licenses and Certification List** along with a copy of each license and certificate listed. All licenses and certifications must be valid and current as of the date the Bid is submitted.

Failure by a Bidder to demonstrate meeting or exceeding the minimum qualification requirements stated above, shall be grounds for disqualification and removal from further consideration for award. The County reserves the right to request additional information regarding the qualification and experience of the Bidder in order to determine the responsibility of the Bidder to perform the specified work.

24) SUB-CONTRACTORS

Each Bidder shall identify any and all proposed sub-contractors and major material suppliers to be used if awarded a Contract, by completing and submitting **Attachment "D" – List of Proposed Sub-Contractors and Material Suppliers**. Bidders shall also include any and all licenses and certifications held by the proposed sub-contractors and material suppliers, as applicable, to demonstrate their qualifications for the portion(s) of work for which they are proposed. The County reserves the right to reject or disqualify any proposed sub-contractor or material supplier for failure to meet minimum qualification requirements, minimum experience requirements, or for previously documented failure to perform for the County. In the event the County rejects a proposed sub-contractor or material supplier, the County will notify the Bidder, in writing, and Bidder may, at their option, withdraw their Bid without forfeiture of Bid Security or submit an acceptable substitute at no increase in the submitted Bid Price. If Bidder fails to submit an acceptable substitute within seven (7) calendar days of the original notification, the County then may, at their option, disqualify the Bidder, at no cost to the County.

The County reserves the right to request additional information on any proposed sub-contractor and material supplier in order to determine whether or not the County finds them to be sufficiently qualified and responsible to satisfactorily complete the work for which they are proposed.

25) EMPLOYMENT ELIGIBILITY AND MANDATORY USE OF E-VERIFY

As a condition precedent to entering into the awarded Agreement, and in accordance with section 448.095, F.S., the awarded Contractor and its subcontractors shall register with and use the E-Verify system to verify the work authorization status of all employees hired on or after January 1, 2021 (see **Attachment "I"**).

a. Contractor shall require each of its subcontractors to provide Contractor with an affidavit stating that the

subcontractor does not employ, contract with, or subcontract with an unauthorized alien. Contractor shall maintain a copy of such affidavit for the duration of the awarded Agreement.

- b. The County, Contractor, or any subcontractor who has a good faith belief that a person or entity with which it is contracting has knowingly violated section 448.09(1), F.S. or these provisions regarding employment eligibility shall terminate the contract with the person or entity.
- c. The County, upon good faith belief that a subcontractor knowingly violated these provisions regarding employment eligibility, but Contractor otherwise complied, shall promptly notify Contractor and Contractor shall immediately terminate the contract with the subcontractor.
- d. The County and Contractor hereby acknowledge and mutually agree that, a contract terminated pursuant to these provisions regarding employment eligibility is not a breach of contract and may not be considered as such. Any contract terminated pursuant to these provisions regarding employment eligibility may be challenged in accordance with section 448.095(2)(d), F.S.
- e. Contractor acknowledges that, in the event that the County terminates the awarded Agreement for Contractor's breach of these provisions regarding employment eligibility, then Contractor may not be awarded a public contract for at least one (1) year after such termination. Contractor further acknowledges that Contractor is liable for any additional costs incurred by the County as a result of the County's termination of the awarded Agreement for breach of these provisions regarding employment eligibility.
- f. Contractor shall incorporate in all subcontracts made pursuant to the awarded Agreement the provisions contained herein regarding employment eligibility.

26) PUBLIC CONSTRUCTION BOND

The awarded Contractor shall be required to obtain and submit a recorded Public Construction Bond covering the faithful performance of the Contract and the payment of all obligations arising thereunder in full amount of the awarded Contract, with such acceptable sureties, secured through the Bidder's usual sources as may be agreeable to the parties. The Contractor shall furnish the required bond, after full execution of the awarded Contract. The Bond shall be released upon satisfactory completion of the project.

The Public Construction Bond form will be provided to the awarded Contractor with the fully executed contract. The Contractor shall provide the recorded Public Construction Bond to the County within three (3) business days of receipt of the bond form and executed contract. **The Public Construction Bond must be recorded after the contract is signed by all parties.**

Contractor shall record the Public Construction Bond with the St. Johns County Clerk of Courts, and obtain a certified copy of the recorded bond and provide to the SJC Purchasing Division. No work shall commence until the required bond has been delivered to the Owner. Upon receipt of the certified copy of the recorded bond, the Owner may issue a Notice to Proceed.

Unless otherwise specified in the Bid Documents, the bonds shall be written on the form provided herein. The Bidder shall require the Attorney-in-Fact who executes the required bonds on behalf of the Surety to affix thereto a certified and current copy of his Power of Attorney authorizing his firm to act as agent for the Surety in issuing the bonds.

27) CONTRACT TIME

The Contractor shall have ten (10) business days from Contractor's receipt of Notice of Award, to sign and return the awarded Contract". The County intends to sign and return a fully executed Contract no later than seven (7) business days from receipt of all required documents from the Contractor, but no later than seventeen (17) consecutive calendar days from issuance of Notice of Award.

The Contract Time for completion of Work under the awarded Contract shall be commenced within ten (10) business days of the date provided in the Notice to Proceed. Construction of the project shall reach Substantial Completion within **five hundred forty (540)** consecutive calendar days of the date provided in the Notice to Proceed, and shall reach Final Completion within **thirty (30)** consecutive calendar days of the date of Substantial Completion.

If Contractor fails to achieve Substantial Completion or Final Completion of the Work by its applicable date, then the County shall be entitled to withhold from any amounts otherwise due Contractor or to be paid as a debt due the sum of **one thousand five hundred dollars (\$1,500.00) per day** for each and every calendar day of unexcused delay "Liquidated Damages". The parties agree that such Liquidated Damages are not a penalty but rather a genuine pre-estimate of monetary damages sustained by the County for loss of revenue and/or increased project administration expenses related to this Contract because Contractor failed to perform and complete Work within the time fixed for completion or additional time granted pursuant to the provisions hereof. The assessment of Liquidated Damages is without prejudice to the County's rights of termination and Contractor's obligation to complete the Work.

Should Contractor fall behind the approved Work schedule; the County reserves the right to deduct Liquidated Damages based on an estimated period of late completion. The County need not wait until completion of Work to withhold Liquidated Damages from Contractor's progress payments.

28) INDEMNIFICATION

Contractor shall indemnify and hold harmless the County and its officers and employees from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor and persons employed or utilized by Contractor in the performance of this Contract.

To the extent permitted by, and in accordance with Section 725.06 of the Florida Statutes, Contractor further agrees that "damages, losses and costs", includes fines, citations, court judgments, insurance claims, restoration costs or other liability, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor and persons employed or utilized by Contractor in the performance of this Contract.

To the extent permitted by, and in accordance with Section 725.06 of the Florida Statutes, for purposes of indemnity, the "persons employed or utilized by Contractor" shall be construed to include, but not be limited to, Contractor, its staff, employees, subcontractors, all deliverers, suppliers, furnishers of materials or services or anyone acting for, on behalf of, or at the request of Contractor.

In Claims against any person or entity indemnified hereunder by an employee of Contractor, any Subcontractor, or subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any Subcontractor or subcontractor under any workers' compensation acts, disability benefits acts or other employee benefit acts.

Contractor's indemnity and hold harmless obligations hereunder shall extend to all Claims against the County by any third party or third-party beneficiary of this Contract and all liabilities, damages, losses and costs related thereto.

This indemnification will not be valid in the instance where the loss is caused by the gross negligence, or willful, wanton or intentional misconduct of any Indemnified Party.

If any provision(s), or portion(s) of a provision(s) of this Section, or the application thereof to any person or circumstance shall, to any extent, be held to be invalid, illegal or unenforceable for any reason whatsoever, the

validity, legality and enforceability of the remaining provision(s), or part of the provision(s), shall not in any way be affected or impaired thereby; and shall be interpreted to the fullest extent possible to be enforceable and to give effect to the intent manifested by the provision(s), or portion(s) thereof, held invalid, illegal or unenforceable.

29) INSURANCE REQUIREMENTS

Bidders must include in the submitted Bid, proof of at least the minimum coverage amounts in the type(s) of insurance policies as provided below. Failure to submit proof of current coverage or certification from a qualified insurance provider of the Bidder's ability to obtain the required coverages upon award may be grounds for Bidder being deemed non-responsive and removed from further consideration.

All insurance policies shall be satisfactory to the County and be issued by companies authorized and duly licensed to transact business in the State of Florida. Contractor shall furnish proof of insurance to the County prior to execution of the Contract. No Work shall commence under the awarded Contract until Contractor has obtained all insurance coverages required by the Contract. Certificates of insurance shall clearly indicate Contractor has obtained insurance of the type, amount, and classification as required by the Contract. Required insurance coverage shall be maintained in force, including coverage for Additional Insureds, until Final Completion of all Work including Warranty Work.

No less than ten (10) days written notice shall be provided to the County prior to cancellation, non-renewal or any material change of required insurance policies. Yearly renewal certificates shall be provided to the County within thirty (30) days of expiration of the current policy.

The types and amounts of insurance required under the Contract do not in any way limit the liability of Contractor including under any warranty or indemnity provision of the Contract or any other obligation whatsoever Contractor may have to the County or others. Nothing in the Contract shall limit the Contractor to the minimum required insurance coverages found in the Contract.

The term "Additional Insured" shall mean St. John's County, its elected officials, officers, employees, agents and representatives. Certificates of insurance shall specifically name each Additional Insured for all policies of insurance except Workers' Compensation and Professional Liability. A copy of the endorsement showing the required coverages must accompany the certificate of insurance.

Certificate Holder Address: St. Johns County, a political subdivision of the State of Florida
500 San Sebastian View
St. Augustine, FL 32084
Attn: Purchasing Division

Contractor shall procure and maintain during the life of the awarded Contract, adequate Workers' Compensation Insurance in at least such amounts as is required by law for all of its employees per Florida Statute 440.02.

Contractor shall procure and maintain during the life of the awarded Contract, Comprehensive General Liability Insurance with minimum limits of \$1,000,000 per occurrence, \$2,000,000 aggregate, including bodily injury (including wrongful death), property damage, products, personal & advertising injury, and completed operations. This insurance must provide coverage for all Claims that may arise from the services and/or operations completed under the Contract, whether such services or operations are by Contractor or anyone directly or indirectly employed by them. Such insurance(s) shall also be primary and non-contributory with regard to insurance carried by the Additional Insureds.

Contractor shall procure and maintain during the life of the awarded Contract, Comprehensive Automobile Liability Insurance with minimum limits of \$2,000,000 combined single limit for bodily injury and property damage liability and insuring liability arising out of or in any way related directly or indirectly to the ownership, maintenance or use of any owned, non-owned or rented/hired automobiles.

The required insurance limits identified above may be satisfied by a combination of a primary policy and/or Umbrella or Excess Liability Insurance policy. Contractor shall require each lower-tier subcontractor to comply with all insurance requirements appropriate for its scope of work, and any deficiency shall not relieve Contractor of its responsibility herein. Upon written request, Contractor shall provide County with copies of lower-tier subcontractor certificates of insurance.

Providing and maintaining adequate insurance coverage is a material obligation of Contractor. County has no obligation or duty to advise Contractor of any non-compliance with the insurance requirements contained in this Section. If Contractor fails to obtain and maintain all of the insurance coverages required herein, Contractor shall indemnify and hold harmless the Additional Insureds from and against any and all Claims that would have been covered by such insurance had Contractor complied with its obligations herein.

County reserves the right to adjust the above minimum insurance requirements or require additional insurance coverages to address other insurable hazards.

30) FORM OF AGREEMENT BETWEEN COUNTY AND CONTRACTOR

Unless otherwise provided by the County, the Agreement for completion of the specified work shall be written on the County's Master Construction Agreement.

31) GOVERNING LAWS & REGULATIONS

The Contractor shall be responsible for being familiar and complying with any and all federal, state, and local laws, ordinances, rules and regulations that, in any manner, affect the work required under the awarded Contract. The awarded Contract shall be governed by the laws of the State of Florida and St. Johns County both as to interpretation and performance.

32) OSHA REQUIREMENTS

The Contractor warrants that the product, products, or services supplied to St. Johns County shall conform in all respects to the standards set forth in the Occupational Safety and Health Act (OSHA) of 1970 as amended and the failure to comply will be considered a breach of contract. St. Johns County shall be held harmless against any unsafe conditions and contractor employee incidents.

33) COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT

Contractor certifies that all material, equipment, services, etc., furnished in this bid meets all OSHA requirements for the applicable Sectors. Bidder further certifies that, if he is the successful bidder, and the material, equipment, service, etc., delivered or provided is subsequently found to be deficient in any OSHA requirement in effect on date of delivery or service fulfillment date, all costs necessary to bring the material, equipment, service, etc., into compliance with the aforementioned requirements shall be borne by the bidder. All Personal Protective Equipment used by the contractor and their employees shall be ANSI certified and meet OSHA standards.

34) TRAINING AND EDUCATION (APPLICABLE ONLY WITH CONSTRUCTION SERVICES)

Contractors will ensure that Contractor employees are trained appropriately for their work tasking. The minimum requirements are found in Federal and State Regulations. Examples of this training are (but not limited to):

- Lockout Tagout
- Fall Protection
- Electrical Safety and the National Electrical Code (NEC)
- Confined Space Entry
- Welding/Cutting/Brazing
- Specific Chemical Hazards
- Excavations and Trenching
- Heavy Equipment Operation

Special emphasis should be given towards training and compliance with the Construction industry's "Focus Four" established by OSHA as an outreach program to the construction industry and its workers. Training, education, and awareness should be provided in the areas of: 1) Fall Hazards 2) Caught-In and Between Hazards 3) Struck-By Hazards and 4) Electrocution Hazards.

35) TOXIC SUBSTANCES/FEDERAL HAZARD COMMUNICATION "RIGHT TO KNOW AND UNDERSTAND" REGULATIONS

The Federal "Right to Know and Understand" Regulation (also known as the Hazard Communication / Globally Harmonized System of Classification and Labeling of Chemicals (GHS) implemented by OSHA requires employers to inform their employees of any toxic substances to which they may be exposed in the workplace, and to provide training in safe chemical storage, labeling, handling practices and emergency procedures.

Accordingly, the Contractor(s) performing under this contract shall be required to provide two (2) complete sets of Safety Data Sheets (SDS) to each of the departments utilizing the awarded products. This information should be provided at the time when the initial delivery is made, on a department-by-department basis. If performing work on site, it is preferred that each contractor bring their hazardous communication program and SDS in a binder labeled with the contractor's name and identified as a Hazardous Communication/GHS Program. Upon leaving the jobsite and the removal of all hazardous materials, contractors shall take their information with them.

The transport, use, and disposal of toxic substances must be conducted in accordance with DEP/EPA regulations.

Upon request, contractors working at St. Johns County facilities or jobsites will be given access to the written Hazardous Communication Program and informed where to locate SDS.

36) TEMPORARY TRAFFIC CONTROL (TTC) / MAINTENANCE OF TRAFFIC (MOT) (APPLICABLE ONLY WITH CONSTRUCTION SERVICES)

The Contractor must comply with the Florida Department of Transportation's (DOT) Temporary Traffic Control (TTC) and the Manual on Uniform Traffic Control Devices (MUTCD) in the planning, development, design, implementation, operation, enforcement and inspection of work zone related transportation management and temporary traffic control on streets and highways within the State Highway System right-of-way. Training in the Advanced, Intermediate, and Flagger categories must be completed by the Contractor for their employee when performing right-of-way work while under contract with St. Johns County. Contractor employees must wear a Class II (daytime), Class III (night/limited visibility) high-visibility safety vest or equivalent high-visibility apparel while performing any work that places them in the right-of-way.

37) OWNER DIRECT PURCHASES

St. Johns County reserves the right to Owner Direct Purchase materials or equipment in accordance with Section 6.2.12 of the Policy, or implement other means in order to achieve related sales tax and other cost savings.

38) PUBLIC RECORDS

- A. The cost of reproduction, access to, disclosure, non-disclosure, or exemption of records, data, documents, and/or materials, associated with this Agreement shall be subject to the applicable provisions of the Florida Public Records Law (Chapter 119, Florida Statutes), and other applicable State and Federal provisions. Access to such public records, may not be blocked, thwarted, and/or hindered by placing the public records in the possession of a third party, or an unaffiliated party.
- B. In accordance with Florida law, to the extent that Contractor's performance under this Contract constitutes an act on behalf of the County, Contractor shall comply with all requirements of Florida's public records law. Specifically, if Contractor is expressly authorized, and acts on behalf of the County under this Agreement, Contractor shall:

- (1) Keep and maintain public records that ordinarily and necessarily would be required by the County in order to perform the Services;
 - (2) Upon request from the County's custodian of public records, provide the County with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost as provided in Chapter 119, Florida Statutes, or as otherwise provided by law;
 - (3) Ensure that public records related to this Agreement that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by applicable law for the duration of this Agreement and following completion of this Agreement if the Contractor does not transfer the records to the County; and
 - (4) Upon completion of this Agreement, transfer, at no cost, to the County all public records in possession of the Contractor or keep and maintain public records required by the County to perform the Services.
- C. If the Contractor transfers all public records to the County upon completion of this Agreement, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of this Agreement, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the County, upon request from the County's custodian of public records, in a format that is compatible with the County's information technology systems.
- D. Failure by the Contractor to comply with the requirements of this section shall be grounds for immediate, unilateral termination of this Agreement by the County.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO ITS DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT: 500 San Sebastian View, St. Augustine, FL 32084, Phone: (904) 209-0805, Email: publicrecords@sjcfl.us

END OF SECTION

**OFFICIAL COUNTY BID FORM
WITH ATTACHMENTS**

BID NO: 23-10

**OFFICIAL COUNTY BID FORM
ST. JOHNS COUNTY, FLORIDA**

TO: THE BOARD OF COUNTY COMMISSIONERS OF ST. JOHNS COUNTY, FLORIDA

DATE SUBMITTED: _____

BID PROPOSAL OF

Full Legal Company Name of Bidder

Mailing Address

Telephone Number

Fax Number

Bidders: Having become familiar with requirements of the project, and having carefully examined the Bid Documents entitled for **Bid No: 23-10, CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK** in St. Johns County, Florida, the undersigned proposes to furnish all materials, labor and equipment, supervision and all other requirements necessary to complete the required Work for the following Total Bid Price:

LUMP SUM BID PRICE: All cost for all labor, materials, equipment, supplies, taxes, other miscellaneous costs, profit, and overhead, both direct and indirect, for completion of all Work except for those Bid Items herein listed separately.

\$ _____
Lump Sum Bid Price (Written in Numerals)

\$ _____ /Dollars
Lump Sum Bid Price (Written in Words)

ALLOWANCE: Allowance for FPL Service to Site and Coordination of New Electrical – \$ 20,000.00

TOTAL BID PRICE: Lump Sum Bid Price + Allowance

\$ _____
Total Bid Price (Written in Numerals)

\$ _____ /Dollars
Total Bid Price (Written in Words)

Bidder shall insert the Lump Sum Bid Price and the Total Bid Price above, in numerals and in words. The Total Bid Price shall consist of the lump sum price for the project and allowance.

During the preparation of the Bid, the following addenda, if any, were received:

No.: _____	Date Received: _____	No.: _____	Date Received: _____
No.: _____	Date Received: _____	No.: _____	Date Received: _____
No.: _____	Date Received: _____	No.: _____	Date Received: _____

The Undersigned hereby declares that no person or persons, firm, or corporation, other than the undersigned are interested in this submitted Bid, as principals, and that this Bid is made without collusion with any person, firm, or corporation, and the undersigned has carefully examined, is thoroughly familiar with, and has incorporated the requirements and specifications of the Bid Documents in this submitted Bid.

The Undersigned certifies that a full examination of the locations of the required work and the sources of supply of materials has been completed, and agrees to furnish all necessary labor, equipment and materials, fully understanding that any quantities shown herein are approximate only, and will fully complete all work in accordance with all requirements specified in the Bid Documents.

The Undersigned declares that the statements and representations made in this Bid are true in every respect and that the Bid is, in all respects, fair and made without collusion or fraud, and that no member of the St. Johns County Board, or any other agent or employee of the County, directly or indirectly, is interested in this Bid or in any profits expected to accrue therefrom.

CORPORATE/COMPANY

Full Legal Company Name: _____ (Seal)

By: _____
Signature of Authorized Representative (Name & Title typed or printed)

Address: _____

Telephone No.: (____) _____ Fax No.: (____) _____

Email Address for Authorized Company Representative: _____

Federal I.D. Tax Number: _____ DUNS #: _____
(If applicable)

INDIVIDUAL

Name: _____
(Signature) (Name typed or printed) (Title)

Address: _____

Telephone No.: (____) _____ Fax No.: _____

Email Address: _____

Federal I.D. Tax Number: _____

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

ATTACHMENT "A"
ST. JOHNS COUNTY AFFIDAVIT

Bidder hereby issues the sworn statement below, which must be incorporated into the submitted Bid. This sworn statement shall be an affidavit in the following form, executed by an officer of the firm, association, or corporation submitting the Bid, and shall be sworn to before a person who is authorized by law to administer oaths.

STATE OF _____

COUNTY OF _____

The Undersigned authority, _____ ("Affiant"), who being duly sworn, deposes and states that he/she is the _____ (Title) of the firm of _____ (Full Legal Name of Bidder) submitting the attached Bid for the completion of work specified in the Bid Documents for Bid No: 23-10 CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK, in St. Johns County, Florida.

The Affiant further states that no more than one Bid will be submitted in response to the above IFB from the Affiant, the bidding firm, or corporation under the same or different name, and that such Bidder has no financial interest in any other bidding firm submitting a Bid in response to the above IFB. That neither the Affiant, his/her firm, association, nor corporation has either directly or indirectly entered into any agreement, participated in any collusion, nor otherwise taken any action in restraint of free competitive bidding in connection with this Bid. Furthermore, neither the Bidder nor any of its officers are barred from participating in public contract lettings in the State of Florida or any other state.

DATED this _____ day of _____, 20____.

Signature of Affiant

Printed Name & Title of Affiant

Full Legal Name of Bidder

Sworn to (or affirmed) and subscribed before me by means of physical presence or online notarization, this _____ day of _____, 20____, by Affiant who is personally known to me or has produced _____ as identification. Type and number of I.D. produced: _____.

Notary Public
My Commission Expires: _____

BIDDER MUST EXECUTE AND ATTACH THIS AFFADAVIT TO SUBMITTED BID.

ATTACHMENT "B"
CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the corporation named as Principal in the foregoing; that _____, (Authorized Representative of Bidder) who signed the Bond(s) on behalf of the Bidder, was then _____ (Title) of said corporation; that I know his/her signature; and his/her signature thereto is genuine; and that said bond(s) was duly signed, sealed, and attested to on behalf of said corporation by authority of its governing body.

Signature of Secretary

Full Legal Name of Bidder

STATE OF _____

COUNTY OF _____

Before and by me, a Notary Public duly commissioned, qualified and acting personally, being duly sworn upon oath by means of physical presence or online notarization, _____ (Authorized Representative of Bidder) states that he/she is authorized to execute the foregoing Bid Bond on behalf of the Bidder named therein in favor of St. Johns County, Florida.

Subscribed and sworn to me on this ___ day of _____, 2022, by the Authorized Representative of Bidder, who is personally known to me or has produced _____ as identification. Type and Number of I.D. produced: _____.

Notary Public
My Commission Expires: _____

(Attach Power of Attorney to original Bid Bond and Financial Statement of Surety Company)

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

**ATTACHMENT "C"
LICENSE / CERTIFICATION LIST**

Bidder shall list all **current** licenses and certifications held by the firm and/or Key Personnel of the Bidder. Failure to demonstrate any required licenses or certifications which are stated as a minimum qualification, shall be grounds for disqualification and removal from further consideration. A copy of each license or associated document(s) shall be attached to this form and submitted with the Bid.

License Name	License #	Issuing Agency	Expiration Date
State of Florida Business License			
FL Certified General Contractor's License			
FL Certified Electrical Contractor's License			

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

ATTACHMENT "D"
LIST OF PROPOSED SUB-CONTRACTORS / SUPPLIER LIST

Bidder shall submit any and all proposed sub-contractors and major material suppliers below for review/approval by the County. Bidder shall attach any and all licenses or certifications required for the proposed sub-contractor to perform the intended portion of the Work as stated below. All subcontractors and major materials suppliers are subject to approval of County.

Company Name	Division/Discipline	Primary Contact Name	Contact Number and Email Address

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

ATTACHMENT "F"
CONTRACTOR'S QUALIFICATIONS FORM

Bidder certifies, and has attached to the submitted Bid proof of current and valid licensure to perform the Work in the State of Florida and St. Johns County, and as specified in the Bid Documents. Any material misrepresentation, as determined by the County, shall result in disqualification.

By: _____

Full Legal Name of Bidder

 Authorized Representative Signature

 Date

Contractor's Project Experience

Bidder must be fully licensed to do business in the State of Florida and hold a current Certified General Contractor's or Certified Electrical Contractor's license at the time the bid is due. Bidders must have successfully completed, as a Prime Contractor or Sub-Contractor, at least three (3) projects, in the past five (5) years, of similar type, size with electrical work and dollar value of the project described herein.

Contractor's Project Experience Details	
Project No. 1	
Name of Project:	
Project Manager Name:	
Superintendent Name:	
Project Description:	
Owner Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Engineer/Architect Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Contract Dates	
Started:	

Contractor's Project Experience Details	
Project No. 1	
Original Contractual Completion:	
Final Contractual Completion:	
Actual Completion:	
Contract Value	
Original Contract Value:	
Final Contract Value:	
Value of Change Orders to Date:	
Value of Outstanding Claims to Date:	
Bonding Company Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Major Subcontractor Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	

Contractor's Project Experience Details Project No. 2	
Name of Project:	
Project Manager Name:	
Superintendent Name:	
Project Description:	
Owner Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Engineer/Architect Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Contract Dates	
Started:	
Original Contractual Completion:	
Final Contractual Completion:	
Actual Completion:	
Contract Value	
Original Contract Value:	
Final Contract Value:	
Value of Change Orders to Date:	
Value of Outstanding Claims to Date:	
Bonding Company Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	

**Contractor's Project Experience Details
Project No. 2**

Major Subcontractor Information

Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	

Contractor's Project Experience Details Project No. 3	
Name of Project:	
Project Manager Name:	
Superintendent Name:	
Project Description:	
Owner Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Engineer/Architect Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Contract Dates	
Started:	
Original Contractual Completion:	
Final Contractual Completion:	
Actual Completion:	
Contract Value	
Original Contract Value:	
Final Contract Value:	
Value of Change Orders to Date:	
Value of Outstanding Claims to Date:	
Bonding Company Information	
Name:	
Address:	
Contact Person:	
Telephone Number:	

**Contractor's Project Experience Details
Project No. 3**

Major Subcontractor Information

Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	
Name:	
Address:	
Contact Person:	
Telephone Number:	

ATTACHMENT "G"
DRUG-FREE WORKPLACE FORM

The undersigned firm, in accordance with Florida Statute 287.087 hereby certifies that

_____ does:

Name of Firm

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the danger of drug abuse in the workplace, the business' policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, employee assistance programs and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the contractual services that are described in St. Johns County's request for proposals to provide bond underwriter services a copy of the statement specified in paragraph 1.
4. In the statement specified in paragraph 1, notify the employees that, as a condition of working on the contractual services described in paragraph 3, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Florida Statute 893, as amended, or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction or plea.
5. Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community by, any employee who is so convicted.
6. Consistent with applicable provisions with State or Federal law, rule, or regulation, make a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs 1 through 5.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

Signature

Date

ATTACHMENT "H"
CLAIMS, LIENS, LITIGATION HISTORY
(Complete and Submit)

1. Within the past 7 years, has your organization filed suit or a formal claim against a project owner (as a prime or subconsultant) or been sued by or had a formal claim filed by an owner, subconsultant or supplier resulting from a construction dispute? Yes ___ No ___ If yes, please attach additional sheet(s) to include:

Description of every action Captions of the Litigation or Arbitration

Amount at issue: _____ Name (s) of the attorneys representing all parties:

Amount actually recovered, if any: _____

Name(s) of the project owner(s)/manager(s) to include address and phone number:

2. List all pending litigation and or arbitration.

3. List and explain all litigation and arbitration within the past seven (7) years - pending, resolved, dismissed, etc.

4. Within the past 7 years, please list all Liens, including Federal, State and Local, which have been filed against your Company. List in detail the type of Lien, date, amount and current status of each Lien.

5. Have you ever abandoned a job, been terminated or had a performance/surety bond called to complete a job?

Yes _____ No _____ If yes, please explain in detail:

6. For all claims filed against your company within the past five (5) years, have all been resolved satisfactorily with final judgment in favor of your company within 90 days of the date the judgment became final? Yes ___ No ___ If no, please explain why?

7. List the status of all pending claims currently filed against your company:

Liquidated Damages

1. Has a project owner ever withheld retainage, issued liquidated damages or made a claim against any Performance and Payment Bonds? Yes _____ No _____ If yes, please explain in detail:

(Use additional or supplemental pages as needed)

ATTACHMENT "I"
E-VERIFY AFFIDAVIT

STATE OF _____
COUNTY OF _____

I, _____ ("Affiant"), being duly authorized by and on behalf of _____ ("Bidder") hereby swears or affirms as follows:

1. Bidder understands that E-Verify, authorized by Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), is a web-based system provided by the United States Department of Homeland Security, through which employers electronically confirm the employment eligibility of their employees.
2. For the duration of Contract No. _____ (hereinafter "Agreement"), in accordance with section 448.095, F.S., Bidder shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Bidder and shall expressly require any subcontractors performing work or providing services pursuant to the Agreement to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor.
3. Bidder shall comply with all applicable provisions of section 448.095, F.S., and will incorporate in all subcontracts the obligation to comply with section 448.095, F.S.
4. Bidder understands and agrees that its failure to comply with all applicable provisions of section 448.095, F.S. or its failure to ensure that all employees and subcontractors performing work under the Agreement are legally authorized to work in the United States and the State of Florida constitute a breach of the Agreement for which St. Johns County may immediately terminate the Agreement without notice and without penalty. The Bidder further understands and agrees that in the event of such termination, Bidder shall be liable to the St. Johns County for any costs incurred by the St. Johns County resulting from Bidder's breach.

DATED this _____ day of _____, 20____.

Signature of Affiant

Printed Name & Title of Affiant

Full Legal Name of Bidder

Sworn to (or affirmed) and subscribed before me by means of physical presence or online notarization, this _____ day of _____, 20____, by Affiant, who is personally known to me or has produced _____ as identification.

Notary Public
My Commission Expires: _____

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

ATTACHMENT "J"
LOCAL PREFERENCE

Any Bidder that meets the criteria of a Local Business, in accordance with Section 16.3 of the SJC Purchasing Policy, must complete and sign this form to indicate their qualification to receive local preference. All required documentation to demonstrate that the Bidder meets all qualification criteria as a local business must be included in the submitted Bid.

In order to qualify for local preference Respondent must provide sufficient documentation to demonstrate:

- A physical, brick and mortar place of business located within the geographic boundaries of St. Johns County, with a valid mailing address, in an area zoned for the conduct of such business, from which the Supplier has operated or performed business on a day-to-day basis that is substantially similar to those specified in the solicitation for a period of at least one (1) calendar year prior to the issuance of the solicitation. No PO Boxes shall be accepted.
- Local address above must be registered as the Supplier’s principal place of business with the Divisions of Corporations Florida Department of State for at least one (1) calendar year prior to the issuance of this BID.
- Submit current and valid Local Business Tax Receipt, and must have Local Business Tax Receipts issued by the St. Johns County Tax Collector from at least one (1) calendar year prior to issuance of this BID.
- Must qualify as a local business as shown above **AND** self-perform a minimum of fifty percent (50%) of all services under the awarded Contract, or must have a minimum of fifty percent (50%) of all services performed by qualified local businesses as sub-contractors or sub-consultants.

If qualifying for local preference through the use of qualified local sub-contractors, Bidder must submit all required documentation to demonstrate the above requirements of all proposed sub-contractors and sub-consultants for local preference consideration with the submitted proposal.

Bidder is a Local Business as defined in Section 16.3, SJC Purchasing Policy _____

Bidder is **not** a Local Business as defined in Section 16.3, SJC Purchasing Policy _____

Signature – Authorized Respondent Representative

Printed Name & Title

Date of Signature

BID NO: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK

BID BOND

STATE OF _____

COUNTY OF _____

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned _____ (Full Legal Name of Bidder) as Principal, at _____ (Address) and _____ as Surety, hereby hold and firmly bind ourselves, our heirs, executors, administrators, and successors and assigns, jointly and severally, by these presents, unto St. Johns County, Florida, as Obligee, in the penal sum of five percent (5%) of the Total Bid Price, or _____ Dollars (\$ _____) lawful money of the United States.

WHEREAS, the Principal has submitted a Bid for **Bid No: 23-10; CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK** dated _____, 2022:

- (a) If the Principal shall not withdraw said Bid within ninety (90) days of the opening of Bids by the Owner, and shall enter into a written Contract with the County within ten (10) business days after prescribed forms are provided to Principal for signature, in accordance with the Bid Documents, and give Bond with good and sufficient Surety or Sureties, as may be required, for the faithful performance and proper fulfillment of such Contract, then the above obligations shall be void and of no effect, otherwise to remain in full force and effect.
- (b) In the event of the withdrawal of said Bid within the period specified, or the failure to enter into such Contract and give such Bond within the time specified, the Principal shall pay the County the lesser of the following amounts: 1) the amount of this bond as hereinabove set forth, of 2) the difference between the amount specified in the Principal's Bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid including the administrative costs to effect such contract, then this obligation shall be void and of no effect, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the above bound parties have signed and sealed this instrument under their several seals, on this _____ day of _____, 20____, the name and corporate seal of Principal and Surety being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WITNESSES:

PRINCIPAL:

Full Legal Name of Principal

Signature of Authorized Officer

Printed Name & Title of Signing Officer

Mailing Address

City, State, Zip Code

Email Address of Signing Officer

SURETY:

Full Legal Name of Surety

Signature of Authorized Surety Agent

Mailing Address of Local Agency


City, State, Zip Code

Email Address of Surety Agent

Attorney-In-Fact Signature

SEALED BID MAILING LABEL

SEALED BID • DO NOT OPEN	
IFB NO.:	23-10
IFB TITLE:	CR 208 WATER BOOSTER PUMP STATION - ELECTRICAL WORK
SUBMITTAL DEADLINE:	By 2:00PM – December 7, 2022
SUBMITTED BY:	Company Name
	Company Address
	Company Address
DELIVER TO:	St. Johns County Purchasing Division 500 San Sebastian View St. Augustine FL 32084



END OF DOCUMENT



Technical Specifications

for

CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

SJCUD Project No.: 4488-56302-6264-56302

Mott MacDonald Project No. 502100379-007

**Electrical Contractor Package
October 2022**

M

M

**MOTT
MACDONALD**

10245 Centurion Parkway North, Suite 320

Jacksonville, FL 32256

Tel: (904) 203-1090

EB-0000155

CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

ELECTRICAL CONTRACTOR TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 1

GENERAL REQUIREMENTS

01010	Summary of Work
01014	Construction Sequence
01015	Measurement and Payment
01050	Project Controls (Surveying)
01110	Environmental Protection Procedures
01200	Project Meetings
01300	Submittals
01310	Construction Scheduling
01370	Schedule of Values & Schedule of Assets
01390	Construction Photographs and Videotaping
01410	Testing and Testing Laboratory Services
01465	Equipment Testing and Startup
01500	Temporary Facilities
01501	Control of Work
01580	Project Identification and Signs
01600	Delivery, Storage, and Handling
01700	Contract Closeout
01710	Cleaning
01720	Project Record Documents
01730	Operating and Maintenance Data
01740	Warranties

DIVISION 2

SITE WORK

02100	Site Preparation
02140	Dewatering
02220	Excavating, Backfilling, and Grading for Structures
02221	Trenching, Bedding, and Backfill for Pipes, and Site Earthwork
02282	Termite Control
02400	Graded Aggregate Base
02500	Superpave Asphalt Concrete
02605	Precast Concrete Structures
02610	Site Drainage
02910	Sodding

DIVISION 3

CONCRETE

03300	Cast-In-Place Concrete
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DIVISION 4

MORTAR AND MASONRY

04230	Reinforced Unit Masonry
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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

ELECTRICAL CONTRACTOR TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 5 METALS

05120	Structural Steel
05210	Steel Joists
05310	Steel Deck
05500	Metal Fabrications

DIVISION 6 CARPENTRY

06100	Rough Carpentry
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DIVISION 7 THERMAL AND MOISTURE PROTECTION

07131	Self-Adhering Sheet Waterproofing
07132	Vertical Sub Surface Waterproofing
07133	Horizontal Sub Surface Waterproofing
07190	Water Repellent
07210	Building Insulation
07265	Underslab Vapor Protection
07270	Air and vapor barrier system
07552	(SBS) Modified Bituminous Membrane Roofing
07600	Flashing and Sheet Metal
07625	Sheet Metal Gutters and Downspouts
07710	Roof Specialties
07720	Roof Hatch
07900	Joint Sealers

DIVISION 8 DOORS AND WINDOWS

08110	FRP Doors and Panels
08331	Overhead Coiling Doors
08710	Door Hardware
08800	Glazing

DIVISION 9 FINISHES

09110	Non-Load-Bearing Steel Framing
09260	Gypsum Wallboard and Sheathing Assemblies
09512	Acoustical Tile Ceilings
09650	Resilient Base
09900	Painting

DIVISION 10 SPECIALTIES

10200	Louvers and Vents
10520	Fire-Protection Specialties

CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

ELECTRICAL CONTRACTOR TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 11	EQUIPMENT
11214	Vertical Turbine Can Pumps (Owner Furnished Equipment)
DIVISION 12	NOT USED
DIVISION 13	SPECIAL CONSTRUCTION
13216	Wire Wrapped Prestressed Concrete Tank
DIVISION 15	MECHANICAL
15060	Hangers and Supports HVAC
15064	Plastic Pipe and Fittings
15066	Stainless Steel Pipe and Fittings
15072	Ductile Iron Pipe and Fittings
15076	HVAC Piping and Equipment Identification
15081	Piping Insulation
15090	Pipe Support Systems
15100	Valves and Appurtenances
15120	Piping Specialties
15141	Disinfection
15506	Refrigerant Piping Systems
15738	Split System Heat Pumps Units
15810	Ductwork and Duct Accessories
15815	Duct Insulation
15830	Fans
15910	HVAC Instrumentation and Control Devices
15951	Testing, Adjusting and Balancing
DIVISION 16	ELECTRICAL
16000	Electrical Work - General
16015	Electrical Systems Analysis
16150	Electric Motors
16200	Electrical Generation Equipment (Owner Furnished Equipment)
16400	Electrical Apparatus
16600	Grounding System
16900	Instrumentation and Controls

APPENDICES

Appendix A – Geotechnical Report
Appendix B – Permits
Appendix C – Piping and Fitting Pre-Purchase Quantities

SECTION 01010

SUMMARY OF WORK

PART 1- GENERAL

1.01 LOCATION OF WORK

- A. The work for this Contract is located on property owned by St. Johns County Utility Department (SJCUD) at 3575 Agriculture Center Drive St. Augustine, Florida, within County easements, and within St. Johns County (SJC) right-of-ways (ROWS).

1.02 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required to access the site, construct a new 3.0 MG (nominal volume; 2.8 MG useable volume) potable water ground storage tank, install the water main and reclaimed water main, and construct the new booster pump station and electrical building as shown on the Drawings and as specified herein.
 - 1. A geotechnical investigation and report was completed and is attached in **Appendix A**.
- B. The project will be executed through three separate contracts – Contract 1 includes the construction of the prestressed concrete ground storage tank by the TANK CONTRACTOR, Contract 2 includes electrical and I&C procurement and installation by the ELECTRICAL CONTRACTOR, and Contract 3 includes the construction of the booster pump facility and all other associated work as shown on the Drawings. The CONTRACTOR will be required and should include in their base bid all costs associated with coordinating their work with the TANK CONTRACTOR and ELECTRICAL CONTRACTOR including scheduling of work that is to be completed on the tanks after it is constructed and sequencing the ELECTRICAL CONTRACTOR's work with their own.
- C. The following equipment and materials have been pre-purchased by the OWNER, but it is the responsibility of the CONTRACTOR, TANK CONTRACTOR, and/or ELECTRICAL CONTRACTOR to coordinate with each manufacturer/supplier, ENGINEER and OWNER to receive, unload, install, and test.
 - 1. Four vertical turbine can pumps
 - 2. PVC and ductile iron pipe and fittings. (A detailed bill of materials and drawing showing what piping was pre-purchased is provided in **Appendix C**). The CONTRACTOR or TANK CONTRACTOR shall be responsible for providing all other piping, fittings, sleeves and valves as required on the project.
 - 3. Generator and fuel tank including the automatic transfer switch.
- D. The following items will be the responsibility of the TANK CONTRACTOR but is not necessarily limited to the following:
 - 1. Mobilization/demobilization, general requirements, bonds, and insurance
 - 2. Site work
 - a. Clearing and grubbing for the entire site property
 - b. Excavation of pond from existing grade and import of structural fill for GST construction
 - c. Sedimentation and erosion control measures
 - 3. 3.0 MG nominal volume GST including all appurtenances as described in Section 13216

SECTION 01010

SUMMARY OF WORK

4. Installation of all “under” piping related to the GST. **Appendix C** provides a summary of what piping and fittings have been pre-purchased by the OWNER and will be provided to the TANK CONTRACTOR for installation. All other piping related to the tank shall be provided by the TANK CONTRACTOR.
 5. Unloading, storage, and installation of any piping and fittings pre-purchased by the OWNER for construction of the tank
 6. All materials testing required during construction
 7. All permits necessary to complete the work
 8. Coordination efforts with CONTRACTOR and ELECTRICAL CONTRACTOR
- E. The following items will be the responsibility of the CONTRACTOR but is not necessarily limited to the following:
1. Mobilization/demobilization, general requirements, bonds, and insurance
 2. Site work
 - a. Import of structural and common fill for the site (outside of the tank area), final grading, seeding, and sodding
 - b. Sedimentation and erosion control measures
 - c. Paving and sidewalks
 - d. Stormwater improvements including stormwater inlets, piping, wet detention pond, piping and structures
 - e. Landscaping, fencing, access gates, and irrigation system
 - f. Overflow/drain vault for the GST and the concrete curb and gravel around the GST
 3. Yard piping including yard valves, fittings, and connections to piping
 - a. New reclaimed water piping from CR-208 ROW northwest of the project site, through the utility easement and the site, and ending in the Agriculture Center Drive ROW. The new reclaimed water main will be capped in CR-208 and Agriculture Center Drive for future connections.
 - b. New finished water supply from the existing water main within CR-208 ROW northwest from the project site to an existing water main within Agriculture Center Drive ROW southeast of the project site. Piping installation required by the CONTRACTOR versus the TANK CONTRACTOR is reflected on the drawings. CONTRACTOR shall coordinate with the TANK CONTRACTOR for tank fill and pump suction connections.
 4. New split face cavity wall booster pump station building including the following:
 - a. Electrical room
 - b. Pump room including four vertical turbine can pumps
 - c. Process piping, valves, and appurtenances
 - d. HVAC system including fans, louvers, and associated duct work
 5. Concrete pads for generator and fuel storage tank, tank fill and discharge flow meter concrete pads, HVAC and electrical equipment pads and concrete curb wireway.
 6. Unloading, storage, and installation of any piping and equipment pre-purchased by the OWNER
 7. All performance and materials testing required during construction
 8. All permits necessary to complete the work
 9. Coordination efforts with TANK CONTRACTOR and ELECTRICAL CONTRACTOR

SECTION 01010

SUMMARY OF WORK

- F. The following items will be the responsibility of the ELECTRICAL CONTRACTOR to purchase, unload, store, install, and test. It is the responsibility of the CONTRACTOR to coordinate with the ELECTRICAL CONTRACTOR regarding schedule and general coordination efforts to provide a fully functioning system.
1. Mobilization/demobilization, general requirements, bonds, and insurance
 2. New electrical service including coordination with FP&L
 3. All instrumentation and electrical components including conduit, wires, cabling, level instruments, level floats, flow meters, and other field instruments for a fully functioning system
 4. All programming for the control panel and SCADA system
 5. For the new booster pump station:
 - a. Instrumentation and control panel and PLC control system equipment
 - b. Motor control centers and VFDs
 - c. Low voltage power distribution equipment
 - d. Lighting and receptacles
 - e. Lightning protection system
 6. Unloading, storage, and installation of electrical equipment pre-purchased by the OWNER
 7. All performance and equipment testing required during construction
 8. All permits necessary to complete the work
 9. Coordination efforts with CONTRACTOR and TANK CONTRACTOR

1.03 PERMITS AND REGULATIONS

- A. Each CONTRACTOR'S responsibility includes compliance with federal, state, and local regulations which in any way affect the work or implementation of the Project.
1. Copies of permits already obtained by the ENGINEER and OWNER are attached in **Appendix B**.

1.04 WORK BY OTHERS

- A. It is anticipated that work will be completed by others on the property prior to construction. CONTRACTOR shall coordinate with the OWNER and the TANK CONTRACTOR for construction access and schedule. The CONTRACTOR shall include in their bid price coordination efforts for work within the site alongside the TANK CONTRACTOR.
- B. An ELECTRICAL CONTRACTOR will be contracted with SJCUD as part of execution of this Contract. The CONTRACTOR shall coordinate with the OWNER and ELECTRICAL CONTRACTOR for coordination of work efforts and schedule.

1.05 WORK DESCRIPTION AND SEQUENCE

- A. Perform work in a sequence to ensure completion of the Work in the Contract Time. Completion dates of the various stages shall be in accordance with the approved construction schedule submitted by the CONTRACTOR.
- B. The CONTRACTOR shall submit a written schedule to the ENGINEER for approval prior to commencing work. Completion dates of the various stages shall be in accordance with the approved construction schedule submitted by the CONTRACTOR.

SECTION 01010

SUMMARY OF WORK

- C. Specific schedule constraints shall be outlined in Section 01014 Construction Sequence.
- D. CONTRACTOR'S Substantial Completion and Final Completion: The project will include two separate major milestones including:
 - 1. Substantial completion: Requires a five-day consecutive 24-hour day period of successful operation of the system as per Section 01465.
 - 2. Final completion: The last stage of construction shall be final construction and shall include the final remaining items subject to ENGINEER'S approval as well as all items listed in Section 01700, Contract Closeout. A total of 30 days has been allotted for final completion after substantial completion.
- E. TANK CONTRACTOR'S Substantial and final completion will be granted based on completion of all work related to the tank construction, testing, and acceptance.

1.06 CONTRACTOR'S USE OF PREMISES

- A. CONTRACTOR shall have complete use of the premises for the performance of the Work. CONTRACTOR shall coordinate activities with any other CONTRACTOR who will be performing work in the same general area.
 - 1. Coordination of work within the site will be required with the TANK CONTRACTOR and ELECTRICAL CONTRACTOR.
- B. CONTRACTOR shall limit the use of the premises for his/her Work and for storage to allow for:
 - 1. Work by other contractors
 - 2. Public Use
- C. Coordinate uses of premises with OWNER and other CONTRACTORS. The CONTRACTOR will have to work with the TANK CONTRACTOR and ELECTRICAL CONTRACTOR for location of trailers, storage of materials, and coordination of work efforts.
- D. CONTRACTOR shall assume full responsibility for security of all his/her and his/her subcontractor's materials and equipment stored on the site.
- E. If directed by the OWNER or ENGINEER, move any stored items which interfere with operations of OWNER or other CONTRACTORS.
- F. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.07 CONTRACTOR'S STAGING, STORAGE, AND STOCKPILE AREA

- A. Limited areas on the site are available for the CONTRACTOR's staging, storage, stockpile, and trailer areas. The available areas for the staging, storage, and trailers area at the project site will be agreed upon by the CONTRACTOR and OWNER at the start of construction. Should the CONTRACTOR require additional space for trailers or storage this shall be obtained by them and at their cost or included in the base bid.

SECTION 01010

SUMMARY OF WORK

1.08 SECURITY

- A. The CONTRACTOR shall ensure that each employee, representative, Supplier, and others acting for the CONTRACTOR use designated staging areas and parking areas.
- B. The CONTRACTOR shall employ watchmen on the work when necessary and shall erect and maintain strong and suitable barriers and lights as necessary to prevent the happening of any accident to a person, to the property, to the work, and to any materials stored onsite.
- C. The CONTRACTOR shall employ any additional temporary fencing and gates to adequately protect the work and shall provide all access required by the ENGINEER and the OWNER.
- D. Stored materials shall be kept in a neat and orderly manner. Materials that are subject to deteriorations by exposure to the sun, rain, or other elements shall be kept adequately covered and protected. Refer to Section 01600 for additional details.
- E. The CONTRACTOR shall be responsible for protecting all stored materials and the project site safe from theft and vandalism. The CONTRACTOR shall employ security personnel and erect additional fences as necessary at no additional cost to the OWNER.

1.09 BASIS OF DESIGN AND MODIFICATIONS FOR ALTERNATE EQUIPMENT

- A. Drawings indicate the extent and general arrangement of the Work. If any departures from the Drawings are deemed necessary by the CONTRACTOR and/or the ELECTRICAL CONTRACTOR to accommodate the materials and equipment he proposes to furnish, details of such departures and reasons therefore shall be submitted. No such departures shall be made without the prior written approval of the ENGINEER and OWNER. Approved changes shall be made without additional cost to the OWNER.
- B. The specific equipment proposed for use by the CONTRACTOR and/or the ELECTRICAL CONTRACTOR on the project may require changes to structures, auxiliary equipment, piping, electrical, mechanical, controls, or other work to provide a completely satisfactory operating installation. The CONTRACTOR shall submit to the ENGINEER for approval all necessary Drawings and details showing such changes to verify conformance with the overall project structural and architectural requirements and overall project operating performance. The lump sum bid price shall include all costs in connection with the preparation of new drawings and details and all changes in construction work to accommodate the proposed equipment, including increase in the costs.
- C. In the event that the ENGINEER is required to provide additional engineering services as a result of substitution of materials or equipment, which are not listed as "or equal", or changes by the CONTRACTOR and/or the ELECTRICAL CONTRACTOR in dimension, weight, power requirements, etc. of the equipment accessories furnished, or if the ENGINEER is required to examine and evaluate any changes proposed by the CONTRACTOR for the convenience of the

SECTION 01010

SUMMARY OF WORK

CONTRACTOR, then the ENGINEER'S charges in connection with such additional services shall be charged to the CONTRACTOR by the OWNER.

PART 2- GENERAL PRODUCTS (NOT USED)

PART 3- GENERAL EXECUTION (NOT USED)

END OF SECTION 01010

SECTION 01014

CONSTRUCTION SEQUENCE

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. This project consists of work on the OWNER's property located at 3575 Agriculture Center Drive St. Augustine, Florida, within easements owned by the County, and within SJC right-of-way. Work will include construction of the booster pump station building, ground storage tank, large diameter water and reclaimed water mains and additional items as shown on the Drawings. All coordination of phasing and sequencing of construction shall be approved and confirmed in writing by the OWNER and ENGINEER to be considered valid.
- B. The project will be executed in with three separate contracts as noted in Section 01010 – Summary of Work. Contract 1 includes the construction of the prestressed concrete ground storage tank by the TANK CONTRACTOR, Contract 2 includes electrical and I&C procurement and installation by the ELECTRICAL CONTRACTOR, and Contract 3 includes the construction of the booster pump facility and all other associated work as shown on the Drawings. Additionally, the OWNER will be pre-purchasing the vertical turbine pumps, PVC and ductile iron pipe and fittings, generator, fuel tank, and ATS as described herein and as shown on the Drawings. The CONTRACTOR will be required and should include in his base bid all costs associated with coordinating his work with the TANK CONTRACTOR and ELECTRICAL CONTRACTOR including scheduling of work that is to be completed on the tanks after it is constructed, installation of electrical equipment, and coordination and testing of electrical equipment. The tank construction is scheduled to be substantially complete by end of November 2023.
- C. The construction progress schedule required under Section 01310 shall reflect the construction sequences and constraints presented in this section.
- D. See Sections 01465 and 01730 for additional requirements and Division 11 through 16 on specific equipment startup and testing requirements.
- E. The OWNER reserves the right to postpone connections to existing utilities due to operational and/or weather-related concerns.

1.02 DEFINITIONS AND TERMS

- A. Construction Scheduling Constraints: Constraints for performance of the Work, required because of special sequencing with other parts of the Work, OWNER system operation requirements, calendar time constraints and special testing, commissioning and procedures are identified in this Section. These constraints are in addition to the standard procedures such as maintaining working drawings, testing, commissioning, training, etc. These constraints shall be included in the CONTRACTOR's progress schedule.
- B. Special Conditions: Certain special conditions related to performance of the Work are identified in this Section and shall be included in the CONTRACTOR's progress schedule.

SECTION 01014

CONSTRUCTION SEQUENCE

1.03 NOTIFICATION REQUIREMENTS

- A. The CONTRACTOR shall give a **minimum of 14 working days advance written notice** to the OWNER and ENGINEER of each component proposed for tie-in or disruption, all of which shall be subject to OWNER's prior approval and limitations. Tie-ins or disruptions specifically mentioned in this Section must conform to this requirement and any others requested by the ENGINEER or OWNER.
- B. No work which affects or could affect the pressure in the existing water main shall be performed without a specific work and implementation plan written by the CONTRACTOR and approved in advance by the ENGINEER and the OWNER.

1.04 SUBMITTAL REQUIREMENTS

- A. CONTRACTOR shall submit shop drawings and working drawings in accordance with Section 01300 to show schedules and details of all temporary services, bypasses, tie-ins, and connections to existing systems.
- B. No shutdowns are anticipated for this project. CONTRACTOR shall submit an RFI if they believe any shutdowns are required.

1.05 SITE CONDITIONS

- A. The CONTRACTOR shall submit to the ENGINEER and the OWNER a description and schedule as to how the common areas will be utilized. Coordinate uses of premises with OWNER and other contractors. The CONTRACTOR will have to work with the TANK CONTRACTOR and ELECTRICAL CONTRACTOR for location of trailers, storage of materials, and coordination of work efforts.
- B. Various components of construction may involve work near or under roads, utility structures (such as power and communication poles), and underground utilities requiring the CONTRACTOR to field verify the connections intended on the Drawings. Furthermore, the CONTRACTOR shall provide any corrective measure or temporary facilities necessary to perform the work at no additional cost to the OWNER. Where temporary shoring/sheeting is required to allow new construction to proceed while protecting adjacent existing structures, the CONTRACTOR shall engage the services of a company to design and install engineered systems signed and sealed by a Florida PE.
- C. Where potable water is required in large quantity for preoperational or watertightness testing or other use, the CONTRACTOR and/or TANK CONTRACTOR shall provide all necessary facilities and pay all costs associated with delivering water from the point of supply to the point of use. The OWNER will provide the water free of charge. The CONTRACTOR and/or TANK CONTRACTOR shall be responsible for temporary installation of the water meter, back flow preventer, and piping for use on an interim basis until any newly proposed systems are installed, tested, and put into service.
- D. The CONTRACTOR shall bear responsibility for ensuring a complete and fully operational tank and BPS. All coordination efforts required for getting the

SECTION 01014

CONSTRUCTION SEQUENCE

MANUFACTURERS or other CONTRACTORS on site for startup and testing of equipment shall be included in the CONTRACTOR's base bid. During all start-up and performance testing activities, the CONTRACTOR shall make available onsite the manpower, equipment, and manufacturer's representatives required to make any necessary adjustments and OWNER staff training. The CONTRACTOR shall provide all disinfection chemicals of suitable quantity to test the operation of the new facilities. Fuel shall be provided by the CONTRACTOR to demonstrate performance of each system. The OWNER shall provide a full tank volume of fuel at the time of generator startup. The CONTRACTOR shall be responsible for offloading, installing, and providing any additional fuel for the generator necessary if any other equipment testing occurs prior to having permanent power to the pump station.

- E. The CONTRACTOR shall submit their disinfection and sampling plan, including all proposed sample points to the OWNER and ENGINEER for approval. The CONTRACTOR shall be responsible for the coordinating the sample taking and testing at a FDEP or FDOH certified lab and providing the results to the OWNER and ENGINEER in a timely manner. No installed, constructed, or off-line facilities shall be made operational until they have been approved for service by the FDEP in accordance with FAC 62-555.340.
- F. Dust-tight and noise dampening partitions, or other methods approved by the ENGINEER to contain dust, debris, rain, noise, etc., from construction areas shall be provided. Protective, sanitary covers for equipment, furnishings, and water filled basins shall be provided by the CONTRACTOR in areas of work within existing buildings and structures.

1.06 CONSTRUCTION CONSTRAINTS

- A. The CONTRACTOR shall meet the constraints below and shall consider these constraints when developing their overall plan of construction. The list is not all inclusive or intended to release the CONTRACTOR from the responsibility to coordinate the Work in any manner which will ensure project completion within the time allowed. The following areas are not necessarily listed in their required sequence of construction. A suggested sequence within each area, where necessary, is included. However, the overall general sequence outlining the critical items is provided below. Should the CONTRACTOR wish to deviate from this overall sequence they shall obtain the OWNER and ENGINEER's permission and approval prior to proceeding. CONTRACTOR shall coordinate with the TANK CONTRACTOR and ELECTRICAL CONTRACTOR on any deviations from this overall sequence.
 - 1. Yard piping, including the connection and construction of the finished water main, and construction of the reclaimed water main, shall be performed at an agreed upon time by the CONTRACTOR.
 - 2. Construct access road for the site, either to the requirements of the Drawings or temporary measures until the proposed access road is installed. CONTRACTOR shall coordinate with the TANK CONTRACTOR on utilization of the access drive.
 - 3. Construct stormwater improvements on the site to ensure that any dewatering activities and drainage on the site is maintained throughout construction activities. Construction of the stormwater pond shall not impede completion of the ground storage tank. CONTRACTOR shall coordinate with the TANK

SECTION 01014

CONSTRUCTION SEQUENCE

CONTRACTOR to ensure both parties agree upon the sequencing prior to submitting the schedule to the OWNER and ENGINEER.

4. Install new service transformer and power to the site as required to facilitate temporary construction power and startup/commissioning activities.
5. The construction of the tank shall be performed by the TANK CONTRACTOR after subgrade has been deemed acceptable. All connecting piping shall be completed after post-loading of the tank.
6. Construct the new booster pump and electrical building.
7. Perform remaining civil work including yard piping up to existing connection points, storm drainage, grading, and paving.
8. Schedule of tie-ins and piping connections shall be coordinated with OWNER to complete the work.
9. Coordinate with the ELECTRICAL CONTRACTOR to perform field operational tests including all SCADA and automatic functions prior to startup. This shall be implemented and demonstrated to confirm that the station is ready to begin the 5-day operational test required for substantial completion. Operation in "hand" without all instruments, SCADA, and controls in place is not an acceptable means and does not dictate startup. All programming and controls shall be performed by an approved Instrumentation System Supplier (ISS).
10. All potable water disinfection testing approval of sampling through FDEP shall be completed prior to starting the 5-day operational testing period.
11. Once the new facility is on-line and deemed ready for operation, test the system as per requirements of Division 1, technical specifications, and Drawings.
12. Complete all landscaping and fencing.

B. Sitework

1. The TANK CONTRACTOR shall perform all clearing and grubbing, site preparation, and tree and brush removal as required to perform the work shown on the Drawings.
2. Cut and fill site as necessary to obtain the elevations reflected on the Drawings. The TANK CONTRACTOR will only be responsible for the fill required to construct the tank. Any fill required outside of the limits of the tank shall be the responsibility of the CONTRACTOR. The TANK CONTRACTOR shall excavate the pond for use of a portion of the fill required for the GST. Any unused soil will be stockpiled onsite and can be used by the CONTRACTOR for common or structural fill as deemed suitable on the site.
3. Erosion control, temporary fencing of all construction areas, and tree protection shall be installed within 30 days after the Notice to Proceed. All such devices shown on the Drawings shall be installed prior to any onsite work commencing.
4. Since work will be occurring around active, existing pipes, the CONTRACTOR shall prepare working drawings of existing and proposed new work to scale and submit to the ENGINEER in advance of excavation. This will require additional utility pot-holing and excavations to locate and determine pipe elevations. The ENGINEER has provided all known existing information to the CONTRACTOR.
5. The CONTRACTOR's field office shall be set up, fully equipped, and all utilities connected for occupancy within 45 days from the Notice to Proceed. The office shall not be removed earlier than the date of substantial completion and not later than the date of final payment.

SECTION 01014

CONSTRUCTION SEQUENCE

6. All site and underground pipe and structures installation work shall be organized and scheduled to accomplish the following:
 - a. All underground work shall be performed concurrently to avoid subsequent trenching through the same areas to a reasonable extent. This is especially critical during the installation of the piping in the CR-208 ROW, under CR-208, and through the utility easement.
 - b. Yard electrical work and piping work shall be shown on the same working drawings and fully coordinated horizontally and vertically.
 - c. Existing systems shall remain fully operational. No outages shall be allowed without pre-planned, scheduled, and organized temporary outages that have been approved by the OWNER and ENGINEER through the RFI process.
7. New slabs or pavement shall not be installed until all piping, cables, conduits, and duct banks under the paved area have been installed. Roads shall be stabilized with crushed stone until that time. Any weak areas in base course or existing pavement shall be removed and replaced prior to the final surface course installation.
8. Locations and numbers of sedimentation control facilities shall be adjusted as the work progresses so that all site runoff flows through sedimentation control facilities at all times. Facilities shown are minimums only. At no time shall silt-laden water be allowed to leave the site. Maintenance and upgrading of facilities shall be scheduled weekly and after all rain events.
 - a. The CONTRACTOR/TANK CONTRACTOR shall check the stormwater daily for sedimentation and erosion control and shall provide additional measures or means to minimize any impacts to adjacent property.
9. The installation of temporary stormwater and sedimentation facilities shall be constructed and stabilized prior to onsite excavation, backfilling, and compaction of soils in accordance with the project's requirements and geotechnical recommendations for piping, foundations, pads, drives, walks, ground storage tank and all other structures shown on the project plans.
 - a. Construction of the permanent or temporary stormwater management system is encouraged to properly maintain site drainage during construction.
 - b. The CONTRACTOR/TANK CONTRACTOR shall also include in his bid sufficient funds to maintain the new system throughout the construction process and base his maintenance budget on a normal annual rainfall for the geographical region.
10. Dewatering activities shall be properly protected and desilted and permitted. Refer to the geotechnical report in **Appendix A** as well as Section 02140 for additional details.
 - a. The CONTRACTOR/TANK CONTRACTOR shall submit a Notice of Intent to Use Noticed General Permit for Short Term Construction Dewatering to the St. Johns River Water Management District prior to starting dewatering activity at the project site.
11. Except as noted for removal, all existing trees on the site around and/or adjacent to the construction area shall be protected and remain undamaged at all times. If the CONTRACTOR/TANK CONTRACTOR anticipates damage to a tree due to construction activities, the CONTRACTOR/TANK CONTRACTOR shall contact the ENGINEER immediately and prior to commencing work in that area.

SECTION 01014

CONSTRUCTION SEQUENCE

- C. **Booster Pump Station Access Driveway**
1. A new site access driveway as reflected on the Drawings shall be constructed by the CONTRACTOR. Any additional stone or stabilization required for daily construction shall be provided by the CONTRACTOR/TANK CONTRACTOR. Construction of any temporary roads or access including stabilization as part of the project, these costs shall be included in the CONTRACTOR's base bid. No additional monies will be provided for access to and during the site during construction.
- D. **Booster Pump and Electrical Building Construction**
1. Construction of the booster pump building can begin after the necessary site clearing and necessary fill has occurred in the area of the building.
 2. Once the building has been deemed ready for operation and all electrical, controls, and SCADA components and pumping systems have been preliminarily tested the performance testing and startup can begin.
 3. CONTRACTOR shall coordinate with OWNER on pre-purchased vertical turbine pumps, piping, and fittings for installation and with the ELECTRICAL CONTRACTOR on installation and testing of all electrical equipment.
- E. **Ground Storage Tank**
1. The ground storage tank will be constructed by the TANK CONTRACTOR, under Contract 1.
 2. ELECTRICAL CONTRACTOR shall be responsible for all electrical and instrumentation related to, located on, or adjacent to the tank. CONTRACTOR shall be responsible for coordination with other CONTRACTORS, all piping connections, and other work necessary to commission the GST.
 3. The CONTRACTOR shall include sufficient time and monies to coordinate their work with the work of the TANK CONTRACTOR.
- F. **Testing**
1. All facilities and systems shall be tested as a condition precedent to substantial completion. See Section 01465 and equipment specifications for additional requirements. Start-up plans for the facility and equipment shall be submitted, reviewed, and approved by the ENGINEER.
 2. Testing shall be coordinated by the CONTRACTOR with the TANK CONTRACTOR and ELECTRICAL CONTRACTOR.
 3. All equipment and facilities shall be tested according to respective process component specifications herein and more specifically:
 - a. **Pre-startup Testing:** All components, subsystems, and systems in each process component and associated process component shall be checked before electrical and process fluids are applied, and these checks shall verify completeness, leakage, electrical, and instrumentation connections and circuit correctness, and correct installation. Equipment suppliers and all trades must certify that the respective systems are ready for operation. The ENGINEER shall inspect and must agree that each system is ready for energizing and process fluids. The ENGINEER and OWNER shall be present for verification of pre-startup testing. All systems in contact with potable water shall be properly disinfected in accordance with the OWNER's and the state of Florida disinfection procedures.

SECTION 01014

CONSTRUCTION SEQUENCE

- b. Operational Testing: All process systems shall be operated with clean water to verify that all components, sub-systems, and systems operate correctly and meet individual performance requirements and that electrical, control, and instrumentation systems function satisfactorily. Corrections, adjustments, replacements, calibrations, and OWNER staff training shall take place during this stage. All systems must be functionally complete and 100 percent satisfactory and ready for process start-up and continuous operation at the conclusion of this stage. Details on operational testing requirements are specified in the respective process component specifications. The ENGINEER and OWNER shall be present for verification of operational testing. Final OWNER staff training shall take place during operational testing. Failure to achieve satisfactory results may require that the CONTRACTOR go back and retest and/or re-disinfect the system.
 - c. Performance Testing: Performance testing shall be conducted after the respective process systems and all associated process systems have been started and are operating continuously and satisfactorily. Demonstration of successful performance testing shall be a condition precedent to final completion. Details on performance testing requirements are included in the respective process component specification and herein. The ENGINEER and OWNER shall be present for verification of performance testing.
- G. Final Piping Connections and Pressure Testing
- 1. Final connections will be required to existing pipes within ROWs. All connections shall be coordinated with the OWNER's operating staff and scheduled a minimum of two weeks in advance with the OWNER. The CONTRACTOR shall pressure test and disinfect all piping prior to making connections. The CONTRACTOR shall coordinate with the OWNER to complete all bacteriological testing on all new facilities individually to place into service after OWNER, ENGINEER and FDEP approval as per FAC 62-555.340.
- H. Electrical and Booster Pump Building Testing
- 1. The CONTRACTOR shall submit a plan for testing operation of the building including all HVAC, pumps, electrical equipment, and all controls.
 - 2. The CONTRACTOR shall test the pumps with potable water and certify that that the pumps met the operating conditions outlined in Section 11214. Controls to automatically operate the system shall be in place.
 - 3. After the connections are made, the CONTRACTOR shall operate the system in automatic mode for five consecutive days without any interruption and perform performance testing requirements.

1.07 PERMITS

- A. The CONTRACTOR/TANK CONTRACTOR shall arrange for all required regulatory agency inspections and coordinate their schedule with the OWNER and ENGINEER. The CONTRACTOR/TANK CONTRACTOR shall close out the issued regulatory permits at the end of the Contract and provide the OWNER and ENGINEER with copies of all submitted documentation, in addition to all specified documentation required by the Contract for its Final Completion.

SECTION 01014

CONSTRUCTION SEQUENCE

- B. A copy of any approved permits is attached in Appendix B.

1.08 FPL SERVICE

- A. FPL is the electric service provider for this site. FPL prefers to initiate the process 12 weeks prior to the required in service date.
- B. Mott MacDonald recommends installation of the new service transformer early in the project to mitigate potential conflicts during the electrical construction portion of the project. CONTRACTOR shall make application for new service within 1 month of receiving notice to proceed according to the following:
 1. Apply for new service at www.fpl.com/construction
 2. Within 48 hours contact:

Chris Wrenn (FPL)
303 Hastings Rd
St Augustine, FL 32084
(904) 824-7659
christopher.wrenn@fpl.com

3. Chris Wrenn will initiate FPL Engineering process, which is typically 2 to 3 weeks. During FPL Engineering process, Chris will request completion of an Easement Form, Underground Contract, and prepare any invoicing for payments.
4. FPL Construction process will commence upon completion of FPL Engineering process. Construction typically takes less than 8 weeks.
5. Upon completion of FPL Construction process, CONTRACTOR shall transfer all responsibility, documentation, and permits to the OWNER.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01014

SECTION 01015

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The scope of this section defines the items included in each bid item in the Bid Form of these Specifications. Payment will be made based on the specified items included in the description in this section for each bid item.
- B. All contract prices included in the Schedule of Prices section will be full compensation for all labor, materials, tools, equipment, and incidentals necessary to complete the CR 208 Ground Storage Tank and Booster Pump Station project ELECTRICAL CONTRACTOR portion shown on the Drawings and/or as specified in the Contract Documents to be performed under this contract. Payment for all items listed in the Schedule of Prices will constitute full compensation for all work shown and/or specified to be performed under this project.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 DESCRIPTION OF BID ITEM MEASUREMENT AND PAYMENT

- A. All costs for all labor, materials, equipment, supplies, taxes, other miscellaneous costs, profit, and overhead, both direct and indirect, for completion of all Work by the ELECTRICAL CONTRACTOR except for those Bid Items hereinafter listed separately (Item No. 1).
 - 1. Measurement
 - a. Measurement of the work of Item No. 1 shall be on a lump sum basis.
 - 2. Payment
 - a. Payment to the ELECTRICAL CONTRACTOR of the total price bid for Item No. 1, in the Schedule of Prices will be made and shall fully compensate the ELECTRICAL CONTRACTOR for furnishing all labor, materials, equipment, incidentals, taxes, overhead and profit, and other miscellaneous costs required to complete the work as shown on the Drawings and as specified with the exception of item 2 below.
 - b. Payment shall also fully compensate the ELECTRICAL CONTRACTOR for any other work which is not specified or shown but which is required to complete the work of Item Nos. 1 through 2 as shown on the Drawings and as specified herein. This shall include any work necessary in addition to the specifically described work included in the price for Item 2. Item 2 makes reference to work not included in these pay items that must be included in Pay Item No. 1. It is the ELECTRICAL CONTRACTOR'S responsibility during the bidding of this project to make sure all required work has been included in their bid; there will not be any consideration given to a request for additional funds because the various material supplier and labor trades make a claim that it was unclear who was to

SECTION 01015

MEASUREMENT AND PAYMENT

supply and/or perform. The ELECTRICAL CONTRACTOR'S responsibility during bidding is to verify and include all costs.

- B. Allowance for FPL Service and New Electrical to the Site (Item No. 2)
 - 1. Measurement
 - a. This FPL allowance (Item No. 2) is to provide payment for the contribution in aid of construction and/or additional costs for the ELECTRICAL CONTRACTOR to provide FPL service to the site. The allowance shall be \$20,000.00 as specified in the Schedule of Prices.
 - 2. Payment
 - a. Payment to the ELECTRICAL CONTRACTOR shall be for the direct FPL'S invoice costs and/or an itemized account with labor, materials, and equipment shown for additional work required for the new FPL service. Anything that is not a pass-through cost directly from FPL will be reviewed and approved by the OWNER prior to payment. Any allowance fee not utilized shall be credited back to the OWNER.

END OF SECTION 01015

SECTION 01050

PROJECT CONTROLS (SURVEYING)

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Provide and pay for field engineering services required for project, including but not limited to:
 - 1. Survey work required for project controls and layout and to execute project.
 - 2. Certified as-built surveys specified herein.
 - 3. Civil, structural, or other professional engineering services specified or required to execute CONTRACTOR/TANK CONTRACTOR's construction methods.

- B. Retain the services of a registered land surveyor licensed in the state of Florida to:
 - 1. Identify existing control points and property line corners indicated on the Drawings.
 - 2. Verify and record all existing structure locations in the vicinity of, or adjacent to, the proposed Work; and the locations of all proposed structures and facilities.
 - 3. Maintain an accurate record of locations of all new buried and above-ground piping, valves, and duct banks and existing buried piping and other buried existing facilities (piping, conduits, and structures) encountered and/or relocated during construction of the new work.
 - 4. Maintain accurate locations of all new structures, including corner locations, and equipment locations within the project site.

- C. All survey work as described herein shall be completed by the registered land surveyor on a monthly basis and provided at each monthly progress meeting.

1.02 RELATED WORK

- A. Project Record Documents is included in Section 01720.

- B. Summary of Work is included in Section 01010.

- C. Contract Closeout is included in Section 01700.

1.03 SUBMITTALS

- A. Submit, to the ENGINEER, the name, address and state registration and license number of proposed registered land surveyor.

- B. On request of the ENGINEER, submit documentation to verify accuracy of field engineering work.

SECTION 01050

PROJECT CONTROLS (SURVEYING)

- C. At the end of the project, and prior to final payment, submit certified as-built drawing(s) (with the Surveyor's title block, signed and sealed by registered Land Surveyor) of the items listed throughout this Section. All surveys shall be tied to the applicable grid system and shall indicate all pre-existing and new project benchmarks. Vertical control shall conform to the project elevation datum designated on the plans.
1. Certified site survey at 1-inch = 40-ft scale or larger, but not greater than 1-inch = 20-ft scale, on 22-inch by 34-inch sheet(s) and electronic (PDF) version, indicating the building corners, sidewalks, paved areas and location of all above ground structures within the project site or limits of construction.
 2. Certified survey, drawn to the same scale as the ENGINEER's yard piping drawings, showing the locations, lines and grades in plan and profile views of all below-grade lines (piping and all electrical ducts) exterior to buildings and other buried facilities (e.g., valves, tanks, etc.). This requirement includes all utilities installed as a part of the scope of this project, as well as existing pipes encountered during the installation of the new Work.
 3. Certified survey showing the location, pipes and grades of all pipes 2 inches in diameter and larger buried and exterior to buildings and other buried facilities (e.g. valves, tanks, vaults, etc.) installed as a result of the work. This shall be at the same scale as the ENGINEER's yard piping drawing.
 4. Certified survey showing elevations of all flow control points, such as weirs, elevations of all new structures and equipment etc. in the wastewater treatment plant.

1.04 QUALIFICATIONS OF SURVEYOR

- A. Registered land surveyor, licensed in the state of Florida.

1.05 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the project are those designated on Drawings.
- B. Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.
1. Make no changes or relocations without prior written notice to and approval by the ENGINEER.
 2. Report to the ENGINEER when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 3. Require the surveyor to correctly replace project control points which may be lost or destroyed. Establish replacements based on original survey control.

SECTION 01050

PROJECT CONTROLS (SURVEYING)

1.06 PROJECT SURVEY REQUIREMENTS

- A. Establish a minimum of two permanent benchmarks on site, referenced to data established by survey control points.
 - 1. Record locations, with horizontal and vertical data, on the as-built survey.
 - 2. Permanent benchmarks shall be installed and spaced for convenient reference and use at locations along the pipeline route and/or on the plant site.
 - 3. Benchmarks shall be installed to North American Vertical Datum (NAVD 1988) standards and shall include horizontal and vertical data, as well as the installation date.

- B. Establish lines and levels; locate and lay out:
 - 1. Site improvements.
 - a. Stakes for grading, fill and topsoil placement.
 - b. Utility slopes and invert elevations.
 - c. Sidewalks, pavement, fencing, storm drainage facilities, and other finish surface work.
 - d. Locations, sizes, and depths of manholes, valves, and fittings.
 - 2. Batter boards for structures.
 - 3. Building foundation, column locations and floor levels.
 - 4. Controlling lines and levels required for mechanical and electrical trades.
 - 5. Slabs and floor levels.

- C. If lines, levels, or layouts are lost or destroyed, or if required by the OWNER or ENGINEER, verify layouts by same methods.

- D. Establish all lines and grades prior to construction of pipe work for all pressurized mains, storm drainage piping, gravity sewers and other new utility lines at 100-ft increments, at defined breaks in grade, and at manholes.

The following dimensional references must be depicted on the as-built drawings.

- 1. Depths of various elements of foundation in relation to finish first floor datum.
- 2. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of all underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc. All pipes and valves shall be labeled using the method as per the contract drawings.
- 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
- 4. Field changes of dimension and detail.
- 5. Changes made by field order or by change order.
- 6. Details not on original contract drawings.
- 7. Equipment and piping relocations.

SECTION 01050

PROJECT CONTROLS (SURVEYING)

8. All underground duct banks with elevations and dimensions, horizontal and vertical locations of underground duct banks, and manholes along duct banks.
 9. All underground cable elevations and horizontal locations of underground cables.
 10. All existing and new structures clearly indicated.
 11. All elevations of new structures (including weirs) clearly indicated.
- E. All work will be performed in accordance with the Minimum Technical Standards set forth by the Florida Board of Land Surveyors.
- F. As a condition of completing the County permit, after approval, and upon completion of the proposed project, an "As-Built" survey is required. The as-built will show all easements, all on and off-site physical improvements (i.e., paving, buildings, walkways, buffer, fencing, dumpster enclosures accessible routes) and identify street names and shall be in compliance with Part 6.04.00 C of the Land Development Code (LDC) prior to issuance of any Certificates of Occupancy (COs). A copy of these requirements can be obtained from Section 15.0 As-Built in the Development Review Manual whose link is <http://www.sjcfi.us/DevelopmentReview/DRManual.aspx>. St. Johns County Development Review inspector shall be contacted 24 hours prior to all necessary site work inspections and 5 days prior to the final inspection.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 RECORDS

- A. Maintain a complete, accurate log of all control and survey work as it progresses.
- B. Update the project as-built survey on a monthly basis, based on the work performed during the month. Submit one copy of up to date as-built documentation with Contractor's monthly applications for payment.
- C. Maintain an accurate record of new and existing piping, conduit and structure changes, revisions, relocations, and modifications.

END OF SECTION 01050

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this Section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Section, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes. These are general guidelines. It is the CONTRACTOR's responsibility to determine the specific construction techniques to meet these guidelines.
- B. The control of environmental pollution requires consideration of air, water and land, and involves management of noise and solid waste, as well as other pollutants.
- C. CONTRACTOR shall schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. CONTRACTOR shall provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching or other special surface treatments as are required to prevent silting and muddying of adjacent property. All erosion control measures shall be in place in an area prior to any construction activity in that area. Specific requirements for erosion and sedimentation controls are provided in the contract drawings.
- D. All phases of sedimentation and erosion control shall comply with and be subject to the laws of the State of Florida. CONTRACTOR shall prepare a sedimentation and erosion control drawing meeting the requirements of the law. Furnish two copies of the approved Drawing to the ENGINEER no less than two weeks prior to starting the work.
- E. CONTRACTOR shall coordinate with the TANK CONTRACTOR on associated responsibilities. TANK CONTRACTOR shall be equally responsible for requirements in this section for work that is defined in their contract.

1.02 APPLICABLE REGULATIONS

- A. Comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

1.03 NOTIFICATIONS

- A. The ENGINEER will notify the CONTRACTOR in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

aspects of the environmental protection requirements shall notify the CONTRACTOR in writing, through the ENGINEER, of any non-compliance with State or local requirements. After receipt of such notice from the ENGINEER or from the regulatory agency through the ENGINEER, immediately take corrective action. Such notice, when delivered to the CONTRACTOR or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the CONTRACTOR fails or refuses to comply promptly, the ENGINEER or Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the CONTRACTOR unless it is later determined that the CONTRACTOR was in compliance.

1.04 IMPLEMENTATION

- A. Prior to commencement of the work, CONTRACTOR shall meet with the ENGINEER to develop mutual understandings relative to compliance with these provisions and administration of the environmental pollution control program.
- B. CONTRACTOR shall remove temporary environmental control features, when approved by the ENGINEER and incorporate permanent control features into the project at the earliest practicable time.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 EROSION CONTROL

- A. CONTRACTOR shall provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Erosion control measures, such as siltation basins, hay check dams, mulching, jute netting and other equivalent techniques, shall be used as appropriate. Flow of surface water into excavated areas shall be prevented. Ditches around construction area shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of the work, ditches shall be backfilled and the ground surface restored to original condition.

3.02 PROTECTION OF STREAMS AND SURFACE WATERS

- A. Care shall be taken to prevent, or reduce to a minimum, any damage to any stream or surface water from pollution by debris, sediment, or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream. Such waters shall be diverted through a settling basin or filter before being directed into streams or surface waters.

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

- B. The CONTRACTOR shall not discharge water from dewatering operations directly into any live or intermittent stream, channel, wetlands, surface water or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.
- C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action plan approved by the Florida Department of Environmental Protection and the US EPA. The CONTRACTOR shall submit two copies of approved contingency plans to the ENGINEER.
- D. Water being flushed from structures or pipelines after disinfection, with Cl_2 , shall be treated with a dechlorination solution, in a method approved by the ENGINEER, prior to discharge.

3.03 PROTECTION OF LAND RESOURCES

- A. Restore land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.
- B. Outside of areas requiring earthwork for the construction of the new facilities, the CONTRACTOR shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the ENGINEER. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The CONTRACTOR shall in any event be responsible for any damage resulting from such use.
- C. Protect trees or monuments that may possibly be defaced, bruised, injured, or otherwise damaged by the construction equipment, dumping or other operations, by placing boards, planks, or poles around them.
- E. The locations of the CONTRACTOR'S storage and other construction activities, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared as by the OWNER and ENGINEER and shall not be within wetlands or floodplains. The Contractor shall submit a layout of the proposed storage areas to the OWNER and ENGINEER for approval at least 10 days prior to scheduled start. Drawings showing storage facilities shall be submitted for approval of the ENGINEER.

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

- F. If the CONTRACTOR proposes to construct temporary roads or embankments and excavations for work areas, he shall submit the following for approval at least ten days prior to scheduled start of such temporary work.
 - 1. A layout of all temporary roads, excavations, embankments and drainage to be constructed within the work area.
 - 2. Details of temporary road construction.
 - 3. Drawings and cross sections of proposed embankments and their foundations, including a description of proposed materials.

- G. CONTRACTOR shall remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the ENGINEER. It is anticipated that excavation, filling and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as approved by the ENGINEER or Owner.

- H. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.04 PROTECTION OF AIR QUALITY

- A. Burning – The use of burning at the project site for the disposal of refuse and debris will not be permitted unless authorized by the OWNER and a Large Land Clearing Burning Permit is acquired under the State of Florida.

- B. Dust Control - Maintain all excavations, embankment, stockpiles, access roads, plant sites, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded and which would cause a hazard or nuisance to others. CONTRACTOR shall control dust resulting from clearing and grubbing operations to prevent nuisance to adjacent property owners and the general public. CONTRACTOR shall use dust control methods and materials approved by the ENGINEER.

- C. An approved method of stabilization consisting of sprinkling or other similar methods will be permitted to control dust. The use of petroleum products is prohibited. The use of chlorides may be permitted with approval from the ENGINEER.

- D. Sprinkling, to be approved by the ENGINEER, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the CONTRACTOR shall have sufficient competent equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the OWNER.

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

3.05 NOISE CONTROL

- A. CONTRACTOR shall make every effort to minimize noises caused by the construction operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with Federal and State regulations. CONTRACTOR shall meet the local ordinances regarding noise control.
- B. All equipment to be furnished under this Contract, unless specified otherwise in the technical specifications, shall be designed to ensure that the sound pressure level does not exceed 85 decibels over a frequency range of 37.8 to 9600 cycles per second at a distance of 3-ft from any portion of the equipment, under any load condition, when tested using standard equipment and methods. Noise levels shall include the noise from the motor. Mufflers or external baffles shall not be acceptable for the purpose of reducing noise. Data on noise levels shall be included with the shop drawing submittal.

3.06 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION

- A. During the life of this contract, CONTRACTOR shall maintain all facilities constructed for pollution control as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

3.07 ENVIRONMENTAL AND PUBLIC NUISANCE

- A. CONTRACTOR shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, or excessive noise or dust. CONTRACTOR shall eliminate noise to as great an extent as practicable at all times.

END OF SECTION 01110

SECTION 01200

PROJECT MEETINGS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The ENGINEER shall schedule, administer, and prepare meeting minutes for the pre-construction meeting, periodic progress meetings, and specially called meetings throughout progress of the work.
- B. Representatives of CONTRACTORS, SUBCONTRACTORS and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. The CONTRACTOR shall attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

1.02 RELATED REQUIREMENTS

- A. Section 01300: Submittals
- B. Section 01310: Construction Scheduling
- C. Section 01720: Project Record Documents
- D. Section 01730: Operating and Maintenance Data

1.03 PRE-CONSTRUCTION MEETING

- A. Location: A central site, convenient for all parties, designated by the OWNER.
- B. A pre-construction meeting will be held for each of the three contracts.
- C. Attendance
 - 1. Owner's representative
 - 2. ENGINEER and professional consultants
 - 3. Resident project representative
 - 4. CONTRACTOR'S superintendent
 - 5. Major SUBCONTRACTORS
 - 6. Major suppliers
 - 7. Others as appropriate
 - 8. Tank CONTRACTOR
 - 9. Electrical SUBCONTRACTOR
- D. Suggested Agenda
 - 1. Distribution and discussion of:
 - a. List of major SUBCONTRACTORS and suppliers
 - b. Projected construction schedules
 - 2. Critical work sequencing
 - 3. Major equipment deliveries and priorities
 - 4. Project coordination
 - a. Designation of responsible personnel

SECTION 01200

PROJECT MEETINGS

- b. Submittals
- c. Applications for payment
5. Procedures and processing of:
 - a. Field Decisions
 - b. Proposal requests
 - c. Submittals
 - d. Change orders
 - e. Application for payment
6. Adequacy of distribution of Contract Documents
7. Procedures for maintaining Record Documents
8. Use of premises:
 - a. Office, work, and storage areas
 - b. OWNER's requirements
9. Construction facilities, controls and construction aids
10. Temporary utilities
11. Housekeeping procedures

1.04 PROGRESS MEETINGS

- A. Schedule regular periodic meetings. A total of 11 progress meetings have been allocated over the entire construction period and will be scheduled by the ENGINEER after the schedule has been reviewed. These meetings will be required by both the CONTRACTOR and ELECTRICAL CONTRACTOR. A total of 6 progress meetings have been allocated over the construction period and will be scheduled by the ENGINEER after the schedule has been reviewed for the TANK CONTRACTOR.
- B. Hold called meetings as required by progress of the work.
- C. Location of the meetings: A central site, convenient for all parties, designated by the OWNER.
- D. Attendance shall be similar to pre-construction meeting and as deemed appropriate by the ENGINEER or OWNER.
- E. Suggested Agenda
 1. Review, approval of minutes of previous meeting
 2. Review of work progress since previous meeting
 3. Field observations, problems, and/or conflicts
 4. Problems which impede construction schedule
 5. Review of offsite fabrication, delivery schedules
 6. Corrective measures and procedures to regain projected schedule
 7. Revisions to construction schedule
 8. Progress, schedule, during succeeding work period
 9. Coordination of schedules
 10. Review submittal schedules; expedite as required
 11. Maintenance of quality standards
 12. Pending changes and substitutions
 13. Review proposed changes for:
 - a. Effect on construction schedule and on completion date
 - b. Effect on other contracts of the Project

SECTION 01200

PROJECT MEETINGS

- 14. Other business
- 15. Critical/long lead item

- F. The CONTRACTOR shall attend progress meetings and is to study previous meeting minutes and current agenda items so they are prepared to discuss pertinent topics such as deliveries of materials and equipment, progress of the work, etc.

- G. The CONTRACTOR shall provide a summary of work performed since the last meeting and anticipated work to be performed over the next 30 to 45 days at each progress meeting.

- H. The CONTRACTOR shall provide an updated schedule at each progress meeting for the remaining work.

- I. The CONTRACTOR shall coordinate with the ELECTRICAL CONTRACTOR for schedule updates to be included with documents for progress meetings.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01200

SECTION 01300

SUBMITTALS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the general methods and requirements of submissions applicable to Shop Drawings, Product Data, Samples and Operations and Maintenance Manuals. Detailed submittal requirements are specified in the Technical Sections.
- B. CONTRACTOR shall coordinate with electrical CONTRACTOR on all electrical submittals.
- C. CONTRACTOR shall coordinate with the tank CONTRACTOR on all work related to their contract
- D. CONTRACTOR shall include in their base bid coordination with the ELECTRICAL CONTRACTOR and TANK CONTRACTOR as necessary for all required submittals. For example, any startup plan that required input from the ELECTRICAL CONTRACTOR should be fully coordinated through the CONTRACTOR and the CONTRACTOR shall be responsible for reviewing and incorporating the ELECTRICAL CONTRACTOR's startup schedule into their overall startup schedule.
- E. Submittals are categorized into two types: Action Submittals and Informational Submittals, as follows:
 - 1. Action Submittals: Written and graphic information submitted by the CONTRACTOR that requires the ENGINEER'S approval. The following are examples of action submittals:
 - a. Shop drawings (including working drawings and product data)
 - b. Samples
 - c. Operation and maintenance manuals
 - d. Site usage plan (CONTRACTOR's staging – including trailer siting and material laydown area)
 - e. Schedule of values
 - f. Payment application format
 - 2. Informational Submittal: Information submitted by the CONTRACTOR that is required to be reviewed by the ENGINEER prior to work being completed. ENGINEER will provide review comments that may require revisions. Informational submittals will be marked "Reviewed" by the ENGINEER when submittal is considered acceptable. The following are examples of informational submittals:
 - a. Shop drawing schedule
 - b. Construction schedule
 - c. Statements of qualifications
 - d. Health and Safety Plans
 - e. Construction photography and videography
 - f. Work plans
 - g. Outage requests
 - h. Proposed testing procedures
 - i. Test records and reports

SECTION 01300

SUBMITTALS

- j. Vendor training outlines/plans
 - k. Test and start-up reports
 - l. Certifications
 - m. Record Drawings
 - n. Record Shop Drawings
 - o. Submittals required by laws, regulations and governing agencies
 - p. Submittals required by funding agencies
 - q. Other requirements found within the technical specifications
 - r. Warranties and bonds
 - s. As-Built surveys
 - t. Contract close-out documents
- F. All submittals shall be delivered directly to the Mott MacDonald office located at: 10245 Centurion Parkway North, Suite 320, Jacksonville, FL 32256.
- G. All submittals shall be clearly identified by reference to section number, paragraph, drawing, or detail, as applicable.
- H. Submittals shall be clean and legible and of sufficient size for presentation of data.
- I. Submittal reviews after the "B" submittal will be back-charged to the CONTRACTOR for the ENGINEER'S time by the OWNER for each additional review. This shall be tracked monthly by the ENGINEER and deducted from each monthly pay application. The OWNER will then reimburse the ENGINEER for these additional services through an amendment.

1.02 RELATED WORK

- A. Additional requirements may be specified in the General Conditions for the Contract.
- B. Additional submittal requirements may be specified in the respective technical Specification Sections.
- C. Operation and Maintenance manuals are included in Section 01730.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. All submittals shall be clearly identified as follows:
 - 1. Date of submission
 - 2. Project number
 - 3. Project Name
 - 4. Contractor identification
 - a. Contractor
 - b. Supplier
 - c. Manufacturer
 - d. Manufacturer or supplier representative
 - 5. Identification of the product
 - 6. Reference to Contract drawing(s)
 - 7. Reference to specification section number, page and paragraph(s)

SECTION 01300

SUBMITTALS

8. Reference to applicable standards, such as ASTM or Federal Standards numbers
 9. Indication of CONTRACTOR's approval
 10. CONTRACTOR's Certification statement
 11. Identification of deviations from the Contract Documents, if any
 12. Reference to previous submittal (for resubmittals)
- B. Submittals shall be clear and legible, and of sufficient size for legibility and clarity of the presented data.
- C. Submittal Log
Maintain a log of all submittals. The submittal log shall be kept accurate and up to date. This log should include the following items (as applicable):
1. Description
 2. Submittal number
 3. Date transmitted to the ENGINEER
 4. Date returned to CONTRACTOR (from ENGINEER)
 5. Status of Submittal (Approved/Not Approved/etc.)
 6. Date of Resubmittal to ENGINEER and Return from ENGINEER (if applicable and repeat as necessary)
 7. Date material released for fabrication
 8. Projected (or actual) delivery date
- D. Numbering System
Utilize a 9-character submittal identification numbering system in the following manner:
1. The first character shall be a D, S, M or I which represents Shop Drawing (including working drawings and product data), Sample, Manual (Operation & Maintenance) or Informational, respectively.
 2. The next five digits shall be the applicable Specification Section.
 3. The next two digits shall be the numbers 01 to 99 to sequentially number each separate item or drawing submitted under each specific Specification Section, in the order submitted.
 4. The last character shall be a letter, A to Z, indication the submission (or resubmission) of the same submittal, i.e., "A" = 1st submission, "B" = 2nd submission, "C" = 3rd submission, etc. A typical submittal would be as follows:

D-03300-08-B

D = Shop Drawing
03300 = Section for Concrete
08 = the eighth different submittal under this section
B = the second submission (first resubmission) of the particular Shop Drawing
- E. Variances
Notify the ENGINEER in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.

SECTION 01300

SUBMITTALS

F. Action Submittals

1. Shop Drawings, Working Drawings, Product Data and Samples
 - a. Shop drawings as defined in the General Conditions, and as specified in individual Sections include, but are not necessarily limited to, custom prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, wiring diagrams, coordination drawings, equipment inspection and test reports, including performance curves and certificates, as applicable to the work.
 - b. CONTRACTOR shall verify all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and coordinate each item with other related shop drawings and the Contract requirements.
 - c. All details on shop drawings shall show clearly the relation of the various parts to the main members and lines of the structure and where correct fabrication of the work depends upon field measurements shall be made and noted on the drawings before being submitted.
 - d. All shop drawings submitted by subcontractors and vendors shall be reviewed by the CONTRACTOR for field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and that it has been coordinated with other related shop drawings and the Contract requirements. Submittals directly from subcontractors or vendors will not be accepted by the ENGINEER.
 - e. The CONTRACTOR shall be responsible the accuracy of the subcontractor's or vendor's submittal; and, for their submission in a timely manner to support the requirements of the CONTRACTOR's construction schedule. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractor or vendor to correct before submission to the ENGINEER. All shop drawings shall be approved by the CONTRACTOR.
 - f. Delays to construction due to the untimely submission of submittals will constitute inexcusable delays, for which CONTRACTOR shall not be eligible for additional cost nor additional contract time. Inexcusable delays consist of any delay within the CONTRACTOR's control.
 - g. Submittals for equipment specified under Divisions 11, 15 and 16 shall include a listing of installations where identical or similar equipment manufactured by that manufacturer has been installed and in operation for a period of at least five years.
2. Working Drawings
 - a. Detailed installation drawings (equipment, piping, electrical conduits and controls, HVAC work, and plumbing, etc.) shall be prepared and submitted for review and approval by the ENGINEER prior to installing such work. Installation drawings shall be to-scale and shall be fully dimensioned.
 - b. Piping working drawings shall show the laying dimensions of all pipes, fittings, valves, as well as the equipment to which it is being connected. In addition, all pipe supports shall be shown.

SECTION 01300

SUBMITTALS

- c. Equipment working drawings shall show all equipment dimensions, anchor bolts, support pads, piping connections and electrical connections. In addition, show clearances required around such equipment for maintenance of the equipment.
 - d. Electrical working drawings shall show conduits, junction boxes, disconnects, control devices, lighting fixtures, support details, control panels, lighting and power panels, and Motor Control Centers. Coordinate all locations with the Contract Documents and the CONTRACTOR's other working drawings.
3. Product Data
- a. Product data, as specified individual Specification Sections, include, but are not limited to, the manufacturer's standard prepared data for manufactured products (catalog data), such as the product specifications, installation instructions, availability of colors and patterns, rough-in diagrams and templates, product photographs (or diagrams), wiring diagrams, performance curves, quality control inspection and reports, certifications of compliance (as specified or otherwise required), mill reports, product operating and maintenance instructions, recommended spare parts and product warranties, as applicable.
4. Samples
- a. Furnish, samples required by the Contract Documents for the ENGINEER's approval. Samples shall be delivered to the ENGINEER as specified or directed. Unless specified otherwise, provide at least two samples of each required item. Materials or equipment for which samples are required shall not be used in the work unless and until approved by the ENGINEER.
 - b. Samples specified in individual Specification Sections, include, but are not limited to: physical examples of the work (such as sections manufactured or fabricated work), small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and other specified units of work.
 - c. 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 and Contact Requirements.
 - d. 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 fail testing or are not approved will be returned to the CONTRACTOR at his expense, if so requested at time of submission.
5. Professional Engineer (P.E.) Certification Form
- a. If specifically required in any of the technical Sections, submit a Professional Engineer (P.E) Certification for each item required, signed and sealed by the P.E. licensed or registered in the state wherein the work is located.

SECTION 01300

SUBMITTALS

6. CONTRACTOR's Certification
 - a. Each shop drawing, working drawings, product data, and sample shall have affixed to it the following Certification Statement: *"Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements."*
 - b. Shop drawings, working drawings, and product data sheets 11-inch x 17-inch and smaller shall be bound together in an orderly fashion and bear above Certification Statement on the cover sheet. The transmittal cover sheet for each identified shop drawing shall fully describe the packaged data and include a listing of all items within the package.
7. The review and approval of shop drawings, working drawings, product data, or samples by the ENGINEER shall not relieve the CONTRACTOR from the responsibility for the fulfillment of the terms of the Contract. All risks of error and omissions are assumed by the CONTRACTOR and the ENGINEER will have no responsibility therefor.
8. Project work, materials, fabrications, and installation shall conform to approved shop drawings (including working drawings and product data) and applicable supplies.
9. No portion of the work requiring a shop drawing (including working drawings and product data) or sample shall be started, nor shall any materials be fabricated or installed before approval of such item. Procurement, fabrication, delivery or installation of products or materials that do not conform to approved shop drawings shall be at the CONTRACTOR's risk. Furthermore, such products or materials delivered or installed without approved shop drawings, or in non-conformance with the approved shop drawings will not be eligible for progress payment until such time as the product or material is approved or brought into compliance with approved shop drawings. Neither the OWNER nor ENGINEER will be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
10. Operation and Maintenance Data
 - a. Operation and maintenance data shall be submitted in assembled manuals as specified. Such manuals shall include detailed instructions for OWNER personnel on safe operation procedures, controls, start-up, shut down, emergency procedures, storage, protection, lubrication, testing, trouble shooting, adjustments, repair procedures, and other maintenance requirements.
11. Payment Application Format
 - a. If an application form is included in the Contract Documents, use that form unless otherwise approved by the ENGINEER and OWNER. If an application form is not included in the Contract Documents, CONTRACTOR may propose a form for approval.
12. Site Usage
 - a. Submit a proposed site staging plan, including but not limited to the location of office trailers, storage trailers and material laydown. Such a plan shall be a graphic presentation (drawing) of the proposed

SECTION 01300

SUBMITTALS

locations; and shall include on-site traffic modifications, and temporary utilities, as may be applicable.

G. Informational Submittals

1. Shop Drawing Schedule
 - a. Prepare and submit a schedule indicating when shop drawings are required to be submitted to support the as-planned construction schedule. The submittal schedule shall allow sufficient time for preparation and submittal, review and approval, and fabrication and delivery to support the construction schedule.
2. Construction Schedule
 - a. Prepare and submit construction schedules and monthly status reports as specified.
3. Statements of Qualifications
 - a. Provide evidence of qualification, certification, or registration, as required in the Contract Documents, to verify qualifications of licensed land surveyor, professional engineer, materials testing laboratory, specialty subcontractor, technical specialist, consultant, specialty installer, and other professionals.
4. Health and Safety Plans
 - a. When specified, prepare and submit a general company Health and Safety Plan (HSP), modified or supplemented to include job-specific considerations.
5. Construction Photography and Videography
 - a. Provide periodic construction photographs and videography as specified – including but not limited to preconstruction photographs and/or video, monthly progress photos and/or video and post-construction photographs and/or videos.
6. Work Plans
 - a. Prepare and submit copies of all work plans needed to demonstrate to the OWNER that CONTRACTOR has adequately through-out the means and methods of construction and their interface with existing facilities.
7. Outage Requests
 - a. Provide sufficient notification of any outages (electrical, flow processes, etc.) as may be required to tie-in new work into existing facilities. Unless specified otherwise elsewhere, a minimum of seven calendar days' notice shall be provided.
8. Proposed Testing Procedures
 - a. Prepare and submit testing procedures it proposes to use to preform testing required by the various technical specifications.
9. Test Records and Reports
 - a. Provide copies of all test records and reports as specified in the various technical specifications.
10. Vendor Training Outlines/Plans
 - a. At least two weeks before scheduled training of OWNER's personnel, provide lesson plans for vendor training in accordance with the specification for O&M manuals.

SECTION 01300

SUBMITTALS

11. Test and Start-Up Reports
 - a. Manufacturer shall perform all pre-start up installation inspection, calibrations, alignments, and performance testing as specified in the respective Specification Section. Provide copies of all such test and start up reports.
12. Certifications
 - a. Provide various certifications as required by the technical specifications. Such certifications shall be signed by an officer (of the Firm) or other individual authorized to sign documents on behalf of that entity.
 - b. Certifications may include, but are not limited to:
 - 1) Welding certifications and welders qualifications.
 - 2) Certifications of Installation, Testing and Training for all equipment.
 - 3) Material Testing reports furnished by an independent testing firm.
 - 4) Certifications from manufacturer(s) for specified factory testing.
 - 5) Certifications required indicating compliance with any sustainability or LEEDS accreditation requirements indicated in the Contract Documents.
13. Record Drawings
 - a. No later than Substantial Completion, submit a record of all changes during construction not already incorporated into drawings in accordance with specification on Project Record Documents.
14. Submittals Required by Laws, Regulations, and Governing Agencies
 - a. Prepare and submit all documentation required by state or local law, regulation or government agency directly to the applicable agency. This includes, but is not limited to, notifications, reports, certifications, certified payroll (for projects subject to wage requirements) and other documentation required to satisfy all requirements. Provide to ENGINEER one copy of each submittal made in accordance with this paragraph.
15. Submittals Required by Funding Agencies
 - a. Prepare and submit all documentation required by funding agencies. This includes but is not limited to segregated pay applications and change orders when required to properly allocate funds to different funding sources; and certified payrolls for projects subject to wage requirements. Provide one copy of each submittal made in accordance with this paragraph to the ENGINEER.
16. Other Requirements of the Technical Specifications Sections
 - a. Comply with all other requirements of the technical specifications.
17. Warranties
 - a. Assemble a book(let) of all warranties as specified in the various technical specifications and in accordance with the specification on Warranties and provide to the ENGINEER.
18. As-Built Surveys
 - a. Engage the services of a licensed land surveyor in accordance with the Project Controls specification. Prior to Final Completion, provide an As-Built survey of the constructed facility, as specified.
19. Contract Close-Out Documents
 - a. Submit Contract documentation as indicated in the specification for Contract Close-out.

SECTION 01300

SUBMITTALS

PART 2- PRODUCTS (NOT USED)

PART 3- EXECUTION

3.01 SUBMITTAL SCHEDULE

- A. Provide an initial submittal schedule at the pre-construction meeting for review by OWNER and ENGINEER. Incorporate comments from OWNER or ENGINEER into a revised submittal schedule.
- B. Maintain the submittal schedule and provide sufficient copies for review by OWNER and ENGINEER. An up-to-date submittal schedule shall be provided at each project progress meeting.

3.02 TRANSMITTALS

- A. Prepare separate transmittal sheets for each submittal. Each transmittal sheet shall include at least the following: the CONTRACTOR's name and address, OWNER's name, project name, project number, submittal number, description of submittal, and number of copies submitted.
- B. Submittals shall be transmitted or delivered directly to the office of the ENGINEER, as indicated in the Contract Documents or as otherwise directed by the ENGINEER.

3.03 PROCEDURES

- A. Action Submittals
 - 1. CONTRACTOR's Responsibilities
 - a. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work of other related Sections, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required). Coordinate with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. Extensions to the Contract Time will not be approved for the CONTRACTOR's failure to transmit submittals sufficiently in advance of the Work.
 - b. The submittals of all shop drawings (including working drawings and product data) shall be sufficiently in advance of construction requirements to allow for possible need of re-submittals, including the specified review time for the ENGINEER.
 - c. ENGINEER's review time for shop drawings and O&M manuals shall be no more than 30 calendar days. Resubmittals will be subject to the same review time.
 - d. Submittals of operation and maintenance data should be provided within 30 days of approval of the related shop drawing(s).
 - e. Before submission to the ENGINEER, review shop drawings as follows:
 - 1) Make corrections and add field measurements, as required.

SECTION 01300

SUBMITTALS

- 2) Use any color for its notations except red (reserved for the ENGINEER's notations) and black (to be able to distinguish notations on black and white documents).
 - 3) Identify and describe each deviation or variation from Contract Documents.
 - 4) Include the required CONTRACTOR's certification statement.
 - 5) Provide field measurements (as needed).
 - 6) Coordinate with other submittals.
 - 7) Indicate relationships to other features of the Work.
 - 8) Highlight information applicable to the Work and/or delete information not applicable to the Work.
- f. Submit the following number of copies:
- 1) Shop drawings (including working drawings and product data)- CONTRACTOR shall submit three hard copies of the submittals to be kept by the OWNER and ENGINEER. If the CONTRACTOR would like a copy returned, then the CONTRACTOR shall submit four hard copies of the submittals.
 - 2) Product Data – three copies
 - 3) Samples – as stated in the representative Sections.
 - 4) Site Usage Plan – One copy.
 - 5) Schedule of Values – One copy.
 - 6) Payment application format –One copy.
- g. If CONTRACTOR considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, provide written notice thereof to the ENGINEER immediately; and do not release for manufacture before such notice has been received by the ENGINEER.
- h. When the shop drawings have been completed to the satisfaction of the ENGINEER, carry out the construction in accordance therewith; and make no further changes therein except upon written instructions from the ENGINEER.
2. Engineer's Responsibilities
- a. ENGINEER will not review shop drawings (including working drawings and product data) that do not include the CONTRACTOR's approval stamp. Such submittals will be returned to the CONTRACTOR, without action, for correction.
 - b. Partial shop drawings (including working drawings and product data) will not be reviewed. If, in the opinion of the ENGINEER, a submittal is incomplete, that submittal will be returned to the CONTRACTOR for completion. Such submittals may be returned with comments from ENGINEER indicating the deficiencies requiring correction.
 - c. If shop drawings (including working drawings and product data) meet the submittal requirements, ENGINEER will forward copies to appropriate reviewer(s). Otherwise, noncompliant submittals will be returned to the CONTRACTOR without action – with the ENGINEER retaining one copy.
 - d. Submittals which are transmitted in accordance with the specified requirements will be reviewed by the ENGINEER within the time specified herein. The time for review will commence upon receipt of submittal by ENGINEER.

SECTION 01300

SUBMITTALS

3. Review of Shop Drawings (Including Working Drawings and Product Data) and Samples
 - a. The review of shop drawings, working drawings, data and samples will be for general conformance with the design concept and Contract Documents. They 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.
 - b. The CONTRACTOR remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
 - c. If the shop drawings (including working drawings and product data) or samples as submitted describe variations and indicate a deviation from the Contract requirements that, in the opinion of the ENGINEER are in the interest of the OWNER and are so minor as not to involve a change in Contract Price or Contract Time, the ENGINEER may return the reviewed drawings without noting an exception.
 - d. Only the ENGINEER will utilize the color "RED" in marking submittals.
 - e. Shop drawings will be returned to the CONTRACTOR with one of the following codes:
 - 1) Code 1 – "APPROVED" – This code is assigned when there are no notations or comments on the submittal. When returned under this code the CONTRACTOR may release the equipment and/or material for manufacture.
 - 2) Code 2 – "APPROVED AS NOTED" – This code is assigned when a confirmation of the notations and comments IS NOT required by the CONTRACTOR. The CONTRACTOR may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.
 - 3) Code 3 – "APPROVED AS NOTED/CONFIRM" – This combination of codes is assigned when a confirmation of the notations and comments is required by the CONTRACTOR. The CONTRACTOR may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the ENGINEER, within 15 calendar days of the date of the ENGINEER's transmittal requiring the confirmation.
 - 4) Code 4 – "APPROVED AS NOTED/RESUBMIT" – This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the entire package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the ENGINEER within 30 calendar days of the date of the ENGINEER's transmittal requiring the resubmittal.

SECTION 01300

SUBMITTALS

- 5) Code 5 – “NOT APPROVED/RESUBMIT” – This code is assigned when the submittal does not meet the intent of the contract documents. The CONTRACTOR must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the requirements of the contract documents.
 - 6) Code 6 – “REVIEWED” – This code is assigned to acknowledge receipt of a submittal that is not subject to the ENGINEER’s review and approval and is being filed for informational purposes only or the submittal contains signed and sealed drawings or calculations from another engineer.
 - 7) Codes 7 – “REVIEWED/RESUBMIT” – This code is assigned to a submittal that is incomplete or does not meet the intent of the contract documents. The CONTRACTOR must resubmit the entire package revised to bring the submittal into conformance.
4. Electronic Transmission
- a. ACTION SUBMITTALS may be transmitted by electronic means provided the following conditions are met:
 - 1) The above-specified transmittal form is included.
 - 2) All other requirements specified above have been met including, but not limited to, coordination by the CONTRACTOR, review and approval by the CONTRACTOR, and the CONTRACTOR’s Certification.
 - 3) The submittal contains no pages or sheets larger than 11 x 17 inches.
 - 4) With the exception of the transmittal sheet, the entire submittal is included in a single file.
 - 5) The electronic files are PDF format (with printing enabled).
 - 6) In addition, transmit three hard copy (paper) originals to the ENGINEER.
 - 7) The ENGINEER’s review time will commence upon receipt of the hard copies of the submittal.
 - 8) Submittals that require certification, corporate seal, or professional embossment (i.e. P.E.’s, Surveyors, etc.) transmit at least two hard-copy originals to the ENGINEER. In addition, provide additional photocopied or scanned copies, as specified above, showing the required certification, corporate seal, or professional seal.
- B. Informational Submittals
1. CONTRACTOR’s Responsibilities
 - a. Number of copies: Submit three copies, unless otherwise indicated in individual Specification sections.
 - b. Refer to individual technical Specification Sections for specific submittal requirements.
 2. Engineer’s Responsibilities
 - a. The ENGINEER will review each informational submittal within 10 days. If the informational submittal complies with the Contract requirements, ENGINEER will file for the project record and transmit a copy to the

SECTION 01300

SUBMITTALS

- OWNER. ENGINEER may elect not to respond to CONTRACTOR regarding informational submittals meeting the Contract requirements.
- b. If an informational submittal does not comply with the Contract requirements, ENGINEER will respond accordingly to the CONTRACTOR within 15 days. Thereafter, the CONTRACTOR shall perform the required corrective action, including retesting, if needed, until the submittal, in the opinion of the ENGINEER, is in conformance with the Contract Documents.
3. Electronic Transmission
- a. INFORMATIONAL SUBMITTALS may be transmitted by electronic means providing all of the following conditions are met:
 - 1) The above-specified transmittal form is included.
 - 2) The submittal contains no pages or sheets larger than 11 x 17 inches.
 - 3) With the exception of the transmittal sheet, the entire submittal is included in a single file.
 - 4) The electronic files are PDF format (printing enabled).
 - 5) Submittals that require certification, corporate seal, or professional embossment (i.e. P.E.'s, Surveyors, etc.) transmit two hard-copy originals to the ENGINEER.

END OF SECTION 01300

SECTION 01300

SUBMITTALS

ATTACHMENT A

Professional Design Services Performance Certification

1. My name is _____

2. My Florida State Professional Engineering License number is _____

3. My license expires _____, _____

4. The Project for which I have performed professional design services is described as:

5. The Specification Section(s) under which I have performed my services is/are:

6. The name and address of the individual or entity for whom I have performed my professional design services is:

SECTION 01300

SUBMITTALS

ATTACHMENT A (continued)

Professional Design Services Performance Certification (continued)

7. I hereby certify that, to the best of my knowledge, information and belief, I have performed or supervised the performance of the professional design services hereunder, and that said services have been performed in accordance with all applicable local, state and federal codes, rules and regulations and in accordance with the standard of care currently expected of professional engineers/architects performing similar services for projects of similar size and complexity in the State of Florida.

Signature

Typed or Printed Name

Name of Firm

Street Address

[SEAL] _____
City/State/Zip Code

Telephone: _____

Fax: _____

SECTION 01310

CONSTRUCTION SCHEDULING

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. A Critical Path Method (CPM) construction schedule shall be used to control the work of this Contract and to provide a definitive basis for determining job progress. The construction schedule shall be prepared and maintained by the CONTRACTOR/TANK CONTRACTOR. All work shall be done in accordance with the established CPM schedule; and, the CONTRACTOR and all SUBCONTRACTORS shall be responsible for cooperating fully in effectively utilizing the CPM schedule.
 - 1. The CONTRACTOR shall coordinate with the electrical CONTRACTOR and tank CONTRACTOR on the project schedule throughout the duration of the project.
- B. The CPM schedule to be prepared and submitted by the CONTRACTOR shall consist of a CPM network (diagram of activities), a computer-generated schedule (print-out), and reports as specified herein.
- C. Computer-based schedule shall be completed in either Oracle-Primavera, P6 Profession Project Management, or Microsoft Project.

1.02 QUALIFICATIONS

- A. The CONTRACTOR shall have the capability of preparing and utilizing the specified CPM scheduling technique. A written statement of CPM capability shall be submitted by the successful bidder that will verify the CONTRACTOR's organization has in-house capability qualified to use the technique, or that the CONTRACTOR employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the CONTRACTOR or his/her consultant has successfully applied the CPM scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of a computer-based CPM schedule. The submittal shall include the name of the individual on the CONTRACTOR's staff who will be responsible for the CPM schedule and for providing the required updating information.

1.03 NETWORK REQUIREMENTS

- A. The network of activities shall show the order and inter-dependence of activities and the sequence in which the work is to be accomplished as planned by the CONTRACTOR. The basic concept of a network analysis diagram shall be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.
- B. Detailed network activities shall include: the procurement of major materials and equipment, fabrication of materials and equipment and their delivery, construction activities, installation and testing, start-up and training. Break the work into activities with durations no longer than 20 working days each, except as to non-construction activities (such as procurement of materials and delivery of equipment) and any other activities for which the ENGINEER may concur showing longer duration. To the

SECTION 01310

CONSTRUCTION SCHEDULING

extent feasible, activities related to a specific physical area of the work shall be grouped on the network for ease of understanding and simplification.

- C. Separate activities shall be provided for each significant identifiable function in each trade area in each facility. Activities shall be so identified to clearly indicate the work included in each activity.
- D. Each activity on the network shall have the following indicated:
 - 1. Unique activity identification number
 - 2. Activity description
 - 3. Original duration
 - 4. Remaining duration
 - 5. Early start date
 - 6. Early finish date
 - 7. Late start date
 - 8. Late finish date
 - 9. Total float
- E. The selection and number of activities shall be subject to the ENGINEER's approval.
- F. The ENGINEER's review will only be for conformance with the Contract time and those sequences of work indicated in or required by the contract documents. After review, the ENGINEER will return the CPM schedule submittal to the CONTRACTOR as either "Amend and Resubmit" or "No Exceptions Taken". Submittal stamped as "No Exceptions Taken" will represent the most-current Contract Schedule as of the date of the submittal. Neither the ENGINEER's review of a CPM Schedule, nor the ENGINEER's statement of "No Exceptions Taken", will relieve the CONTRACTOR from responsibility for complying with the Contract Time required by the Contract Documents, or from completing any omitted Work within the Contract Time(s).

1.04 SUBMITTALS

- A. Submit as per Section 01300. Each computer-generated schedule submittal from the CPM activity network shall include the following minimum items:
 - 1. Activity details (specified in Paragraph 1.03 D)
 - 2. Graphic presentation of the CPM network
 - 3. Project information
 - 4. Schedule shall show the following:
 - a. Duration
 - b. Start date (effective date of the Notice to Proceed)
 - c. Fixed milestones (completion dates)
 - d. Floating milestones (phasing or staging goals, as specified)
 - e. Special construction sequences, as specified
 - f. Substantial and final completion
 - g. Identify the critical path
 - h. Identify work calendar (work days vs. calendar days)
 - i. Allowances for normal weather
 - j. Holidays to be observed by the CONTRACTOR's workforce

SECTION 01310

CONSTRUCTION SCHEDULING

- B. Each schedule submitted shall include the following reports:
 - 1. List of Activities (sorted by activity number)
 - 2. Early Start
 - 3. Total Float
 - 4. Predecessors/Successors

1.05 IMPLEMENTATION SCHEDULE

- A. Within 15 days following the receipt of the Notice to Proceed, submit an Interim Schedule indicating the planned operations during the first 60 calendar days after Notice to Proceed. The general approach for the balance of the project shall be indicated.
- B. Within 30 days following the receipt of Notice to Proceed, provide a detailed schedule showing the entire Scope of Work.
- C. ENGINEER's review of the schedule submittals shall not relieve CONTRACTOR from responsibility for any deviations from the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to such deviations at the time of submission and ENGINEER has given written concurrence to the specific deviations, nor shall any concurrence by ENGINEER relieve CONTRACTOR from responsibility for errors and omissions in the submittals. Concurrence of the CPM Activity Network by the ENGINEER is advisory only and shall not relieve the CONTRACTOR of responsibility for accomplishing the work within the Contract completion date(s).
- D. Upon acceptance of, or concurrence by the OWNER of the CONTRACTOR's Detailed Schedule, the Detailed Schedule shall be recognized as the CONTRACTOR's baseline or as-planned project schedule. The baseline or as-planned schedule shall not include any actual progress earned during its development.
- E. Once the baseline or as-planned schedule is complete, updates of the Interim Schedule shall be discontinued and subsequent schedule updates shall be based on the baseline schedule.
- F. Any requests to changes that affect the schedule for the project shall be submitted with justification and within the timelines as per SJCUD general conditions.

1.06 PROGRESS REPORTING

- A. CONTRACTOR shall submit monthly status reports (updates) of the CPM schedule. At each monthly progress meeting, the CONTRACTOR and ENGINEER shall meet at the jobsite and jointly evaluate the status of each activity on which work has started or is due to start, based on the preceding CPM schedule; to show actual progress, to identify those activities started and those completed during the previous period, to show the estimated time required to complete or the percent complete of each activity started but not yet completed and to reflect any changes indicated for the network. Activities shall not be considered to be complete until they are, in fact, 100 percent complete.

SECTION 01310

CONSTRUCTION SCHEDULING

- B. At each progress meeting, submit a narrative report based on the CPM schedule evaluation described above, in a format agreed upon by the CONTRACTOR and the ENGINEER. The report shall include a description of the progress during the previous period in terms of completed activities, an explanation of each activity which is showing a delay, a description of problem areas, current and anticipated delaying factors and their estimated impact on performance of other activities and completion dates and an explanation of corrective action taken or proposed. This report, as well as the CPM Status Report, will be discussed at each progress meeting.

1.07 RESPONSIBILITY FOR SCHEDULE COMPLIANCE

- A. Whenever it becomes apparent from the current CPM schedule and CPM Status Report that delays to the critical path have resulted and the contract completion date will not be met, or when so directed by the ENGINEER, take some or all of the following actions at no additional cost to the OWNER. Submit to the ENGINEER for approval, a written statement of the steps intended to take to remove or arrest the delay to the critical path in the approved schedule.
 1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.
 2. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work.
 3. Reschedule activities to achieve maximum practical concurrence of accomplishment of activities and comply with the revised schedule.
- B. If when so requested by the ENGINEER, failure to submit a written statement of the steps intended to take or should fail to take such steps as approved by the ENGINEER, the ENGINEER may direct the CONTRACTOR to increase the level of effort in man-power (trades), equipment and work schedule (overtime, weekend and holiday work, etc.) to be employed by the CONTRACTOR in order to remove or arrest the delay to the critical path in the approved schedule and the CONTRACTOR shall promptly provide such level of effort at no additional cost to the OWNER.

1.08 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME

- A. If the CONTRACTOR desires to make changes in his/her method of operating which affect the current contract CPM schedule, the CONTRACTOR shall notify the ENGINEER in writing stating what changes are proposed and the reason for the change. After the ENGINEER reviews the changes, the CONTRACTOR shall revise and submit the network schedule, without additional cost to the OWNER, all of the affected portions of the CPM network. The CPM schedule shall be adjusted by the CONTRACTOR only after prior review of his/her proposed changes by the ENGINEER. Adjustments may consist of changing portions of the activity sequence, activity durations, division of approved activities, or other adjustments. The addition of extraneous, non-working activities and activities which add unapproved restraints to the CPM schedule are not allowed.
- B. If the completion of any activity, whether or not critical, falls more than 100 percent behind its current schedule duration, submit a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.

SECTION 01310

CONSTRUCTION SCHEDULING

- C. Shop drawings which are not approved on the first submittal or within the schedule time and equipment which do not pass the specified tests shall be immediately rescheduled.
- D. The contract completion time will be adjusted only for causes specified in this Contract. In the event the CONTRACTOR requests an extension of any contract completion date, he/she shall furnish such justification and supporting evidence as the ENGINEER may deem necessary to determine whether the CONTRACTOR is entitled to an extension of time under the provisions of this Contract. The ENGINEER will, after receipt of such justification and supporting evidence, make findings of fact and will advise the CONTRACTOR in writing thereof. If the ENGINEER finds that the CONTRACTOR is entitled to any extension of any contract completion date, the ENGINEER's determination as to the total number of days extension shall be based upon the current contract CPM schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule. Actual delays in activities which, according to the CPM schedule, do not affect any contract completion date shown by the critical path in the network will not be the basis for a change therein.
- E. Each request for change in any contract completion date shall be submitted by the CONTRACTOR to the ENGINEER within 30 days after the beginning of the delay for which a time extension is requested but before the date of final payment under this Contract. No time extension will be granted for requests which are not submitted within the foregoing time limit.
 - 1. From time to time it may be necessary for the contract schedule or completion time to be adjusted by the OWNER to reflect the effects of job conditions, unusual weather, technical difficulties, strikes, unavoidable delays on the part of the OWNER or its representatives and other unforeseeable conditions which may indicate schedule adjustments or completion time extensions. Under such conditions, the ENGINEER will direct the CONTRACTOR to reschedule the work or contract completion time to reflect the changed conditions and the CONTRACTOR shall revise his/her schedule accordingly. No additional compensation will be made to the CONTRACTOR for such schedule changes except for unavoidable overall contract time extensions beyond the actual completion of all unaffected work, in which case the CONTRACTOR shall take all possible action to minimize any time extension and any additional cost to the OWNER. Available float time in the CPM schedule may be used by the OWNER as defined by the ENGINEER, as well as by the CONTRACTOR.
- F. The OWNER controls the float time in the contract CPM network and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates set out in the CPM network, the OWNER may initiate changes to the work that absorb float time only. OWNER initiated changes that affect the critical path on the approved CPM network shall be the sole grounds for extending (or contracting) said completion dates. CONTRACTOR- initiated changes that encroach on the float time identified in the approved CPM network may be accomplished with the OWNER's concurrence. Such changes, however, shall give way to OWNER-initiated changes competing for the same float time.

END OF SECTION 01310

SECTION 01370

SCHEDULE OF VALUES AND SCHEDULE OF ASSETS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Submit to the ENGINEER a schedule of values and schedule of assets allocated to the various portions of the Work, within 14 days after the effective date of the Agreement.
- B. Upon request of the ENGINEER, support the values with data which will substantiate their correctness.
- C. The schedule of values, unless objected to by the ENGINEER, shall be used only as the basis for the CONTRACTOR's applications for payment.

1.02 RELATED REQUIREMENTS

- A. Standard General Conditions of the Construction Contract are included in the Front End Documents.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on an 8-1/2-inch x 11-inch or 8-1/2-inch x 14-inch white paper furnished by the OWNER; CONTRACTOR's standard forms and automated printout will be considered for approval by the ENGINEER upon CONTRACTOR's request. Identify schedule with:
 - 1. Title of Project and location.
 - 2. ENGINEER and Project number.
 - 3. Name and Address of CONTRACTOR.
 - 4. Contract designation.
 - 5. Date of submission.
- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Identify each line item with the number and title of the respective major section of the specifications.
- D. For each major line item, also list sub-values of major products or operations.
- E. For the various portions of the Work:
 - 1. Each item shall include a directly proportional amount of the CONTRACTOR's overhead and profit.
 - 2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the ENGINEER.
 - b. The total installed value.
- F. The sum of all values listed in the schedule shall equal the total Contract Sum.

SECTION 01370

SCHEDULE OF VALUES AND SCHEDULE OF ASSETS

- G. Any items on the bid form denoted as allowances shall be accompanied with actual receipts showing the actual costs. The OWNER will only reimburse the CONTRACTOR for actual costs incurred and shall not include any additional markups. All remaining unused allowance amounts will be returned to the OWNER at the end of construction.
- H. Any items on the bid form denoted as unit price items shall be field verified by the ENGINEER and/or RPR for each payment application. All remaining unused portions of each unit price item will be returned to the OWNER at the end of construction.

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a sub-schedule of unit costs and quantities for:
 - 1. Products on which progress payments will be requested for stored products.
- B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.
- C. The unit quantity for bulk materials shall include an allowance for normal waste.
- D. The unit values for the materials shall be broken down into:
 - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 - 2. Copies of invoices for component material shall be included with the payment request in which the material first appears.
- E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

1.05 FORM AND CONTENT OF SCHEDULE OF ASSET VALUES

- A. For each asset listed, provide a constructed cost which will include an allocation of construction activities including but not limited to, demolition, sitework, specialties, materials, labor, general conditions, and overhead and profit associated with the construction of the asset.
- B. The combined value of the assets will equal the bid price for the project and will require adjustments as necessary due to change orders. The schedule of asset values will be updated on a monthly basis and will be included in the monthly pay request application for approval.
- C. The OWNER reserves the right to edit this list prior to the first pay application and may add up to 10 percent more items than have been identified in the list.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01370

SECTION 01390

CONSTRUCTION PHOTOGRAPHS AND VIDEOTAPING

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. CONTRACTOR and TANK CONTRACTOR shall provide competent photographer to take preconstruction video and photographs throughout the project.

1.02 PHOTOGRAPHY REQUIRED

- A. A preconstruction video is required to be taken within four weeks prior to the start of construction. The preconstruction video is required to document the existing site conditions including CR 208 and Agricultural Center Drive to establish a baseline for the existing conditions. The preconstruction video shall be on DVD format and will provide the date and time of the video on the recording during playback. They should be submitted to the OWNER and ENGINEER for review.
- B. Views and quantities for photography shall include:
 - 1. All photography shall be digitally produced and electronically maintained. Provide the electronic copies of photos to the ENGINEER and OWNER.
 - 2. Photographer shall agree to furnish additional prints to CONTRACTOR and OWNER at commercial rates applicable at time of purchase. Photographer shall also agree to participate as required in any litigation requiring the photographer as an expert witness.
 - 3. The photographer shall provide the electronic records of the digital photographs to CONTRACTOR and OWNER with copyrights assigned to the OWNER.

1.03 COSTS OF PHOTOGRAPHY

- A. The CONTRACTOR shall pay costs for specified photography and prints. Additional prints beyond those specified here shall be charged to interested party.

1.04 OWNERSHIP OF PROPERTY

- A. Upon receipt of the photographs, the OWNER will be deemed owner of the photographs.

PART 2 – PRODUCTS

2.01 PHOTOGRAPHS AND VIDEOS

- A. Color
 - 1. Paper: Single weight, color print paper.
 - 2. Finish: Smooth surface glossy.
 - 3. Photograph Size: 8½-inch x 11-inch

SECTION 01390

CONSTRUCTION PHOTOGRAPHS AND VIDEOTAPING

- B. Provide properly labeled CDs with electronic records of all photographs with identification for exposure number, orientation of view, and date of exposure.

PART 3 – EXECUTION

3.01 TECHNIQUE

- A. Factual presentation
- B. Correct exposure and focus
 1. High resolution and sharpness
 2. Maximum depth-of-field
 3. Minimum distortion

3.02 AUDIOVISUAL RECORDING

- A. The recordings shall contain coverage of all surface features within the construction zone of influence. These features shall include, but not be limited to, all features of existing utilities and structures within the SJC right-of-way and County property, landscaping and landscape buffer area, trees, and fences. Of particular concern shall be the existence or non-existence of any faults, fractures or defects.
- B. Video coverage shall include all surface conditions located within the zone of influence supported by appropriate audio description. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the object.
- C. Accompanying the video recording of each video tape shall be a corresponding and simultaneously recorded audio recording. This audio recording, exclusively containing the commentary of the camera operator, shall assist in viewer orientation and in any needed identification, differentiation, clarification, or objective description of the features being shown in the video portion of the recording. The audio recording shall also be free from any conversation between the camera operator and any other production technicians.
- D. Visibility: All recording shall be performed during times of good visibility; no recording shall be done during periods of significant precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subject and to produce sharp, bright video recordings of those subjects.
- E. In order to ensure the continuity of coverage, the coverage shall consist of a single continuous unedited recording which begins at one end of the construction area.
- F. The average rate of travel during a particular segment of coverage shall be directly proportional to the number, size, and value of the surface features within that construction area's zone of influence.

SECTION 01390

CONSTRUCTION PHOTOGRAPHS AND VIDEOTAPING

G. Camera Operation

1. Camera Height and Stability: When conventional wheeled vehicles are used as conveyances for the recording system, the vertical distance between the camera lens and the ground shall not exceed 10 feet. The camera shall be firmly mounted such that transport of the camera during the recording process will not cause an unsteady picture.
2. Camera Control: Camera pan, tilt, zoom-in and zoom-out rates shall be sufficiently controlled such that recorded objects shall be clearly viewed during video tape playback. In addition, all other camera and recording system controls, such as lens focus and aperture, video level, pedestal, white balance and electrical focus shall be properly controlled or adjusted to maximize picture quality.
3. Viewer Orientation Techniques: The audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views of all visible house and business addresses shall be utilized. In areas where the proposed construction location will not be readily apparent to the video tape viewer, highly visible yellow flags shall be placed, by the CONTRACTOR, in such a fashion as to clearly indicate the proposed center line of construction.

END OF SECTION 01390

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The CONTRACTOR and tank CONTRACTOR will employ and pay for the services of an independent testing laboratory to perform testing specifically indicated in the Contract Documents. This testing includes all required testing to determine soil/density, concrete compressive strength, asphalt testing, and reinforcement testing.
 - 1. CONTRACTOR(S) shall cooperate with the laboratory to facilitate the execution of its required services.
- B. The OWNER will reimburse the CONTRACTOR(S) for the costs of all passing laboratory tests from the laboratory based on actual invoices. Failed tests will be back-charged to the CONTRACTOR(S) at the time of final payment. All required testing shall be coordinated with and scheduled by the CONTRACTOR(S).
- C. Payment shall be made from the testing allowance shown in the Bid Form. Any costs for coordination of these efforts, markups, or incidentals by the CONTRACTOR(S) shall be included in the CONTRACTOR'S bid and will not be allowed as part of the allowance.
- D. SJCUD will be responsible for any required water quality testing and bacteriological clearance of water mains and or other potable water components.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
- B. Respective sections of specifications: Certification of products.
- C. Each specification section listed: Laboratory tests required, and standards for testing.
- D. Testing Laboratory inspection, sampling and testing is required for but not limited to the following:
 - 1. Section 02100: Site Preparation
 - 2. Section 02220: Excavating, Backfilling, and Grading for Structures
 - 3. Section 02221: Trenching, Bedding, and Backfill for Pipes, and Site Earthwork
 - 4. Section 02400: Graded Aggregate Base
 - 5. Section 02610: Site Drainage
 - 6. Section 03300: Cast-in-Place Concrete
 - 7. Section 13216: Wire Wrapped Prestressed Concrete Tank

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.

SECTION 01410

TESTING AND TESTING LABORATORY SERVICES

2. Approve or accept any portion of the Work.
3. Perform any duties of the CONTRACTOR(S).

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 material mixes which require control by the testing laboratory.
- D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The ENGINEER may require the CONTRACTOR(S) to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the CONTRACTOR(S), and no extra charge to the OWNER shall be allowed on account of such testing and certification.
- E. 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.
- F. 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.
 2. All testing shall be coordinated by the CONTRACTORS and all testing shall be witnessed by the RPR or OWNER's Representative.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01410

SECTION 01465

EQUIPMENT TESTING AND STARTUP

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR and ELECTRICAL CONTRACTOR shall provide a competent field services technician of the manufacturers of all equipment furnished under Divisions 11, 15, and 16 to supervise installation, adjustment, initial operating and testing, performance testing, final acceptance testing and startup of the equipment.

1.02 RELATED WORK

- A. Submittals are included in Section 01300.
- B. Operation and maintenance data is included in Section 01730.
- C. Performance and acceptance testing and startup requirements are included in the respective sections of Division 11, 15 and 16.

1.03 SUBMITTALS

- A. The CONTRACTOR and ELECTRICAL CONTRACTOR shall provide the name, address, and resume of proposed field services technicians at least 30 days in advance of the need of such services.
- B. Submit, in accordance with Section 01300, detailed testing procedures for shop tests, field performance tests, and final acceptance tests as specified in various equipment specifications.
- C. Submittals shall include at a minimum the following:
 - 1. Testing schedule including proposed dates and times of testing.
 - 2. Summary of power, lighting, chemicals, water, sludge, gas, etc. needs and identification of who will provide them.
 - 3. Outline specific assignments of the responsibilities of the CONTRACTOR and ELECTRICAL CONTRACTOR and manufacturer's factory representative or field personnel.
 - 4. Detailed description of step-by-step testing requirements with reference to appropriate standardized testing procedures and laboratory analyses by established technical organizations (e.g. ASTM, Standard Methods, etc.)
 - 5. Sample of forms that will be used to collect and record test data and to present tabulated test results.
- D. Provide copies of all final testing reports including field, shop, performance, and acceptance testing.

1.04 QUALITY ASSURANCE

- A. Field service technicians shall be competent and experienced in the proper installation, adjustment, operation, testing, and startup of the equipment and systems being installed.

SECTION 01465

EQUIPMENT TESTING AND STARTUP

- B. Manufacturer's sales and marketing personnel will not be accepted as field service technicians.

PART 2- GENERAL (NOT USED)

PART 3- EXECUTION

3.01 PRELIMINARY REQUIREMENTS

- A. After installation of the equipment has been completed and the equipment is presumably ready for operation, before it is operated by others, the manufacturer's field service technician shall inspect, operate, test and adjust the equipment. The inspection shall include at least the following points where applicable:
 1. Soundness (without crack or otherwise damaged parts).
 2. Completeness in all details and as specified and required.
 3. Correctness of setting, alignment, and relative arrangement of various parts.
 4. Adequacy and correctness of packing, sealing, and lubricants.
- B. Upon completion of this work, the manufacturer's field service technician shall submit a signed report of his/her inspection, operation, adjustments, and tests.

3.02 WITNESS REQUIREMENTS

- A. Shop tests or factory tests may be witnessed by the OWNER and/or ENGINEER, as required by the various equipment specifications. Factory test reports must be provided and approved prior to shipment of any equipment to the site.
- B. Field performance and acceptance tests shall be performed in the presence of the OWNER and/or ENGINEER.

3.03 STARTUP AND ACCEPTANCE OF THE WORK

- A. General requirements
 1. Successfully execute the step-by-step procedure of startup and performance demonstration specified herein.
 2. The startup and performance demonstration shall be successfully executed prior to Substantial Completion and acceptance by the OWNER of the booster station and GST installation and related systems.
 3. All performance tests and inspections shall be scheduled at least 5 working days in advance or as otherwise specified by the OWNER and the ENGINEER. All performance tests and inspections shall be conducted during the work week of Monday through Thursday, unless otherwise specifically authorized.
 4. CONTRACTOR shall coordinate and schedule with ELECTRICAL CONTRACTOR on all startup activities, testing, and acceptance of work.
- B. Preparation for Startup
 1. Upon completion of the installation of the Work, all related systems shall be flushed with potable water and hydraulically water tightness tested for 24 hours and checked for leaks, cracks, and defects. Refer to Section 03300

SECTION 01465

EQUIPMENT TESTING AND STARTUP

2. Paragraph 3.15 H for additional requirements related to watertightness testing of structures.
 3. All mechanical and electrical equipment shall be checked to ensure that it is in good working order and properly connected. Preliminary run-ins of the pumps, fans, and other remaining equipment shall be made. Each equipment manufacturer shall certify the system is ready for operation. All systems shall be cleaned and purged as required. All sumps, tanks, basins, chambers, pump wells, and pipelines which are hydraulically checked shall be drained and returned to their original condition once the testing is completed.
 4. All instruments and controls shall be calibrated through their full range. All other adjustments required for proper operation of all instrumentation and control equipment shall be made.
 5. No testing or equipment operation shall take place until it has been verified by the ENGINEER that all specified safety equipment has been installed and is in good working order.
- C. Facilities Startup
1. Startup period shall not begin until all new equipment have been tested as specified and are ready for operation. The OWNER shall receive spare parts, safety equipment, tools, and maintenance equipment, lubricants, and approved O&M manuals prior to startup. All valve tagging shall also be completed prior to startup.
 2. **All instrumentation and SCADA shall be tested and able to operate completely in automatic mode.** Perform field operational tests including all SCADA and automatic functions prior to startup. This shall be implemented and demonstrated to confirm that the station is ready to begin the 5-day operational test required for substantial completion. Operation is "hand" without all instruments, SCADA, and controls in place is not an acceptable means to dictate startup. All programming and controls shall be performed by an OWNER approved Instrumentation System Supplier (ISS).
 3. In the event of failure to demonstrate satisfactory performance of the facility on the first or any subsequent attempt, all necessary alterations, repairs, and replacements shall be made. When the facility is again ready for operation, it shall be brought on line, and a new test shall be started. This procedure shall be repeated until the facility has operated continuously to the satisfaction of the OWNER and ENGINEER for the specified duration.
 4. The OWNER will furnish all operating personnel (other than vendor's or subcontractor's) needed to operate equipment during the testing period; however, said personnel will perform their duties under the CONTRACTOR'S direct supervision. Until the performance testing is completed, and units and systems are accepted by the OWNER as substantially complete, the CONTRACTOR shall be fully responsible for the operation and maintenance of the facilities.
 5. The OWNER will provide all water and electricity required for the testing. However, the CONTRACTOR shall provide all necessary personnel (field, vendor, subcontractors) on an 8 hour per day basis at the facilities on a 24 hour per day basis locally during the startup period. All chemicals for performance testing and startup shall be provided by the OWNER. Major equipment suppliers shall include, but not be limited, to the following:
 - a. Vertical turbine can pumps
 - b. HVAC system

SECTION 01465

EQUIPMENT TESTING AND STARTUP

- c. Electrical equipment including generator and ATS
 - d. Instrumentation and control equipment
6. Do not, at any time during startup, allow for the facility to be operated in a manner which subjects equipment to conditions that are more severe than the maximum allowable operating conditions for which the equipment was designed.

END OF SECTION 01465

SECTION 01500

TEMPORARY FACILITIES

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This Section includes general requirements relating to CONTRACTOR's (including tank CONTRACTOR and electrical CONTRACTOR) responsibilities for temporary construction facilities.

1.02 CONSTRUCTION FACILITIES

A. General

1. Temporary facilities and protective devices include, but are not necessarily limited to, temporary barricades, fences, bridges, guards, temporary utilities, steel plates over trenches, maintenance of traffic, project identification signs, and construction of haul roads.
2. Use materials of size, shape, and strength suitable for intended use, in construction of the above.
3. Conduct construction operations to cause least inconvenience possible to the County staff and ENGINEER.
4. Where required, erect and maintain signs, fences, barricades, and pedestrian bridges, and supply guards and flagmen for protection of public.
5. Obtain ENGINEER's approval before transporting or locating temporary facilities within construction site.
6. All facilities must comply and be installed as per the Florida Building Code latest edition.

B. Temporary Fencing

1. Furnish and construct, as required, to fence off excavation, storage, and operating areas.
2. Erect suitably constructed temporary fences, neat in appearance, and meeting ENGINEER's approval.
3. Unless otherwise indicated, fences shall be 6-feet high.

C. Barricades

1. Barricade or close openings in roadways, floors, walls, or other parts of structures or walkways while openings are not in regular use.
2. Use barricades that are structurally sound, suitable for intended use, neat in appearance, and of size and arrangement, as approved by the ENGINEER.

D. Field Office Facilities for the CONTRACTORS

1. An office trailer is not required but will be allowed should the CONTRACTORS prefer. If preferred, the CONTRACTORS shall furnish adequate field office facilities for his own use during the execution of this Contract.
2. Pay for installation, maintenance, and monthly electric service, internet, and telephone charges in this office.
3. Pay for installation, maintenance, and monthly service charges for potable water and toilet facilities for this office.
4. Provide portable UL-rated, Class A fire extinguishers for site offices and similar spaces. In other locations, provide portable UL-rated Class ABC dry chemical extinguishers or a combination of NFPA recommended classes for the

SECTION 01500

TEMPORARY FACILITIES

exposure. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

1.03 TEMPORARY UTILITIES

- A. Water
 - 1. The OWNER shall furnish potable water required during entire construction period for the contract at no cost to the CONTRACTOR.
 - 2. CONTRACTOR shall make the necessary arrangements for connection, provide all piping, backflow devices, and appurtenances required.
 - 3. Assure the availability of drinking water for his work force.
 - 4. Provide temporary pumps, tanks and compressors as necessary to produce required pressures.

- B. Electricity: Each CONTRACTOR shall make necessary arrangements and pay for all temporary electric service and lighting required during construction period. The CONTRACTOR shall pay costs for temporary power and used during construction period through the date of Contract final completion.
 - 1. Ensure electric service of sufficient capacity and characteristics to supply proper current for various types of construction tools, motors, welding machines, light, heating plant, pumps, testing, and other work required.
 - 2. Install necessary temporary wiring, panelboards, outlets, switches, lamps, fuses, controls and accessories.

- C. Toilets: Maintain adequate number of temporary prefabricated chemical type toilets, unless otherwise indicated, with proper enclosures for use of workers during construction.
 - 1. Locate toilets where directed.
 - 2. Keep toilets clean and comply with local and State health requirements and sanitary regulations.
 - 3. Keep locked during non-working hours.

- D. Communications
 - 1. Provide DSL phone line or T1 cable line with internet access or wireless cable as an alternative for the duration of the project.
 - 2. Pay all costs for installation, maintenance, and removal of the telephone and internet service and instruments, including cellular phone service. The monthly cost of all calls made and received by the CONTRACTOR and Subcontractors, including long distance calls, shall be paid for by the CONTRACTOR for the duration of the project.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01500

SECTION 01501

CONTROL OF WORK

PART 1 – GENERAL

1.01 PLANT

- A. The CONTRACTOR, electrical CONTRACTOR, and tank 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 ensure the completion of the work within the time stipulated in the Proposal. If any time such personnel appears to the ENGINEER to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the CONTRACTORS to increase the efficiency, change the character or increase the personnel and equipment, and the CONTRACTORS shall conform to such order. Failure of the ENGINEER to give such order shall in no way relieve the CONTRACTORS of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

- A. The CONTRACTORS shall not enter or occupy private land outside of easements, except by permission of the OWNER.

1.03 PIPE LOCATIONS

- A. Pipelines 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 barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The CONTRACTORS 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. The length of open trench will be controlled by the surrounding conditions but shall always be confined to the limits prescribed by the ENGINEER. 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 CONTRACTORS 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 well lighted at night.

SECTION 01501

CONTROL OF WORK

1.05 TEST PITS

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the CONTRACTORS as required to complete the work and/or at the direction of the ENGINEER. 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.

1.06 MAINTENANCE OF TRAFFIC

- A. The CONTRACTORS shall always maintain roadways for emergency vehicles.
- B. The CONTRACTOR shall follow an established MOT plan for tie-in work along CR-208 and Agricultural Center Drive. All MOT plans shall be approved by the ENGINEER, OWNER, and through St. Johns County ROW.

1.07 CARE AND PROTECTION OF PROPERTY

- A. The CONTRACTORS shall be responsible for the preservation of all public and private property and 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 CONTRACTORS, the CONTRACTORS shall restore such property to a condition similar or equal to that existing before the damage was done, or make good the damage in other manner acceptable to the ENGINEER.

1.08 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The CONTRACTORS shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables, whether or not they are shown on the Drawings. The CONTRACTORS shall carefully support and protect all such structures and utilities from injury of any kind. Immediately repair any damage resulting from the construction operations.
- B. Assistance will be given to the CONTRACTORS in determining the location of existing services. The CONTRACTORS, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain, and sewers). The CONTRACTORS shall maintain services to buildings and pay costs or charges resulting from damage thereto.
- C. The CONTRACTORS shall notify all utility companies in writing at least 72 hours (excluding Saturdays, Sundays and Legal holidays) before excavating in any public way.
- D. If, in the opinion of the ENGINEER, permanent relocation of a utility owned by the OWNER is required, the ENGINEER may direct the CONTRACTORS, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices or through an agreed upon change order.

SECTION 01501

CONTROL OF WORK

- E. Along the proposed pipe lines as indicated on the plans, the CONTRACTORS shall remove the surface materials only to such widths as will permit a trench to be excavated which will afford sufficient room for proper efficiency and proper construction. All applicable regulations shall be followed. Where sidewalks, driveways, pavements, and curb and gutter are encountered, care shall be taken to protect against fracture or disturbance beyond reasonable working limits. All fractured, broken, or disturbed surfaces shall be restored to their original condition prior to completion of the work.
- F. Lawn areas shall be left in as good or better condition as before starting the work. Where sod is to be removed, it shall be carefully restored with new sod of the same type. Solid sodding shall be placed on all slopes greater than 4:1, within 10 feet of all proposed structures and where existing sod is removed or disturbed by the work. In addition, CONTRACTORS shall restore all storm drains, culverts, inlets, and storm manholes to equal or better condition.
- G. Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the CONTRACTORS and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired and replaced and the materials used shall be subject to the approval of the ENGINEER.
- H. All trees and shrubs not shown to be removed on the plans shall be protected by the CONTRACTORS at his expense. No excavated materials shall be placed so as to injure such trees and shrubs. Trees or shrubs destroyed by negligence of the CONTRACTORS or his employees shall be replaced by him with new stock of similar size and age at the sole expense of the CONTRACTORS.

1.09 POTABLE WATER FOR CONSTRUCTION PURPOSES

- A. The CONTRACTOR will be allowed to use potable water without charge for construction purposes.
- B. Potable water for use in water tightness testing shall be provided to the CONTRACTOR(S) free of charge but the necessary piping and or appurtenances to provide water to the tank shall be provided by the CONTRACTOR(S). The CONTRACTOR(S) will be required to coordinate with the SJCUD on the rate and times for filling tanks to avoid causing low pressure within the system.

1.10 MAINTENANCE OF FLOW

- A. The CONTRACTORS shall provide for the flow of sewers, drains and water courses interrupted during the progress of the work, and immediately cart away and remove all offensive matter. Discuss the entire procedure of maintaining existing flow with the ENGINEER at least seven (7) days prior to the interruption of any flow.

1.11 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, the CONTRACTORS shall keep the site of operations as clean and neat as possible. The CONTRACTORS shall dispose of all residue resulting from the construction work and, after the work, remove and haul away any

SECTION 01501

CONTROL OF WORK

surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations and leave the entire site of the work in a neat and orderly condition.

- B. To prevent environmental pollution arising from the construction activities related to the performance of this Contract, the CONTRACTORS shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and in other related sections.
- C. Disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property OWNER is obtained. Any violation of this restriction by the CONTRACTORS or any person employed by him will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. The CONTRACTORS will be required to remove the fill and restore the area impacted at no increase in the Contract Price.

1.12 GRADES, SURVEY LINES, AND PROTECTION OF MONUMENTS

- A. All work shall be constructed in accordance with the lines and grades shown on the drawings. The full responsibility for keeping alignment and grade shall rest upon the CONTRACTORS.
- B. Bench marks and base line controlling points shall be established prior to beginning work. Reference marks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the work as possible. The CONTRACTORS shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. CONTRACTORS shall remove any obstructions placed contrary to this provision.
- C. The CONTRACTORS shall furnish and maintain, at his own expense, stakes and other such materials and give such assistance, including qualified helpers, for setting reference marks to the satisfaction of the ENGINEER. The CONTRACTORS shall check reference marks by such means, as he may deem necessary. The CONTRACTORS shall, at his own expense, establish all working or construction lines and grades as required from the reference marks and shall be solely responsible for the accuracy thereof.
- D. Property corners and survey monuments shall be preserved using care not to disturb or destroy them. If a property corner or survey monument is disturbed or destroyed during construction, whether by accident, careless work, or required to be disturbed or destroyed by construction work, said property corner or survey monument shall be restored by a land surveyor registered in the state of Florida. All costs for this work shall be paid for by the CONTRACTORS.

PART 2 – PRODUCTS (NOT USED)

SECTION 01501

CONTROL OF WORK

PART 3 – EXECUTION

3.01 COOPERATION WITHIN THIS CONTRACT

- A. All firms or persons authorized to perform any work under this Contract shall cooperate with the CONTRACTOR, tank CONTRACTOR, and electrical CONTRACTOR and their 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.

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the CONTRACTOR at his own expense.
- B. All structures shall be protected in a manner approved by the ENGINEER. Should any of the floors or other parts of the structures become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the CONTRACTORS at his own expense and to the satisfaction of the ENGINEER. If, in the final inspection of the work, any defects, faults or omissions are found, the CONTRACTORS shall cause the same to be repaired or removed and replaced by proper 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.
- C. Further, the CONTRACTORS shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the OWNER.

END OF SECTION 01501

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The CONTRACTOR shall furnish, install and maintain project identification sign at appropriate location to provide required information.
- B. Remove sign on completion of construction.
- C. Allow no other signs to be displayed.
- D. Finishes or painting shall be adequate to resist weathering and fading for scheduled construction period.

1.02 RELATED WORK

- A. Rough Carpentry is included in Section 06100.

1.03 SUBMITTALS

- A. Submit in accordance with the requirements of Section 01300.

1.04 PROJECT IDENTIFICATION SIGN

- A. One painted sign, of not less than 32 square feet (3 square meters) and with painted graphic content to include:
 - 1. Title of project (4-inch letters): CR-208 Ground Storage Tank and Booster Pump Station
 - 2. Name of OWNER (4-inch letters): St. Johns County Utility Department
 - 3. Name of ENGINEER (3-inch letters): Design Engineer – Mott MacDonald
 - 4. Name of CONTRACTOR (3-inch letters)
 - 5. Name of major contractors (2-inch letters)
- B. The CONTRACTOR shall coordinate with ENGINEER to obtain the OWNER's and ENGINEER's logos.
- C. Graphic design, style of lettering and colors: as approved by the OWNER and ENGINEER and subject to the approval of the local community appearance board or its equivalent and applicable local regulations for signs.
- D. The CONTRACTOR shall erect on the site at a lighted location of high visibility and adjacent to the main entrance to site as approved by OWNER.

1.05 INFORMATIONAL SIGNS

- A. Painted signs with painted lettering, or standard products.
 - 1. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.
 - 2. Colors: as required by regulatory agencies, otherwise of uniform colors throughout Project.

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 2 – PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.
 - 1. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.
- C. Rough Hardware: Galvanized
- D. Paint: Exterior quality, as specified in Division 9.
 - 1. Use bulletin colors for graphics.
 - 2. Colors for structure, framing, sign surfaces and graphics: As selected by the ENGINEER.

PART 3 – EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

- A. Paint exposed surfaces of supports, framing and surface material; one coat of primer and one coat of exterior paint.
- B. Paint graphics in styles, sizes and colors selected.

3.02 MAINTAINENCE

- A. Maintain signs and supports in a neat, clean condition; repair damages to structure, framing or sign.

3.03 REMOVAL

- A. Remove signs, framing, supports and foundations at completion of project.

END OF SECTION 01580

SECTION 01600

DELIVERY, STORAGE AND HANDLING

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY

- A. Transportation and handling shall be in accordance with MANUFACTURER's instructions.
- B. The CONTRACTOR, TANK CONTRACTOR, and ELECTRICAL CONTRACTOR shall schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than two months prior to installation without written authorization from the ENGINEER. Should equipment (anything with a motor, electrical, and instrumentation) need to be stored longer than two months, an approved climate controlled storage unit shall be provided by the CONTRACTOR(S) at no additional cost to the OWNER.
- C. CONTRACTOR, TANK CONTRACTOR, and ELECTRICAL CONTRACTOR shall coordinate with OWNER and ENGINEER on pre-purchased equipment and storage requirements. The CONTRACTOR, TANK CONTRACTOR, or ELECTRICAL CONTRACTOR will be responsible for unloading and storage of all equipment including that equipment pre-purchased by the OWNER.
- D. The CONTRACTORS shall coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.
- E. Products shall be delivered to the site in MANUFACTURER's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting, and installing.
- F. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the CONTRACTOR's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- G. The CONTRACTORS shall provide necessary equipment and personnel to unload all items delivered to the site.
- H. The CONTRACTORS shall promptly inspect shipment to assure that products comply with requirements, quantities are correct and items are undamaged. For items furnished by others (i.e. OWNER, other Contractors), perform inspection in the presence of the OWNER's Representative. Notify ENGINEER verbally, and in writing, of any problems.

SECTION 01600

DELIVERY, STORAGE AND HANDLING

- I. If any item has been damaged, such damage shall be repaired at no additional cost to the OWNER.

1.03 STORAGE AND PROTECTION

- A. The CONTRACTORS shall store and protect products in accordance with the MANUFACTURER's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the CONTRACTORS and reviewed with the OWNER's Representative by him/her. Instruction shall be carefully followed and a written record of this kept by the CONTRACTOR(S). Arrange storage to permit access for inspection.
 1. CONTRACTOR, TANK CONTRACTOR, and ELECTRICAL CONTRACTOR shall coordinate with OWNER and ENGINEER on pre-purchased equipment.
- B. The CONTRACTORS shall store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous, 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. Beams shall be stored with the webs vertical. Precast concrete 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, cracking and spalling to a minimum.
- D. All mechanical and electrical equipment and instruments shall be stored in a weather tight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the OWNER's Representative. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by MANUFACTURER.
 1. CONTRACTOR to coordinate with TANK CONTRACTOR and ELECTRICAL CONTRACTOR on storing requirements for all pre-purchased equipment and maintenance methods.
 2. CONTRACTOR to coordinate with OWNER on maintenance methods for all pre-purchased equipment.
 3. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the MANUFACTURER.
 4. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the CONTRACTORS shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
 5. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
 6. Prior to acceptance of the equipment, the CONTRACTOR shall have the MANUFACTURER inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by

SECTION 01600

DELIVERY, STORAGE AND HANDLING

the MANUFACTURER shall be deemed to mean that the equipment is judged by the MANUFACTURER to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the MANUFACTURER will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the CONTRACTOR's expense.

- E. All paint and other coating products shall be stored in areas protected from the weather. Follow all storage requirements set forth by the paint and coating MANUFACTURER's.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01600

SECTION 01700

CONTRACT CLOSEOUT

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the Work.
- B. The CONTRACTOR, tank CONTRACTOR, and electrical CONTRACTOR shall be required to complete all close out documentation requirements to the satisfaction of the OWNER and ENGINEER.

1.02 RELATED REQUIREMENTS

- A. Conditions of the Contract. Fiscal provisions, legal submittals and additional administrative requirements.
- B. Section 01050: Project Controls (Surveying)
- C. Section 01390: Construction Photographs and Videotaping
- D. Section 01710: Cleaning
- E. Section 01720: Project Record Documents
- F. Section 01730: Operating and Maintenance Data
- G. Section 01740: Warranties
- H. The respective sections of Specifications: Closeout Submittals Required of Trades.

1.03 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- A. Evidence of compliance with requirements of governing authorities.
- B. Hard copies of a photographs and CDs: Refer to Section 01390.
- C. Project Record Documents: Refer to requirements of Section 01720.
- D. Operating and Maintenance Data, Instructions to Owner's Personnel: Refer to requirements of Section 01730.
- E. Warranties: Refer to requirements of Section 01740.
- F. Spare parts and maintenance materials: Refer to requirements of Section 01730.
- G. Evidence of Payment and Release of Liens: Refer to requirements of General and Supplementary Conditions.
- H. Certificate of insurance for products and completed operations.

SECTION 01700

CONTRACT CLOSEOUT

1.04 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the ENGINEER.
- B. Statement shall reflect all adjustments to the Contract Sum
 1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders
 - b. Allowances
 - c. Unit Prices
 - d. Deductions for uncorrected Work
 - e. Penalties and Bonuses
 - f. Deductions for liquidated damages
 - g. Deductions for reinspection payments
 - h. Other adjustments
 3. Total Contract Sum, as adjusted.
 4. Previous payments.
 5. Sum remaining due.
- C. ENGINEER will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.05 FINAL APPLICATION FOR PAYMENT

- A. CONTRACTOR shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

1.06 FINAL CLEANING

- A. Refer to Section 01710 for final cleaning requirements.

1.07 FINAL SURVEY

- A. In addition to monthly surveys completed for the project, a final as-built survey shall be completed by a land surveyor registered in the state of Florida. This survey shall be provided to the OWNER and ENGINEER for review and comment prior to final acceptance. Refer to Section 01050 for additional requirements.

1.08 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01700

SECTION 01710

CLEANING

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by the General Conditions and Contract Documents.
- B. CONTRACTOR shall coordinate with the tank CONTRACTOR on all cleaning requirements prior to completing construction on site.

1.02 RELATED WORK

- A. Conditions of the Contract
- B. Each Specification Section: Cleaning for specific products or work.

1.03 DISPOSAL REQUIREMENTS

- A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 – EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

SECTION 01710

CLEANING

3.02 DUST CONTROL

- A. Clean interior spaces, piping, and equipment prior to the start of finish painting and continue cleaning on an as needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fail on wet or newly coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight exposed interior and exterior surfaces.
- C. Wash and shine glazing and mirrors.
- D. Polish glossy surfaces to a clear shine.
- E. Ventilating Systems:
 - 1. Clean permanent filters and replace disposable filters if units were operated during construction.
 - 2. Clean ducts, blowers and coils if units were operated without filters during construction.
- F. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- G. Prior to final completion, or OWNER occupancy, CONTRACTOR shall conduct an inspection of sight exposed interior and exterior surfaces, and all work areas, to verify that the entire Work is clean.

END OF SECTION 01710

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Maintain at the site for the OWNER and ENGINEER one record copy of:
 - 1. Drawings
 - 2. Specifications
 - 3. Change Orders and other Modifications to the Contract
 - 4. Engineer's Field Orders or written instructions
 - 5. Approved Shop Drawings, Working Drawings, and Samples
 - 6. Field Test records
 - 7. Construction photographs
 - 8. All applicable permits

1.02 RELATED REQUIREMENTS

- A. Section 01050: Project Controls (Surveying)
- B. Section 01300: Submittals
- C. Section 01370: Operation and Maintenance Data

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in CONTRACTOR's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with Construction Specifications Institute (CSI) format.
- C. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by the ENGINEER.
- E. As a prerequisite for monthly progress payments, the CONTRACTOR is to exhibit the currently updated "record documents" for review by the ENGINEER and the OWNER.
- F. CONTRACTOR shall maintain documents and samples from tank CONTRACTOR and electrical SUBCONTRACTOR.

1.04 RECORDING

- A. Use felt tip marking pens for recording information in "Red."
- B. Label each document "PROJECT RECORD" in neat large printed letters.

SECTION 01720

PROJECT RECORD DOCUMENTS

- C. Record information concurrently with construction progress.
 - 1. Do not conceal any work until required information is recorded.

- D. Drawings: Legibly mark to record actual consideration:
 - 1. Depths of various elements of foundation in relation to finish first floor datum.
 - 2. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc.
 - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure (this includes electrical conduits).
 - 4. Field changes of dimension and detail.
 - 5. Changes made by RFIs, field orders, or by change orders.
 - 6. Details not on original contract drawings.
 - 7. Equipment and piping relocations.
 - 8. Major architectural and structural changes including relocation of doors, windows, etc.
 - 9. Architectural schedule changes according to CONTRACTOR's records and shop drawings.
 - 10. Locations, elevations, sizes, types and materials of all manholes (including pipe invert, manhole rim, and bottom elevations), valves, water and sewer services, fire hydrants and all associated structures, hose bibbs, and fittings.
 - 11. With reference to electrical work the exact routing of conduit runs shall be shown on these drawings.
 - 12. In addition to the monthly as-builts that are required, a comprehensive final as-built survey shall be signed and sealed by a land surveyor registered in the state of Florida. A hard copy of this survey shall be provided to the OWNER and ENGINEER for review and comment prior to final acceptance.

1.05 SUBMITTAL

- A. At contract close-out, deliver record documents to the ENGINEER for the OWNER. The information submitted by the tank CONTRACTOR, CONTRACTOR, and electrical CONTRACTOR into the Record Drawings and Record Documents will be assumed to be correct, and each individual CONTRACTOR shall be responsible for the accuracy of such information and shall bear the costs resulting from the correction of incorrect data.

- B. Accompany submittal with transmittal letter in duplicate, containing:
 - 1. Date
 - 2. Project title and number
 - 3. Contractor's name and address
 - 4. Title and number of each Record Document
 - 5. Signature of Contractors or his authorized representative

- C. Delivery of record drawings and record documents to the ENGINEER will be a prerequisite to final payment.

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01720

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 GENERAL

- A. Compile product data and related information appropriate for OWNER's maintenance and operation of products furnished under this Contract.
 - 1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
 - 2. Provide a minimum of three hard copies and an electronic copy of the manuals at both the draft and final submittals.
- B. Instruct OWNER's personnel in maintenance of products and in operation of equipment and systems.
- C. CONTRACTOR shall coordinate with electrical CONTRACTOR and TANK CONTRACTOR on all associated submittals.

1.02 RELATED REQUIREMENTS

- A. Section 01300: Submittals

1.03 QUALITY ASSURANCE

- A. Preparation of data shall be done by personnel:
 - 1. Trained and experienced in maintenance and operation of described products.
 - 2. Familiar with requirements of this Section.
 - 3. Skilled as technical writer to the extent required to communicate essential data.
 - 4. Skilled as draftsman competent to prepare required drawings.

1.04 OPERATING MANUALS

- A. The VENDOR shall provide operation and maintenance instructions for all electrical, mechanical, and instrumentation and controls equipment furnished under various technical specifications Sections.
- B. Complete sets of operations and maintenance manuals approved by the ENGINEER covering all equipment furnished under Divisions 11 and 16 shall be delivered at least 30 days prior to scheduled start-up directly to the OWNER.
- C. An electronic copy of the manual shall be provided as well as hard copy submittal.
- D. Separate manuals shall be provided for each type of equipment, or each Section number. Each manual shall contain the following specific requirements. Manuals that do not meet the requirements shall be rejected and Equipment Supplier/Manufacturer will bear all expenses to resubmit the manual to meet the following requirements.

SECTION 01730

OPERATING AND MAINTENANCE DATA

- E. Manual Format
 - 1. Size: 8 1/2 inches x 11 inches.
 - 2. Paper: 20 pound minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data, or neatly typewritten.
 - 4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Reduce larger drawings and fold to size of text pages but not larger than 11 inches x 17 inches.
 - 5. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of product, and major component parts of equipment.
 - b. Provide indexed tabs.
 - 6. Cover: Identify each volume with typed or printed, title "OPERATING AND MAINTENANCE INSTRUCTIONS" List:
 - a. Title of Project.
 - b. Identity of separate structure as applicable.
 - c. Identity of general subject matter covered in the manual.
- F. Binders
 - 1. Commercial quality three-post binders with durable and cleanable plastic covers.
 - 2. Maximum post width: 2 inches or as applicable.
 - 3. When multiple binders are used, correlate the data into related consistent groupings.

1.05 CONTENT OF MANUAL

- A. Neatly typewritten table of contents for each volume, arranged in systematic order.
 - 1. Contractor, name of responsible principal, address, and telephone number.
 - 2. A list of each product required to be included, indexed to content of the volume.
 - 3. List, with each product, name, address, email, and telephone number of:
 - a. Subcontractor, manufacturer, or installer.
 - b. Local manufacturer's representative
 - c. Maintenance contractor, as appropriate.
 - d. Identify area of responsibility of each.
 - e. Local source of supply for parts replacement.
 - 4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- B. Product Data
 - 1. Include only those sheets which are pertinent to the specific product.
 - 2. Annotate each sheet to:
 - a. Clearly identify specific product or part installed
 - b. Clearly identify data applicable to installation
 - c. Delete references to inapplicable information

SECTION 01730

OPERATING AND MAINTENANCE DATA

- C. Drawings
 - 1. Supplement product data with drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
 - 2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
 - 3. Do not use Project Record Documents as maintenance drawings.
- D. Written text, as required to supplement product data for the particular installation:
 - 1. Organize in consistent format under separate headings for different procedures.
 - 2. Provide logical sequence of instructions of each procedure.
 - 3. Copy of each warranty, bond and service contract issued.
 - 4. Provide information sheet for OWNER's personnel, give:
 - a. Proper procedures in event of failure.
 - b. Instances which might affect validity of warranties or bonds.
- E. Electronic Transmission of O&M Manuals
 - 1. Electronic O&M manuals shall meet the following conditions:
 - a. All other requirements specified above have been met, including, but not limited to, coordination by the CONTRACTOR, review and approval by the CONTRACTOR.
 - b. With the exception of the transmittal sheet, the entire submittal is included in a single file.
 - c. Files are Portable Document Format (PDF) – with the printing function enabled.
 - d. The Vendor provided equipment, sub-system, or system manuals shall be in PDF format, compliant with the Adobe PDF specification (latest version). The manual shall be searchable image. The optical character recognition of the image shall be a 95% confidence level. The manuals shall be linked and bookmarked as follows:
 - 1) Provide links from all Table of Contents, List of Tables, List of Figures, etc., entries to the actual occurrence in the body of the manual.
 - 2) Create bookmarks for all linked Table of Contents entries.
 - e. All drawings shall be in PDF format, compliant with the Adobe PDF Specification (latest version). The manual shall be PDF Searchable Image. The Optical Character Recognition of the image shall be at a 95% confidence level. The drawings shall be linked as follows:
 - 1) External links from the Drawing Index (if it exists) to each drawing.
 - 2) External links from references within drawings to other drawings.
 - 2. When electronic copies are provided, transmit three hard-copy (paper) originals to the Engineer.
 - 3. The electronic copy of the O&M manual must be identical in organization, format, and content to the hard copies of the manual.

SECTION 01730

OPERATING AND MAINTENANCE DATA

1.06 INSTRUCTION OF OWNER'S PERSONNEL

- A. Prior to startup of equipment and facilities, fully instruct OWNER's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment, and systems. Refer to individual specifications for training requirements.
- B. Operating and maintenance manual shall constitute the basis of instruction.
 - 1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.
- C. Unless specified otherwise under the respective equipment specification section, vendor training/instruction shall consist of eight hours of training for each type of equipment. Such training/instruction shall be scheduled and held at times to accommodate the work schedules of OWNER'S personnel, including splitting the required training/instruction time into separate sessions and/or presented at reasonable times other than the CONTRACTOR's "normal working hours" or the OWNER's normal day shift.
- D. At least two weeks prior to the schedule for vendor training, a detailed lesson plan, representative of the material to be covered during instruction, shall be submitted to the ENGINEER for approval. Lesson plans shall consist of in-depth outlines of the training material, including a table of contents, resume of the instructor, materials to be covered, start-up procedures, maintenance requirements, safety considerations, and shut-down procedures.
- E. Vendor's training/instruction will be considered acceptable based on the completed *Owner's Acknowledgement of Manufacturer's Instruction* as indicated on the Equipment Manufacturer's Certification of Installation, Testing, and Instruction appended to this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01730 - FORM TO FOLLOW

SECTION 01730

OPERATING AND MAINTENANCE DATA

EQUIPMENT MANUFACTURER'S CERTIFICATE OF INSTALLATION, TESTING, AND INSTRUCTION

Owner: SJCUD

Project: CR-208 Ground Storage Tank and Booster Pump Station

Contract No. _____

Mott MacDonald Project No. 502100379-007

EQUIPMENT SPECIFICATION SECTION _____

I _____, Authorized representative of
(Print Name)

_____, hereby certify that
(Print Manufacturer's Name)

(Print equipment name and model with serial No.)

installed for the subject project [has] [have] been installed in a satisfactory manner, [has] [have] been satisfactorily tested, [is] [are] ready for operation, and that Owner assigned operating personnel have been suitably instructed in the operation, lubrication, and care of the unit[s] on

Date: _____

CERTIFIED BY: _____ DATE: _____
(Signature of Manufacturer's Representative)

OWNER'S ACKNOWLEDGMENT OF MANUFACTURER'S INSTRUCTION

[I] [We] the undersigned, authorized representatives of the _____ and/or Plant Operating Personnel have received classroom and hands on instruction on the operation and maintenance of the subject equipment and [am] [are] prepared to assume normal operational responsibility for the equipment:

_____ DATE: _____

_____ DATE: _____

_____ DATE: _____

SECTION 01740

WARRANTIES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile specified warranties as per general conditions and per the technical specification requirements.
- B. Co-execute submittals when so specified.
- C. Review submittals to verify compliance with Contract Documents.
- D. Submit to the ENGINEER for review and transmittal to OWNER.

1.02 RELATED REQUIREMENTS

- A. SJCUD General and Supplemental Conditions
- B. Section 01700: Contract Closeout.

1.03 SUBMITTAL REQUIREMENTS

- A. Assemble warranties and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and SUBCONTRACTORS.
- B. Number of original signed copies required: Two each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product or work item
 - 2. Vendor or manufacturer, with name of principal, address, and telephone number
 - 3. Scope
 - 4. Date of beginning of warranty, bond or service and maintenance contract
 - 5. Duration of warranty, bond or service maintenance contract
 - 6. Provide information for OWNER's personnel:
 - a. Proper procedure in case of failure
 - b. Instances which might affect the validity of warranty
 - 7. CONTRACTOR, name of responsible principal, address and telephone number

1.04 FORM OF SUBMITTALS

- A. Prepare in duplicate packets
- B. Format:
 - 1. Size 8-1/2 inches x 11 inches, punch sheets for standard 3-post binder.
 - a. Fold larger sheets to fit into binders.
 - 2. Cover: Identify each packet with typed or printed title "WARRANTIES":
 - a. Title of Project
 - b. Name of CONTRACTOR

SECTION 01740

WARRANTIES

- C. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum post width of 2 inches. Include divider tabs for each warranty item and correlate to the table of contents.

1.05 WARRANTY SUBMITTAL REQUIREMENTS

- A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the CONTRACTOR's for one (1) year commencing at the time of acceptance by the OWNER or as specified in the equipment or material specifications.
- B. The CONTRACTOR shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Division 11, 15, and 16 and which has a 1 HP motor or which lists for more than \$1,000. The ENGINEER reserves the right to request warranties for equipment not classified as major. The CONTRACTOR shall still warrant equipment not considered to be "major" in the CONTRACTOR's one-year warranty period even though certificates of warranty may not be required.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01740

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, fill, grading and slope protection required to complete the piping work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to: manholes, vaults, duct conduit, pipe, roadways and paving, and general site earthwork; all backfilling, fill and required borrow; grading; disposal or surplus and unsuitable materials; and all related work such as sheeting, bracing, and water handling.
- B. Furnish and install temporary excavation support systems, including sheeting, shoring and bracing, to ensure the safety of personnel and protect adjacent structures, piping, etc., in accordance with Federal, State and local laws, regulations, and requirements.
- C. Furnish and install temporary dewatering and surface water control systems and operate to dewater and maintain in-a-dry condition. Control drainage into excavations and remove seepage water and rainwater.
- D. All excavation and backfill for structures, utilities, and pavements shall be in accordance with the geotechnical engineering report. The geotechnical report for this project is included as **Appendix A**. Where discrepancies exist between this specification and the referenced geotechnical report, the referenced geotechnical report shall take precedence if more restrictive.
- E. The CONTRACTOR shall be responsible for calculating the required cut and fill calculations for the entire site. All new fill or reuse of soils on the site for fill shall meet the requirements of Sections 02220 this section and the geotechnical report.

1.02 RELATED WORK

- A. Section 02100: Site Preparation
- B. Section 02140: Dewatering
- C. Section 02220: Excavating, Backfilling, and Grading for Structures

1.03 TRENCH PROTECTION

- A. The CONTRACTOR shall construct and maintain sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, existing piping and/or foundation material from disturbance, under-mining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed they shall be immediately filled and rammed.

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

- B. For pipe trench sheeting, no sheeting is to be withdrawn if driven below mid-diameter of any pipe, and no wood sheeting shall be cut off at a level lower than 1 foot above the top of any pipe unless otherwise directed by the ENGINEER. If during the progress of the work the ENGINEER decides that additional wood sheeting should be left in place, he may direct the CONTRACTOR in writing. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by the ENGINEER for an alternate method of removal.
- C. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.
- D. 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 sufficient sheeting and bracing to prevent any caving or moving of the ground.

1.04 JOB CONDITIONS

- A. The CONTRACTOR shall examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The OWNER and ENGINEER will not assume responsibility for variations of sub-soil quality or conditions at locations other than places shown at the time the investigation was made.
- B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the ENGINEER and the OWNER of such piping or utility immediately for directions.
 - 2. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility OWNER.
 - 3. Demolish and completely remove from site existing underground utilities indicated on the Drawings to be removed.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
 - 1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

1.05 SUBMITTALS

- A. If requested by the ENGINEER, the CONTRACTOR shall furnish a representative sample of fill material obtained from onsite or offsite sources weighing approximately 50 pounds for approval, at least ten calendar days prior to the date of anticipated use of such material. For each material obtained from other than onsite sources, the CONTRACTOR shall notify the ENGINEER of the source of the material.
- B. All temporary shoring and bracing shall be designed by a specialty ENGINEER and system design/details shall be submitted to the ENGINEER of record for review and approval; submittals shall be signed and sealed by a registered ENGINEER licensed in the state of Florida. Submit in accordance with Section 01300.

1.06 REFERENCED STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM D75 – Standard Practice for Sampling Aggregates
 - 2. ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soils Using Standard Efforts.
 - 3. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
 - 4. ASTM D2167 – Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
 - 5. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/cu ft (2,700kN-m/cu m)).
 - 6. ASTM D2487 – Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 7. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 – GENERAL

2.01 SOIL MATERIALS

- A. General
 - 1. Materials for use as base fill and backfill shall be as described below.
 - a. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M-145, soil classification Groups A-1, A-2-4, A-2-5 and A-3.
 - b. Unsatisfactory soil materials are those defined in AASHTO M-145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 along with peat and other highly organic soils.

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

B. Structural Fill

1. Structural fill material shall be satisfactory soil material consisting of a minimum of 60 percent clean medium to fine grain sized quartz sand, free of organic, deleterious and/or compressible material, having less than 10% material passing the No. 200 mesh sieve and containing less than 4% organic material. Rock in excess of 2-1/2 inches in diameter shall not be used in the fill material. Structural fill shall not contain hardpan, stones, rocks, cobbles or other similar materials.

C. Common Fill

1. Common fill material shall be satisfactory soil material containing no more than 20 percent by weight finer than No. 200 mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2-1/2 inches in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials.
2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the ENGINEER, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

D. Rock Bedding

1. Rock bedding shall be 3/8-inch to 3/4-inch washed and graded limerock. This rock shall be graded so that 99 percent will pass a 3/4-inch screen and 80 percent will be retained on a No. 8 screen.

PART 3 – EXECUTION

3.01 GENERAL

- A. All excavation, backfill and grading necessary to complete the work shall be made by the CONTRACTOR and the cost thereof shall be included in the contract price.
- B. Material shall be furnished as required from offsite sources and hauled to the site.
- C. The CONTRACTOR shall take all the necessary precautions to maintain the work area in a safe and workable condition.
- D. The CONTRACTOR shall protect his work always by flagging, marking, lighting and barricading. It shall also be the CONTRACTOR's responsibility to preserve and protect all above and underground structures, pipe lines, conduits, cables, drains or utilities which are existing at the time he encounters them. Failure of the Drawings to show the existence of these obstructions shall not relieve the CONTRACTOR from this responsibility. The cost of repair of any damage which occurs to these obstructions during or because of construction shall be borne by the CONTRACTOR without additional cost to the OWNER.

3.02 TRENCH EXCAVATION

- A. All trenching shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926), State of Florida "Trench Safety Act" (Part IV,

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

Chapter 553 of the Florida Statutes) and local requirements. Where conflict between OSHA, State and local requirements exists, the most stringent requirements shall apply.

- B. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made to the depths indicated on the Drawings. Excavate trench to provide a minimum of 30-inch clear cover over the pipe bell unless otherwise noted on the Drawings. Excavate in such manner and to such widths as will give suitable room for laying the pipe or installing the ducts within the trenches, for bracing and supporting and for pumping and drainage facilities. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and indicated on the Drawings.
- C. Rock shall be removed to a minimum 8-inches clearance around the bottom and sides of all the pipe or ducts being laid.
- D. Where pipe or ducts are to be laid in limerock bedding or encased in concrete the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
- E. Where the pipes or ducts are to be laid directly on the trench bottom the lower part of the trenches shall not be excavated to the trench bottom by machinery. The last of the material being excavated shall be done manually in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly and uniformly supported along its entire length on undisturbed material or bedding rock. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barrel only.
- F. The bottom of the excavations shall be firm and dry and in all respects acceptable to the ENGINEER. Excavate any organic soil material from the bottom of the trench and replace with rock bedding, at least 6 inches thick.

3.03 PIPE INTERFERENCES AND ENCASEMENT

- A. In no case shall there be less than 0.5 feet between any two pipe lines or between pipe lines and structures.
- B. Wherever there is more than 0.5 foot but less than 1.0-foot clearance between any two pipe lines, or between pipe lines and structures, then a concrete encasement shall be provided in accordance with the typical detail as shown on the Drawings.
- C. Provide concrete encasement of piping under structures as per the details on the Drawings.
- D. The ENGINEER shall have full authority to direct the placement of the various pipes and structures to facilitate construction, expedite completion and to avoid conflicts.

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

3.04 BACKFILLING

- A. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed, and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.
- B. Backfilling over ducts shall begin not less than three days after placing concrete encasement.
- C. All backfilling shall be prosecuted expeditiously and as detailed on the Drawings.
- D. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than 2-inches and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of the pipe. Compact to 95 percent maximum density (ASTM D1557) in layers not to exceed 4 inches up to the centerline of the pipe from the trench bottom and in layers not to exceed 6 inches from the pipe centerline to 12 inches above the pipe.
- E. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.
- F. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted with common fill by rolling, ramming, or puddling, as the ENGINEER may direct. Compact common fill in 6-inch layers to 95 percent maximum density (ASTM D1557).
- G. The bedding rock in muck areas shall consist of at least 6 inches of washed and graded limerock placed in the trench to the proposed elevation of the centerline of the pipe prior to any pipe laying. This bedding shall not be used under any circumstances as a drain for ground water. The CONTRACTOR shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
- H. In locations where pipes pass through building walls, the CONTRACTOR shall take the following precautions to consolidate the refill up to an elevation of at least 1 foot above the bottom of the pipes:
 - 1. Place structural fill in such areas for a distance of not less than 3 feet either side of the center line of the pipe in level layers not exceeding 6-inches in depth.
 - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the ENGINEER.

3.05 GRADING

- A. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades, and elevations shown or as directed by the ENGINEER and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the work.

- B. Shape the surface of earthwork to conform to lines, grades and cross sections that existed prior to beginning work or as shown on the drawings, within 1/10 of a foot. Round tops of banks to circular curves to not less than a 6-foot radius. Neatly and smoothly trim rounded surfaces. Do not overexcavate and backfill to achieve the proper grade.
- C. Overall area grading for which no grades are indicated shall be addressed as follows: Within the limits of construction and outer limits of clearing and grubbing, all holes and other depressions shall be filled, all mounds and ridges cut down, and the area brought to sufficiently uniform control so that the OWNER'S subsequent mowing operation will not be hindered by irregular terrain. This work shall be done regardless of whether the irregularities were the result of the CONTRACTOR'S operations or originally existed.
- D. If at the time of excavation, it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extras will be considered for the stockpiling or double handling of excavated material.
- E. The right is reserved to make minute adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies on the Drawings or to obtain satisfactory construction.
- F. Stones or rock fragments larger than 2-1/2-inches in their greatest dimensions will not be permitted in the top 6-inches of the subgrade line of all dikes, fills or embankments.
- G. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the ENGINEER.
- H. In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings or as directed by the ENGINEER.
- I. No grading is to be done in areas where there are existing pipe lines that may be uncovered or damaged until such lines which must be maintained are relocated, or where lines are to be abandoned, all required valves are closed and drains plugged at manholes.
- J. The CONTRACTOR shall replace all pavement cut or otherwise damaged during the progress of the work as specified elsewhere herein.

SECTION 02221

TRENCHING, BEDDING, BACKFILL FOR PIPES, AND SITE EARTHWORK

3.06 COMPACTION

- A. Unless otherwise specified or shown on the drawings, areas outside pipe trenches must meet the following compaction requirements. All relative densities specified shall be as compared to modified proctor values as determined in the laboratory.
 - 1. Subgrade Underfill or Backfill: 95% relative density to a depth of 12 inches.
 - 2. Backfill or Fill Under Pavement: 98% relative density in 12-inch maximum layers.
 - 3. All Other Areas: 95% relative density in 12-inch maximum layers.
- B. Compact by using methods acceptable to the ENGINEER (powered tampers, vibrators, etc.). Flooding or puddling with water to consolidate backfill is not acceptable, except where sand is encountered and the specified density can be obtained using this method.
- C. During the compacting operations, maintain material within $\pm 2\%$ of optimum moisture. Aerate material containing excessive moisture by blading, discing, or harrowing to hasten the drying process.
- D. If any field density tests are below the specified relative density, recompact or re-excavate, rebackfill and recompact the area until the specific density is obtained. Make a minimum of two field density tests per recompact and/or re-excavated area.

3.07 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. All surplus and/or unsuitable excavated material shall be disposed of in one of the following ways as directed by the ENGINEER.
 - 1. Transport to soil storage area on OWNER's property and stockpile or spread as directed by the ENGINEER.
 - 2. Transport from OWNER's property and legally dispose of. Any permit required for the hauling and disposing of this material beyond OWNER's property shall be obtained prior to commencing hauling operations.
 - 3. Suitable excavated material may be used for fill if it meets the specifications for common fill and is approved by the ENGINEER. Excavated material so approved may be neatly stockpiled at the site where designated by the ENGINEER provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property OWNERS.

END OF SECTION 02221

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1- GENERAL

1.01 SCOPE OF WORK

- A. Description of scope and intent
1. CONTRACTOR shall provide all material, labor, and tools required to complete the installation of specified system.
 2. Any omission of reference to items required to complete the full operational and functional system specified in the section does not relieve the CONTRACTOR of the obligation to provide same.
 3. To provide installation of all items, including delivery, dispersing to the proper locations within the building, and affixing in place.
 4. Installation shall be accomplished by workers skilled in their craft that will perform their work in a professional manner and will leave the premises safe, orderly and clean.
 5. Drawings and general provisions of Contract, including General and Supplemental Conditions and Division 1 Specification Sections, apply to this Section.
 6. CONTRACTOR is responsible for coordination of work included in this specification with all other specification sections related to furnishing of all materials, labor, permits, fees and services necessary for completion of work in this section.
- B. Section Includes:
1. Formwork for cast in place concrete, with shoring, bracing, and anchorage.
 2. Formwork accessories.
 3. Form stripping.
 4. Reinforcing steel for cast in place concrete.
 5. Grout.
 6. Cast in place concrete, including concrete for the following:
 - a. Foundations, footings.
 - b. Slabs on grade.
 - c. Supported slabs.
 - d. Foundation and structural walls.
 - e. Equipment pads and bases.
 7. Concrete curing.
 8. Shoring and reshoring.

1.02 REFERENCES

All referenced standards refer to the edition in force at the time these plans and Specifications are issued for bidding.

- A. AASHTO M 182 Standard Specification for Burlap Cloth Made from Jute or Kenaf; American Association of State Highway and Transportation Officials.
- B. ACI 117 Standard Tolerances for Concrete Construction and Materials; American Concrete Institute.
- C. ACI 201.2R Guide to Durable Concrete; American Concrete Institute.

SECTION 03300

CAST-IN-PLACE CONCRETE

- D. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute.
- E. ACI 214 Recommended Practice for Evaluation of Compression Test Results of Field Concrete.
- F. ACI 301 Specifications for Structural Concrete for Buildings; American Concrete Institute.
- G. ACI 302.1R Guide for Concrete Floor and Slab Construction; American Concrete Institute.
- H. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute.
- I. ACI 305R Hot Weather Concreting; American Concrete Institute.
- J. ACI 306R Cold Weather Concreting; American Concrete Institute.
- K. ACI 318 Building Code Requirements for Reinforced Concrete; American Concrete Institute.
- L. ACI 347R Guide to Formwork for Concrete; American Concrete Institute.
- M. ACI 350 Code Requirements for Environmental Engineering Concrete Structures.
- N. ACI 350.1 Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures & Commentary
- O. ACI 372 Guide to Design and Construction of Circular Wire-and-Strand-Wrapped Prestressed Concrete Structures
- P. ACI SP 66 ACI Detailing Manual; American Concrete Institute.
- Q. ASTM A 185 Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- R. ASTM A 615 Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- S. ASTM C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- T. ASTM C 33 Standard Specification for Concrete Aggregates.
- U. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

SECTION 03300

CAST-IN-PLACE CONCRETE

- V. ASTM C 42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- W. ASTM C 94 Standard Specification for Ready Mixed Concrete.
- X. ASTM C 143 Standard Test Method for Slump of Hydraulic Cement Concrete.
- Y. ASTM C 150 Standard Specification for Portland Cement.
- Z. ASTM C 171 Standard Specifications for Sheet Materials for Curing Concrete.
- AA. ASTM C 172 Standard Practice for Sampling Freshly Mixed Concrete.
- BB. ASTM C 173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- CC. ASTM C 231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- DD. ASTM C 260 Standard Specifications for Air Entraining Admixtures for Concrete.
- EE. ASTM C 494 Standard Specifications for Chemical Admixtures for Concrete.
- FF. ASTM C 618 Standard Specifications for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- GG. ASTM C 685 Standard Specifications for Concrete Made by Volumetric Batching and Continuous Mixing.
- HH. ASTM C 881 Standard Specification for Epoxy Resin Base Bonding Systems for Concrete.
- II. ASTM C 1059 Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- JJ. ASTM C 1107 Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).
- KK. ASTM D 1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- LL. ASTM D 1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- MM. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs, on Walls, or as Ground Cover.

SECTION 03300

CAST-IN-PLACE CONCRETE

NN. ASTM E 329 Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

OO. CRSI Manual of Standard Practice; Concrete Reinforcing Steel Institute.

PP. Florida Building Code – FBC

1.03 DEFINITIONS

A. Unexposed Finish: A general use finish, with no appearance criteria, applicable to all formed concrete concealed from view after completion of construction.

B. Exposed Finish: A general use finish applicable to all formed concrete exposed to view except those indicated to receive textured finish and including surfaces which may receive a paint coating (if any).

1.04 SUBMITTALS

A. All submittals shall be submitted in accordance with Section 01300.

B. Product Data: Submit manufacturer's product data for the following:

1. Formwork accessories.
2. Form liners.
3. Concrete admixtures.
4. Grout.
5. Bonding compound.
6. Epoxy bonding system

C. Aggregates: Submit test reports showing compliance with specified quality and gradation.

D. Shop Drawings: Submit shop drawings for fabrication and placement of the following:

1. Reinforcement: Comply with ACI SP 66. Include bar schedules, diagrams of bent bars, arrangement of concrete reinforcement, and splices.
 - a. Show construction joints.
 - b. Include details of reinforcement at openings through concrete structures.
 - c. Include elevations of reinforcement in walls.
 - d. Show stirrup spacing.
 - e. Concrete embedment's.
2. Shoring and reshoring for elevated concrete placement shall include:
 - a. Location, size, and type of all shoring members.
 - b. Location, size, and type of all reshoring members.
 - c. Location, size, and type of all mud sills, blocking, temporary lateral bracing and other accessories necessary to safely support and brace the structure during construction.
 - d. Prepare shop drawings under seal of professional structural ENGINEER registered in the state of Florida.

SECTION 03300

CAST-IN-PLACE CONCRETE

- E. Quality Control Submittals
1. Submit the following information related to quality assurance requirements specified:
 2. Design data: Submit proposed mix designs and test data before concrete operations begin. Identify for each mix submitted the method by which proportions have been selected.
 - a. For mix designs based on trial mixtures, include trial mix proportions, test results, and graphical analysis and show required average compressive strength $f'(cr)$.
 - b. Indicate quantity of each ingredient per cubic yard of concrete.
 - c. Indicate type and quantity of admixtures proposed or required.
 3. Test reports: Submit laboratory test reports for all testing specified.
 4. Certifications: Submit affidavits from an independent testing agency certifying that all materials furnished under this section conform to specifications.
 5. Certifications: Provide certification from manufacturers of concrete admixtures that chloride content complies with specified requirements.
 6. Certifications: Submit mill test certificates for all reinforcing steel furnished under this section, showing physical and chemical analysis.
 7. Placement schedule: Submit concrete placement schedule prior to start of any concrete placement operations. Include location of all joints indicated on drawings, plus anticipated construction joints.
 8. Submit batch tickets complying with ASTM C 685 or delivery tickets complying with ASTM C 94, as applicable, for each load of concrete used in the work.
 - a. Include on the tickets the additional information specified in the ASTM document.
 9. Cold weather concreting: Submit description of planned protective measures.
 10. Hot weather concreting: Submit description of planned protective measures.
 11. Mass Concrete: Submit description of planned protective measures.

1.05 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the following documents, except where requirements of the contract documents or of governing codes and governing authorities are more stringent:
1. ACI 301
 2. ACI 318
 3. ACI 350
 4. CRSI Manual of Standard Practice.
- B. Testing Agency Services:
1. Employ, at CONTRACTOR's expense, an independent testing agency acceptable to the ENGINEER to perform specified tests and other services required for quality assurance.
 - a. Testing agency shall meet ASTM E 329 requirements.

SECTION 03300

CAST-IN-PLACE CONCRETE

- C. Source of Materials: Obtain materials of each type from same source for the entire project.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver reinforcement to project site bundled and tagged with metal tags indicating bar size, lengths, and other data corresponding to information shown on placement drawings.
 - 1. Concrete reinforcement materials stored on the site shall be kept on concrete blocks and supported off the ground to prevent damage and accumulation of water, dirt, or rust.
- B. Store cementitious materials in a dry, weather tight location. Maintain accurate records of shipment and use.
- C. Store aggregates to permit free drainage and to avoid contamination with deleterious matter or other aggregates. When stockpiled on ground, discard bottom 6 inches of pile.
- D. Handle aggregates to avoid segregation.

1.07 PROJECT CONDITIONS

- A. Cold Weather Concreting: Comply fully with the recommendations of ACI 306.
 - 1. Well in advance of proposed concreting operations, advise the ENGINEER of planned protective measures including but not limited to heating of materials, heated enclosures, and insulating blankets.
- B. Hot Weather Concreting: Comply fully with the recommendations of ACI 05R.
 - 1. Well in advance of proposed concreting operations, advise the ENGINEER of planned protective measures including but not limited to cooling of materials before or during mixing, placement during evening to dawn hours, fogging during finishing and curing, shading, and windbreaks.
- C. Mass Concrete: Comply fully with the recommendations of ACI 207.1R.
 - 1. Well in advance of proposed concreting operations, advise the ENGINEER of planned protective measures including but not limited to cooling of materials before or during mixing, placement, curing, forms, height of lifts (max 8ft), and monitoring.

PART 2- PRODUCTS

2.01 FORMWORK

- A. Facing Materials:
 - 1. Unexposed finish concrete: Any standard form materials that produce structurally sound concrete.
 - 2. Exposed finish concrete: Materials selected to offer optimum smooth, stain free final appearance and minimum number of joints. Provide materials with sufficient strength to resist hydrostatic head without bow or deflection in excess of allowable tolerances.

SECTION 03300

CAST-IN-PLACE CONCRETE

3. Textured finish concrete: Materials or linings as indicated on the drawings, or as required to match ENGINEER's control sample.
- B. Formwork Accessories:
1. Form coating: Form release agent that will not adversely affect concrete surfaces or prevent subsequent application of concrete coatings.
 2. Metal ties: Commercially manufactured types; cone snap ties, taper removable bolt, or other type which will leave no metal closer than 1-1/2 inches from surface of concrete when forms are removed, leaving not more than a 1 inch diameter hole in concrete surface.
 3. Fillets: Wood or plastic fillets for chamfered corners, in maximum lengths possible.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars: Provide deformed bars complying with the following, except where otherwise indicated:
1. ASTM A 615, Grade 60.
- B. Welded Wire Fabric: ASTM A 185, cold drawn steel, plain.
- C. Reinforcing Accessories:
1. Tie wire: Black annealed type, 16-1/2 gage or heavier.
 2. Supports: Bar supports conforming to specifications of CRSI "Manual of Standard Practice."
 - a. Class 1 (plastic protected) at all formed surfaces which will be exposed to weather.
 - b. Class 1 (plastic protected) or Class 2 (stainless steel protected) at all formed surfaces which will be exposed to view but not to weather.
 - c. Precast concrete blocks of strength equal to or greater than specified strength of concrete or Class 3 supports equipped with sand plates, where concrete will be cast against earth. Concrete masonry units will not be accepted.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, and as follows:
1. Type IL cement shall be the standard default cement for all structures.
- B. Fly Ash: ASTM C 618, Type C or F.
- C. Water: Potable.
- D. Aggregates:
1. Normal weight concrete: ASTM C 33.
 - a. Class 5M.
 - b. Gradation as specified below under mix design.
- E. Admixtures General: Admixtures which result in more than 0.1 percent of soluble chloride ions by weight of cement are prohibited.

SECTION 03300

CAST-IN-PLACE CONCRETE

- F. Air Entraining Admixture: ASTM C 260 and certified by manufacturer for compatibility with other mix components.
 - 1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. "Air Mix"; The Euclid Chemical Company.
 - b. "Sika Aer"; Sika Corporation.
 - c. "Micro Air"; Master Builders, Inc.
 - d. "Darex AEA"; W. R. Grace & Co.

- G. Water Reducing, Retarding Admixture: ASTM C 494, Type D.
 - 1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. "Pozzolith Retarder"; Master Builders, Inc.
 - b. "Eucon Retarder 75"; The Euclid Chemical Company.
 - c. "Daratard 17"; W. R. Grace & Co.
 - d. "PSI R Plus"; Cormix Construction Chemicals.
 - e. "Plastiment"; Sika Corporation.
 - f. "Protard"; Master Builders, Inc. (former Conchem product).

- H. Water Reducing and Accelerating Admixtures: ASTM C 494, Type E.
 - 1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. "Accelguard 80"; The Euclid Chemical Company.
 - b. "Pozzutec 20"; Master Builders, Inc.
 - c. "Gilco Accelerator"; Cormix Construction Chemicals.

- I. High Range Water Reducing Admixture (Superplasticizer): ASTM C 494, Type F or G.
 - 1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. "WRDA 19" or "Daracem 100"; W. R. Grace & Co.
 - b. "PSP Superplasticizer"; Master Builders, Inc. (former Conchem product).
 - c. "Sikament 300"; Sika Corporation.
 - d. "Eucon 37"; The Euclid Chemical Company.
 - e. "PSI Super"; Cormix Construction Chemicals.
 - f. "Rheobuild"; Master Builders, Inc.

2.04 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Vapor Retarder: Membrane for installation beneath building slabs on grade, resistant to decay when tested in accordance with ASTM E 154, and as follows:
 - 1. Polyethylene sheet, not less than 8 mils thick. Refer to 07265 for vapor barrier requirements

- B. Nonshrink Grout: ASTM C 1107.
 - 1. Minimum 4000 psi grout compressive strength
 - 2. Type: Provide nonmetallic type only.

SECTION 03300

CAST-IN-PLACE CONCRETE

3. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. Nonmetallic type:
 - 1) "Masterflow 928"; Master Builders, Inc.
 - 2) "SonogROUT 14k"; Sonneborn Building Products Division ChemRex, Inc.
 - 3) "Euco N S Grout"; The Euclid Chemical Company.
 - 4) "Supreme"; Cormix Construction Chemicals.
 - 5) "Five Star Grout"; Five Star Products, Inc.
- C. Burlap: AASHTO M 182, Class 2 jute or kenaf cloth.
- D. Moisture Retaining Cover: ASTM C 171, and as follows:
 1. Curing paper.
 2. Polyethylene film.
 3. White burlap polyethylene sheeting.
- E. Bonding Compound: Non redispersable acrylic bonding admixture, ASTM C 1059, Type II.
 1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. "Everbond"; L & M Construction Chemicals, Inc.
 - b. "Flex Con"; The Euclid Chemical Company.
- F. Epoxy Bonding Systems: Epoxy adhesive for bonding fresh concrete to hardened concrete and for grouting wall pipes, bolts and reinforcing dowels. ASTM C 881; type, grade, and class as required for project conditions.
 1. Products: The following products, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. "Concresive LPL"; Master Builders, Inc.
 - b. "Sikadur 32 Hi Mod"; Sika Corporation.
 - c. "Euco #452 Epoxy System"; The Euclid Chemical Company.
 - d. "Sikastix 390".
 - e. "EucoEpoxy 461".
 - f. "Five Star Epoxy Grout".
 - g. "Sikstix 370".
 - h. "EucoEpoxy 463".
- G. Expansion Joint Filler
 1. Expansion Joint Filler shall be performed non-extruding and resilient type meeting the Specifications of ASTM D1751, or D1752, unless otherwise specified.
 2. All expansion joints in base slabs on grade other than hydraulic structures shall be fiber expansion joints of required slab depth meeting the requirement of ASTM D1751, Type I and AASHTO M213. Exposed joints shall be sealed as specified below.
 3. All expansion joints in hydraulic structures shall be ¾ inch sponge rubber expansion joints of required wall thickness meeting the requirements of ASTM D1752, Type I and AASHTO M153, Type I. Joints shall be sealed on both sides as specified below.

SECTION 03300

CAST-IN-PLACE CONCRETE

- a. Nonextruding bituminous type: ASTM D 1751.
 - b. Sponge rubber type: ASTM D 1752, Type I.
- H. Expansion Joint Sealer
1. Joint sealants for hydraulic structures shall be one of the following, or approved equal:
 - a. "CM-60" two-part gray tone, as manufactured by W. R. Meadows, Inc., applied over a backer rod sized for the joint. Underwater primer shall be used on all joints subject to immersion. Standard "CM-60" primer shall be applied to all other joints. Sealant depth shall be one-half the width of the joint.
 - b. The sealant shall be a two-part, polyurethane sealant "Eucolastic I" by the Euclid Chemical Company or "Sikaflex 1a" by Sika Chemical Company. Joint width should be 4 times the expected joint movement, but not less than ¼ inch. All joints shall be primed with "Eucolastic Primer" by the Euclid Chemical Company or "Sikaflex 429" by Sika Chemical Company.
- I. PVC Waterstops
- Waterstops: Made of Polyvinyl Chloride (PVC) and of subzero grade, Plastigrip, Type W-6 as manufactured by Progress Unlimited, Inc. or approved equivalent.
1. Minimum 4-inch x 3/16inch- or as specified on the drawings.
 2. Produced from a compound, the base resin of which shall be virgin PVC.
 3. Minimum Properties:
 - a. 2000 psi minimum tensile strength, ASTM D412-51T
 - b. 350% minimum elongation, ASTM D412-51T
 - c. -35 degrees F minimum low temperature brittleness, ASTM D746-57T
 - d. 65-75 shore 'A' durometer hardness, ASTM D676-59T
 - e. 0.15 maximum water absorption, ASTM D570-59T
 4. Field Splicing:
 - a. Butt splices shall be fused welded using a thermostatically controlled Teflon PVC Waterstop iron at the Manufacturer's recommended temperature
 - b. Lapping, gluing or use of adhesives shall not be permitted.
 - c. Provide factory made waterstop fabrications for all changes of directions, intersections, and transitions leaving only butt joint splicing for the field.
 5. Center waterstop in the joint and secure in correct position.
 6. Use ribbed center bulb for all moving joints. Use dumbbell for all non-movement joints.
 7. Always place the center bulb in the center of the expansion joint. Do not embed the center bulb in concrete.
 8. Vibrate concrete around waterstops thoroughly to prevent honeycombing and to ensure contact between concrete and waterstop.

2.05 CONCRETE MIX DESIGN

- A. Review: Do not begin concrete operations until proposed mix has been reviewed by the ENGINEER.

SECTION 03300

CAST-IN-PLACE CONCRETE

- B. Proportioning of Normal Weight Concrete: Comply with recommendations of ACI 211.1.
- C. Required Average Strength: Establish the required average strength $f'(cr)$ of the design mix on the basis of trial mixtures as specified in ACI 301, and proportion mixes accordingly. Employ an independent testing agency acceptable to the ENGINEER for preparing and reporting proposed mix design.
- D. Proportion normal-weight concrete mix to produce an average strength at 28 day as follows unless otherwise indicated on the drawings:
 - 1. Columns, beams, walls, footings and slabs: 4000 psi
 - 2. Masonry Filled Grout: 3000 psi
 - 3. Prestressed Elements: 5000 psi
- E. Fly Ash:
 - 1. The CONTRACTOR may elect to replace a portion of the Portland cement with fly ash up to a maximum of 25 percent by weight of cement plus fly ash.
- F. Admixtures:
 - 1. Air entraining admixture: Add at rate to achieve specified air content.
 - a. Do not use in slabs on grade scheduled to receive topping, unless manufacturer of topping recommends use over air entrained concrete.
 - 2. Water reducing and retarding admixture: Add as required in concrete mixes to be placed at ambient temperatures above 90 degrees F.
 - 3. Water reducing and accelerating admixture: Add as required in concrete mixes to be placed at ambient temperatures below 50 degrees F.
 - 4. High range water reducing admixture (superplasticizer): Add as required for placement and workability.
 - 5. Do not use admixtures not specified or approved.
- G. Design mix to meet or exceed each requirement specified. Where more than one criterion is specified, the most stringent shall apply. For example, a minimum cement content or maximum water cement ratio might result in strengths greater than the minimum specified; likewise, a greater cement content or lower water cement ratio may be required in order to achieve the required strength.
 - 1. Specified compressive strength $f'(c)$ (ASTM C 39): As noted
 - 2. Maximum water cement ratio by weight:
 - a. 0.4 for concrete toppings subject to traffic
 - b. 0.45 for all other concrete
 - 3. Maximum slump: As recommended in ACI 211.1. and ACI 350 as applicable.
 - 4. Gradation of coarse aggregate: ASTM C 33 standard gradation with maximum nominal size of 3/4 inches.
 - 5. Total air content (ASTM C 173 or ASTM C 231): 5 percent.
- H. Mix Adjustments: Provided that no additional expense to OWNER is involved, CONTRACTOR may submit for ENGINEER's approval requests for adjustment to approved concrete mixes when circumstances such as changed project conditions, weather, or unfavorable test results occur. Include laboratory test data substantiating specified properties with mix adjustment requests.

SECTION 03300

CAST-IN-PLACE CONCRETE

2.06 CONTROL OF MIX IN THE FIELD

- A. Slump: A tolerance of up to 1 inch above that specified will be permitted for 1 batch in 5 consecutive batches tested. Concrete of lower slump than that specified may be used, provided proper placing and consolidation is obtained.
 - 1. If slump upon arrival at the site is lower than 1 inch below the value specified, one addition of water in accordance with ASTM C 94 will be permitted to bring slump within tolerance, provided that:
 - a. A positive means is available to measure the amount of water added at the site.
 - b. The specified (or approved) maximum water cement ratio is not exceeded.
 - c. Not more than 45 minutes have elapsed since batching.
- B. Total Air Content: A tolerance of plus or minus 1 1/2 percent of that specified will be allowed for field measurements.
- C. Do not use batches that exceed tolerances.

2.07 CONCRETE MIXING

- A. On Site Equipment: Mix concrete materials in appropriate drum type batch machine mixer, in compliance with ASTM C 685. Mix each batch minimum of 1 1/2 minutes and maximum of 5 minutes before discharging concrete. Clean thoroughly at end of day and before changing concrete type.
- B. Transit Mixers: Mix concrete materials in transit mixers, complying with requirements of ASTM C 94.
 - 1. At ambient temperatures of 85 to 90 degrees F, reduce mixing and delivery time to 75 minutes.
 - 2. At ambient temperatures above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3- EXECUTION

3.01 CONCRETE FORM PREPARATION

- A. General: Comply with requirements of ACI 301 and ACI 347 for formwork, and as herein specified. The CONTRACTOR is responsible for design, ENGINEER, and construction of formwork, and for its timely removal.
- B. Earth Forms: Hand trim bottoms and sides of earth forms to profiles indicated on the drawings. Remove loose dirt before placing concrete.
- C. Design: Design and fabricate forms for easy removal, without impact, shock, or damage to concrete surfaces or other portions of the work. Design to support all applied loads until concrete is adequately cured, within allowable tolerances and deflection limits.

SECTION 03300

CAST-IN-PLACE CONCRETE

- D. Construction: Construct and brace formwork to accurately achieve end results required by contract documents, with all elements properly located and free of distortion. Provide for necessary openings, inserts, anchorages, and other features shown or otherwise required.
 - 1. Joints: Minimize form joints and make watertight to prevent leakage of concrete.
 - a. Align joints symmetrically at exposed conditions.
 - 2. Chamfers: Provide chamfered edges and corners at exposed locations, unless specifically indicated otherwise on the drawings.
 - 3. Permanent openings: Provide openings to accommodate work of other trades, sized and located accurately. Securely support items built into forms; provide additional bracing at openings and discontinuities in formwork.
 - 4. Temporary openings: Provide temporary openings for cleaning and inspection in most inconspicuous locations at base of forms, closed with tight fitting panels designed to minimize appearance of joints in finished concrete work.
- E. Tolerances for Formed Surfaces: Comply with minimum tolerances established in ACI 117, unless more stringent requirements are indicated on the drawings.
- F. Release Agent: Provide either form materials with factory applied non-absorptive liner or field applied form coating. If field applied coating is employed, thoroughly clean and recondition formwork and reapply coating before each use. Rust on form surfaces is unacceptable.

3.02 VAPOR RETARDER INSTALLATION

- A. General: Place vapor retarder sheet over prepared base material, aligning longer dimension parallel to direction of pour and lapped 6 inches. Seal joints with appropriate tape.

3.03 PLACING REINFORCEMENT

- A. General: Comply with requirements of ACI 301 and as herein specified.
- B. Preparation: Clean reinforcement of loose rust and mill scale, soil, and other materials which adversely affect bond with concrete.
- C. Placement: Place reinforcement to achieve not less than minimum concrete coverages required for protection. Accurately position, support, and secure reinforcement against displacement. Provide Class C tension lap splices complying with ACI 318 unless otherwise indicated. Do not field bend partially embedded bars unless otherwise indicated or approved.
 - 1. Use approved bar supports and tie wire, as required. Set wire ties to avoid contact with or penetration of exposed concrete surfaces. Tack welding of reinforcing is not permitted.
 - 2. Wire fabric: Install in maximum lengths possible, lapping adjoining pieces not less than one full mesh. Offset end laps to prevent continuous laps in either direction, and splice laps with tie wire.
- D. Welding: Welding of reinforcement is not permitted.

SECTION 03300

CAST-IN-PLACE CONCRETE

3.04 JOINT CONSTRUCTION

- A. Construction Joints: Locate and install construction joints as indicated on drawings. If construction joints are not indicated, locate in manner which will not impair strength and will have least impact on appearance, as acceptable to the ENGINEER. Construction joints in retaining walls and walls of concrete tanks or structures subject to hydrostatic pressure shall be intentionally roughened to a full amplitude of approximately $\frac{1}{4}$ inch.
 - 1. Keyways: Provide keyways not less than 1 1/2 inches deep.
 - 2. Reinforcement: Continue reinforcement across and perpendicular to construction joints, unless details specifically indicate otherwise.
- B. Isolation Joints: Construct isolation joints in slabs poured on grade at points of contact with vertical components, such as foundation walls and column pedestals. Install expansion joint filler to full concrete depth. Recess top edge of filler 1/8 inch where joints are unsealed.
- C. Expansion Joints: Construct expansion joints where indicated. Install expansion joint filler to full depth of concrete. Recess edge of filler to depth indicated to receive joint sealant and backer rod as specified herein and detailed on drawings.
- D. Control Joints: Construct contraction joints in building slabs poured on grade to form panels of sizes indicated on drawings, but not more than 20 feet apart in either direction.
 - 1. Saw cuts: Form control joints by means of saw cuts one fourth the depth of the slab, performed as soon as possible after slab finishing without dislodging aggregate.

3.05 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set anchorage devices and other items required for other work connected to or supported by cast in place concrete, using templates, setting drawings, and instructions from suppliers of items to be embedded.
 - 1. Edge Forms and Screeds: Set edge forms and intermediate screeds as necessary to achieve final elevations indicated for finished slab surfaces.

3.06 WATERSTOPS

- A. Waterstops shall be provided at all joints to seal off leakage of liquid from or into concrete tanks or structures subject to hydrostatic pressures. The type of waterstops used shall be as shown on the Drawings and as specified herein. The CONTRACTOR shall submit to the ENGINEER for approval the proposed procedure and schedule of concrete placing operations along with a detailed layout of the waterstop materials required showing sizes, lengths and types of joints.
- B. Where required for proper location of waterstops, whether shown on the Drawings or not, starter walls of up to 1-1/2 inches in height and monolithic with slabs shall be provided at all wall construction joints. Reinforcing steel shall not be depressed at waterstops but shall have only the amount of concrete covering shown or specified. Starter walls as specified shall be required whether shown on the Drawings or not, unless specified concrete cover over reinforcing steel is 3 inches or greater.

SECTION 03300

CAST-IN-PLACE CONCRETE

3.07 CONCRETE PLACEMENT

- A. Preparation: Provide materials necessary to ensure adequate protection of concrete during inclement weather before beginning installation of concrete.
- B. Inspection: Before beginning concrete placement, inspect formwork, reinforcing steel, and items to be embedded, verifying that all such work has been completed.
 - 1. Wood forms: Moisten immediately before placing concrete in locations where form coatings are not used.
- C. Placement General: Comply with requirements of ACI 304 and as follows:
 - 1. Concreting should be carried on at such a rate that the concrete is at all times plastic and flows readily into spaces between reinforcement.
 - 2. Schedule continuous placement of concrete to prevent the formation of cold joints.
 - 3. Provide construction joints if concrete for a particular element or component cannot be placed in a continuous operation.
 - 4. Deposit concrete as close as possible to its final location, to avoid segregation.
 - 5. Concrete shall be worked around reinforcement and embedded fixtures and into corners of forms.
 - 6. The following shall be prohibited from use:
 - a. Partially hardened concrete.
 - b. Contaminated concrete.
 - c. Re-tempered concrete.
 - d. Re-mixed concrete after initial set has occurred.
- D. Placement in Forms: Limit horizontal layers to depths which can be properly consolidated, but in no event greater than 24 inches.
 - 1. Consolidate concrete by means of mechanical vibrators, inserted vertically in freshly placed concrete in a systematic pattern at close intervals. Penetrate previously placed concrete to ensure that separate concrete layers are knitted together.
 - 2. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.
 - 3. Do not use vibrators to move concrete laterally.
- E. Slab Placement: Schedule continuous placement and consolidation of concrete within planned construction joints.
 - 1. Thoroughly consolidate concrete without displacing reinforcement or embedded items, using internal vibrators, vibrating screeds, roller pipe screeds, or other means acceptable to ENGINEER.
 - 2. Strike off and level concrete slab surfaces, using highway straightedges, darbies, or bull floats before bleed water can collect on surface. Do not work concrete further until finishing operations are commenced.
- F. Cold Weather Placement: Comply with recommendations of ACI 306 when air temperatures are expected to drop below 40 degrees F either during concrete placement operations or before concrete has cured.
 - 1. Do not use frozen or ice laden materials.
 - 2. Do not place concrete on frozen substrates.

SECTION 03300

CAST-IN-PLACE CONCRETE

- G. Hot Weather Placement: Comply with recommendations of ACI 305R when ambient temperature before, during, or after concrete placement is expected to exceed 90 degrees F or when combinations of high air temperature, low relative humidity, and wind speed are such that the rate of evaporation from freshly poured concrete would otherwise exceed 0.2 pounds per square foot per hour.
1. Do not add water to approved concrete mixes under hot weather conditions.
 2. Provide mixing water at lowest feasible temperature and provide adequate protection of poured concrete to reduce rate of evaporation.
 3. Use fog nozzle to cool formwork and reinforcing steel immediately prior to placing concrete.
- H. Mass Concrete Placement: Comply with recommendations of ACI 207.1R when any volume of concrete with dimensions large enough to require that measures be taken to cope with generation of heat from hydration of the cement and attendant volume change to minimize cracking.
1. When the minimum dimension of the concrete exceeds 36 inches and the ratio of volume of concrete to the surface area is greater than 12 inches, provide for mass concrete.
 2. Lifts shall not exceed 8ft.

3.08 FINISHING FORMED SURFACES

- A. Repairs, General: Repair surface defects, including tie holes, immediately after removing formwork.
1. Remove honeycombed areas and other defective concrete down to sound concrete, cutting perpendicular to surface or slightly undercutting. Dampen patch location and area immediately surrounding it prior to applying bonding compound or patching mortar.
 2. Before bonding compound has dried, apply patching mixture matching original concrete in materials and mix except for omission of coarse aggregate, and using a blend of white and normal Portland cement as necessary to achieve color match. Consolidate thoroughly and strike off slightly higher than surrounding surface.
- B. Textured Form Finish: Repair tie holes and patch defective areas to match pattern created by form construction or form liners.
- C. Unexposed Form Finish: Repair tie holes and patch defective areas. Rub down or chip off fins or other raised areas exceeding ¼-inch height.
- D. Exposed Form Finish: Repair and patch defective areas, with fins or other projections completely removed and smoothed.
1. Smooth rubbed finish: Apply to surfaces indicated no later than 24 hours after form removal.
 - a. Wet concrete surfaces to be finished and rub with Carborundum brick or other abrasive until uniform color and texture are achieved.
 - b. Do not apply separate grout mixture.
 2. Contiguous unformed surfaces: Strike smooth and float to a similar texture tops of walls, horizontal offsets, and other unformed surfaces adjacent to or contiguous with formed surfaces. Continue final finish of formed surfaces across unformed surfaces, unless otherwise specifically indicated.

SECTION 03300

CAST-IN-PLACE CONCRETE

3.09 FINISHING SLABS

- A. Finishing Operations
 - 1. Do not directly apply water to slab surface or dust with cement.
 - 2. Use hand or powered equipment only as recommended in ACI 302.1R.
 - 3. Screeding: Strike off to required grade and within surface tolerances indicated. Verify conformance to surface tolerances. Correct deficiencies while concrete is still plastic.
 - 4. Bull Floating: Immediately following screeding, bull float or darby before bleed water appears to eliminate ridges, fill in voids, and embed coarse aggregate. Recheck and correct surface tolerances.
 - 5. Do not perform subsequent finishing until excess moisture or bleed water has disappeared and concrete will support either foot pressure with less than ¼-inch indentation or weight of power floats without damaging flatness.
 - 6. Final floating: Float to embed coarse aggregate, to eliminate ridges, to compact concrete, to consolidate mortar at surface, and to achieve uniform, sandy texture. Recheck and correct surface tolerances.
- B. Coordinate appearance and texture of required final finishes with the ENGINEER before application.
 - 1. Apply final finishes in the locations indicated on the drawings.
- C. Float Finish: As specified above.
- D. Broomed Float Finish: After floating and when water sheen has practically disappeared, apply uniform transverse corrugations approximately 1/16-inch deep, without tearing surface.
- E. Slab Surface Tolerances:
 - 1. Achieve flat, level planes except where grades are indicated. Slope uniformly to drains.
 - 2. Floated finishes: Depressions between high spots shall not exceed 5/16 inch under a 10-foot straightedge.
- F. Repair of Slab Surfaces: Test slab surfaces for smoothness and to verify surface plane to tolerance specified. Repair defects as follows:
 - 1. High areas: Correct by grinding after concrete has cured for not less than 14 days.
 - 2. Low areas: Immediately after completion of surface finishing operations, cut out low areas and replace with fresh concrete. Finish repaired areas to blend with adjacent concrete. Proprietary patching compounds may be used when approved by the ENGINEER.
 - 3. Crazed or cracked areas: Cut out defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts. Dampen exposed concrete and apply bonding compound. Mix, place, compact, and finish patching concrete to match adjacent concrete.

SECTION 03300

CAST-IN-PLACE CONCRETE

4. Isolated cracks and holes: Groove top of cracks and cut out holes not over 1 inch in diameter. Dampen cleaned concrete surfaces and apply bonding compound; place dry pack or proprietary repair compound acceptable to ENGINEER while bonding compound is still active:
 - a. Dry pack mix: One part Portland cement to 2-1/2 parts fine aggregate and enough water as required for handling and placing.
 - b. Install patching mixture and consolidate thoroughly, striking off level with and matching surrounding surface. Do not allow patched areas to dry out prematurely.

3.10 CONCRETE CURING AND PROTECTION

A. General

1. Prevent premature drying of freshly placed concrete and protect from excessively cold or hot temperatures until concrete has cured.
2. Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case.

B. Curing Period

1. Not less than 7 days for standard cements and mixes.
2. Not less than 4 days for high early strength concrete using Type III cement.

C. Curing Temperature

1. Concrete shall be maintained above 50 degrees F and in moist condition during the entire curing period.

D. Formed Surfaces: Cure formed concrete surfaces by moist curing with forms in place for full curing period.

1. Keep wooden or metal forms moist when exposed to heat of the sun.
2. If forms are removed prior to completion of curing process, continue curing by one of the applicable methods specified.

E. Surfaces Not in Contact with Forms

1. Start initial curing as soon as free water has disappeared, but before surface is dry.
2. Keep continuously moist for not less than 3 days by uninterrupted use of any of the following:
 - a. Water ponding.
 - b. Water saturated sand.
 - c. Water fog spray.
 - d. Saturated burlap: Provide 4-inch minimum overlap at joints.
3. Begin final curing procedures immediately following initial curing and before concrete has dried.
 - a. Moisture retaining cover: Lap not less than 3-inches at edges and ends, and seal with waterproof tape or adhesive. Repair holes or tears during curing period with same tape or adhesive. Maintain covering in intimate contact with concrete surface. Secure to avoid displacement.
 - 1) Extend covering past slab edges at least twice the thickness of slab.
 - 2) Do not use plastic sheeting on surfaces which will be exposed to view when in service.
 - 3) Continue final curing to end of curing period.

SECTION 03300

CAST-IN-PLACE CONCRETE

- F. Avoid rapid drying at end of curing period.
- G. During and following curing period, protect concrete from temperature changes of adjacent air in excess of 5 degrees F per hour and 50 degrees F per 24 hours. Progressively adjust protective measures to provide uniform temperature changes over entire concrete surface.

3.11 SHORES AND SUPPORTS

- A. General: Comply with recommendations of ACI 347 for shoring and reshoring in multistory construction.
- B. Low Rise Construction: Extend shoring from ground to roof for structures 4 stories or less in height.
- C. Reshoring: Remove shores and reshore in a planned sequence, to avoid damage to partly cured concrete. Locate and provide adequate reshoring to safely support work without excessive stress or deflection.
- D. Provide as a package, shoring and reshoring drawings prepared by or under the direct supervision of a specialty ENGINEER registered in the State of Florida.

3.12 REMOVAL OF FORMS AND SUPPORTS

- A. Non Load Bearing Formwork: Provided that concrete has hardened sufficiently that it will not be damaged, forms not actually supporting weight of concrete or weight of soffit forms may be removed after concrete has cured at not less than 50 degrees F for 24 hours. Maintain curing and protection operations after form removal.
- B. Load Bearing Formwork: Do not remove shoring and forms supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, until concrete has attained at least the specified compressive strength $f'(c)$ and until the CONTRACTOR has determined that the actual compressive strength attained is adequate to support the weight of the concrete and superimposed loads.
- C. Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained at least the specified compressive strength $f'(c)$ and until the CONTRACTOR has determined that the actual compressive strength attained is adequate to support the weight of the concrete and superimposed loads.
- D. Keep supports in place until heavy loads due to construction operations have been removed.
- E. Test field cured specimens to determine potential compressive strength of concrete for specific locations.

SECTION 03300

CAST-IN-PLACE CONCRETE

3.13 MISCELLANEOUS CONCRETE ITEMS

- A. Fill in: Fill in holes and openings left in concrete structures for passage of work by other trades after such work is in place. Place such fill in concrete to blend with existing construction, using same mix and curing methods.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as indicated on Drawings. Set anchor bolts at correct elevations, complying with diagrams or templates of equipment manufacturer.
 - 1. Grout base plates and foundations as indicated with non-shrink grout.
 - 2. Use nonmetallic grout for exposed conditions, unless otherwise indicated.
 - 3. Equipment bases shall be sized to provide a minimum of 1.5" between the edge of the equipment bases and the edge of the equipment being served.
 - 4. Provide conduit windows through equipment bases of electrical equipment sized no larger than the conduit windows of the equipment being served.
 - 5. Equipment bases for electrical equipment shall be a minimum of 4" thick with chamfered edges.
- C. Reinforced Masonry: Provide concrete grout for reinforced masonry where indicated on Drawings and as scheduled.

3.14 CONCRETE REPAIRS

- A. General: Repairs due to poor workmanship shall be made by the CONTRACTOR at the CONTRACTOR's expense and shall be approved by the ENGINEER prior to repair procedure being implicated.
- B. Perform cosmetic repairs of concrete surfaces as specified under concrete application.
- C. Perform structural repairs with prior approval of the ENGINEER for method and procedure, using epoxy bonding systems. The ENGINEER's approval is required for repair methods using materials other than those specified.

3.15 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. Refer to Section 01410 for additional concrete testing requirements for the project.
- B. Composite Sampling and Making and Curing of Specimens: ASTM C 172 and ASTM C 31.
 - 1. Take samples at point of discharge.
 - 2. For pumped concrete, perform sampling and testing at the frequencies specified herein at point of delivery to pump, and perform additional sampling and testing at the same frequency at discharge from line.
 - 3. Results obtained at discharge from line shall be used for acceptance of concrete.
- C. Slump: ASTM C 143. One test per strength test and additional tests if concrete consistency changes.
 - 1. Modify sampling to comply with ASTM C 94.

SECTION 03300

CAST-IN-PLACE CONCRETE

- D. Air Content of Normal Weight Concrete: ASTM C 173 or ASTM C 231. One test per strength test performed on air entrained concrete.
- E. Concrete Temperature:
 - 1. Test hourly when air temperature is 40 degrees F or below.
 - 2. Test hourly when air temperature is 90 degrees F or above.
 - 3. Test each time a set of strength test specimens is made.
- F. Compressive Strength Tests: ASTM C 39.
 - 1. Compression test specimens: Mold and cure one set of 4 standard cylinders for each compressive strength test required.
 - 2. Testing for acceptance of potential strength of as delivered concrete:
 - a. Obtain samples on a statistically sound, random basis.
 - b. Minimum frequency:
 - 1) One set per 100 cubic yards or fraction thereof for each day's pour of each concrete class.
 - 2) One set per 3500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.
 - 3) When the above testing frequency would provide fewer than 5 strength tests for a given class of concrete during the project, conduct testing from not less than 5 randomly selected batches, or from each batch if fewer than 5.
 - c. Test one specimen per set at 7 days for information unless an earlier age is required.
 - d. Test 2 specimens per set for acceptance of strength potential; test at 28 days unless other age is specified. The test result shall be the average of the two specimens. If one specimen shows evidence of improper sampling, molding, or testing, the test result shall be the result of the remaining specimen; if both show such evidence, discard the test result and inform the ENGINEER.
 - e. Retain one specimen from each set for later testing, if required.
 - f. Strength potential of as delivered concrete will be considered acceptable if all of the following criteria are met:
 - 1) No individual test result falls below specified compressive strength by more than 500 psi.
 - 2) Average of any 3 consecutive strength test results equals or exceeds specified compressive strength f'c.
 - 3) Testing for evaluation of field curing:
 - a) Frequency: 1 field set of specimens per strength acceptance test.
 - b) Mold specimens from same sample used for strength acceptance tests. Field cure, and test at same age as for strength acceptance tests.
 - c) Evaluate construction and curing procedures and implement corrective action when strength results for field cured specimens are less than 85 percent of test values for companion laboratory cured specimens.
 - 3. Removal of forms or supports: Mold additional specimens and field cure with concrete represented; test to determine strength of concrete at proposed time of form or support removal.

SECTION 03300

CAST-IN-PLACE CONCRETE

- G. Test Results: Testing agency shall report test results in writing to ENGINEER and CONTRACTOR within 24 hours of test.
1. Test reports shall contain the following data:
 - a. Project name, number, and other identification.
 - b. Name of concrete testing agency.
 - c. Date and time of sampling.
 - d. Concrete type and class.
 - e. Location of concrete batch in the completed work.
 - f. All information required by respective ASTM test methods.
 2. Nondestructive testing devices such as impact hammer or sonoscope may be used at ENGINEER's option for assistance in determining probable concrete strength at various locations or for selecting areas to be cored, but such tests shall not be the sole basis for acceptance or rejection.
 3. The testing agency shall make additional tests of in place concrete as directed by the ENGINEER when test results indicate that specified strength and other concrete characteristics have not been attained.
 - a. Testing agency may conduct tests of cored cylinders complying with ASTM C 42, or tests as directed.
 - b. Cost of additional testing shall be borne by the CONTRACTOR when unacceptable concrete has been verified.
- H. Water Tightness of Water Containing Walls
1. All basins, tanks, manholes, storm drainage structures, and wet wells are hydraulic structures and shall be watertight. Water tightness testing shall be conducted prior to any application of coatings or painting systems to the tank, basin, manhole, or wet well as per Sections 09900 and 13216. Each structure shall be filled with water, full depth (above maximum water level), prior to backfilling (unless otherwise noted) and kept full of water for 48 hours prior to starting the tightness testing. After 48-hours the level in the tank shall be measured and the testing period shall begin and conducted over a 24-hour period. The CONTRACTOR shall exercise every precaution to secure water tightness by careful mixing and placing of the concrete to obtain a homogeneous mixture at maximum density, without air pockets or voids, using the minimum practical amount of water in the mix. Extreme care shall be used to secure continuity of water stops at expansion and construction joints, to seal off holes from wall ties, and when placing concrete about wall sleeves, wall pipes and other obstructions. The CONTRACTOR shall fix all leaks.
 2. The CONTRACTOR shall furnish, at his own expense, any pumps, piping, and appurtenances to provide the test water for the water tightness testing and any water post-loading operations of structures.
 3. All structures shall be watertight.

END OF SECTION 03300

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Furnish, test, and put into operation four (4) electric motor-driven, vertical turbine can pumps to serve as booster pumps for the CR 208 GST and Booster Pump Station. The pumps shall be sized per Table 11214-1.
- B. The pumps will be pre-purchased by the OWNER. The pump MANUFACTURER shall include, but in no way be limited to, the following responsibilities in their scope of work:
 - 1. Shop drawing submittals to the OWNER per this Section and Section 01300
 - 2. Factory acceptance testing and submittal of Certified Pump Curves. Certified Pump Curves shall be submitted to the OWNER and ENGINEER prior to delivery of the pumps to the site. Failure to obtain acceptance of Factory Certified Curves prior to the pump delivery may result of rejection of the equipment
 - 3. Delivery of the pumps to the project site and coordination with the installing CONTRACTOR for any activities to deliver, install, and test the pump.
 - 4. Provision of recommendations to the CONTRACTOR for short term storage requirements including any recommendations for maintenance of pumps and motors while in storage
 - 5. Provision of proper anchoring and grouting requirements to the CONTRACTOR
 - 6. Verification of system installation (installation by CONTRACTOR)
 - 7. Review of final alignment of pump (preliminary alignment by CONTRACTOR; MANUFACTURER shall oversee final equipment leveling and alignment per the criteria in this specification) and production of alignment report submittal, Certification of Installation to be provided by the MANUFACTURER
 - 8. Development of operation and maintenance information and manual submittals per Section 01730
 - 9. Provision of factory representatives who will observe and record data from functional demonstration, vibration, and performance testing; CONTRACTOR shall conduct testing, but MANUFACTURER shall provide a report of field testing performed by the CONTRACTOR.
 - 10. MANUFACTURER shall provide an authorized representative who has complete knowledge of the proper installation, operation, and maintenance of the equipment for all required site visits detailed in this Section in addition to any other visits which are required to ensure proper installation and operation, without limitation.
- C. The CONTRACTOR shall include, but not limited to, the following responsibilities in their scope of work:
 - 1. Coordination with the pump MANUFACTURER as required to provide a fully operational system

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

2. Equipment unloading, storage, performance of any short-term maintenance advised by the MANUFACTURER while in storage, and installation per the MANUFACTURER's recommendations
 3. Performance of leveling and alignment with the support of the MANUFACTURER
 4. Repair of any defects incurred during unloading, storage, and installation of the pump
 5. Coordination with MANUFACTURER for any installation inspection and address any issues identified during the review
 6. Conduct field functional demonstration, vibration, and performance testing with support of the MANUFACTURER
 7. Overall commissioning of the installation including the tank, pumps and motors, valves, VFDs, and controls
- D. The units shall be furnished with all necessary accessory equipment including, but not limited to, the pumps, motors, base plates, couplings, any specified sensors, spare parts, special tools and any other required ancillary components, whether specifically mentioned in this Section or not, as required for a complete operational system incorporating the highest standards for this type of service including field testing and instructing the regular operating personnel in the care, operation, and maintenance of all equipment. All complete pumping units shall be factory assembled and tested and shall be shipped in as large an assembly as practical to minimize field assembling effort.

1.02 RELATED SECTIONS

- A. Section 16150 Electric Motors

1.03 SUBMITTALS

- A. Copies of all materials required to establish compliance with the specifications shall be submitted in accordance with Section 01300. Submittals provided by the MANUFACTURER shall include the following:
1. Certified shop and erection drawings showing all important details of construction, dimensions, and anchor bolt locations.
 2. Shop drawings shall provide reaction/thrust for the specific model of pump being provided.
 3. Descriptive literature, bulletins, and/or catalogs of the equipment.
 4. Data on the characteristics and performance of each pump. Data shall include guaranteed performance curves, based on actual shop tests of similar units, which show that they meet the specified requirements for head, capacity, efficiency, NPSHr, current draw, and horsepower. Curves shall be submitted on 8-1/2 inch by 11-inch sheets, at as large a scale as is practical. Curves shall be plotted from no flow at shut off head to runout pump capacity at minimum specified total head. Catalog sheets showing a family of curves will not be acceptable.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

5. Mechanical seal and flush piping arrangement diagram, demonstrating conformance with these specifications.
 6. Complete master wiring diagrams, elementary or control schematics, including coordination with other electrical control devices such as the pump control system and suitable outline drawings shall be furnished. Provide suitable outline drawings showing such details as are necessary to locate conduit stub-ups and field wiring. Due to the complexity of the system, it is imperative the above drawings be clear and carefully prepared to facilitate interconnections with other equipment. Standard pre-printed sheets or drawings simply marked to indicate applicability to this Contract will not be acceptable. Refer to the Drawings for the control wiring diagrams for the pump motors.
 7. The total weight of the equipment, including the weight of the single largest item.
 8. A complete total bill of materials of all equipment.
 9. A list of the MANUFACTURER'S recommended spare parts to be supplied in addition to those specified in Paragraph 1.08, with the MANUFACTURER'S current price for each item. Include gaskets, packing, etc. on the list.
 10. Complete motor data in accordance with Section 16150: Electric Motors.
 11. A statement of compliance with the turbine reverse run-away speed requirements listed in Paragraph 2.01.
 12. Certified factory performance test data, including pump performance curves, showing head-capacity relationship, brake horsepower, efficiency, power factor, current draw, and pump speed. The curves shall be complete for the entire range of operation from shutoff to minimum head conditions. Provide actual test speed curves at 10% increments from 50% to 100%. Provide vibration readings in x, y & z axes at every test point and identify BEP and manufacturers minimum recommend flow rate at every given speed. Certified Factory test shall be performed in accordance with requirements of Paragraph 3.04.
 13. NPSHr test data for the specific pump model number
 14. Operation and Maintenance Data in accordance with Section 01730, and Paragraph 1.07 below. The maintenance instructions shall include troubleshooting data and full preventative maintenance schedules, and complete spare parts lists with ordering information.
 15. Vibration and alignment test reports in accordance with requirements of Paragraph 3.01.
 16. Field test results for inspection and testing performed in accordance with requirements of Paragraph 3.04 and Section 01465.
 17. Written documentation provided by the manufacturer warranting the pump at the minimum flow condition as per Paragraph 2.02 C.
 18. MANUFACTURER's Certificate of Installation, Testing and Instruction as specified in Section 01730.
- B. Certification from the pump Manufacturer that pump and all wetted parts comply with NSF 61 and NSF 372 or NSF 61-G. Wetted parts shall also be compatible with chlorine concentrations specified. Additionally, provide certification that the wetted parts contain a weighted average lead content of less than 0.25%.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

- C. CONTRACTOR shall conduct field testing under the direction of the MANUFACTURER. MANUFACTURER shall provide field test results for inspection and testing for vibration and performance in accordance with requirements of Paragraph 3.04 and Section 01465.
- D. CONTRACTOR shall conduct leveling and alignment; final alignment shall be conducted under the direction of the MANUFACTURER. MANUFACTURER shall provide an alignment test report.
- E. MANUFACTURER and CONTRACTOR shall each provide an individual agreement detailing the conditions of warranty. Warranty conditions shall comply with requirements listed in Paragraph 1.10.
- F. In the event it is impossible to conform to certain details of the specifications due to different manufacturing techniques, describe completely all non-conforming aspects. Failure to describe any and all deviations from the Specifications will be a cause for rejection.

1.04 REFERENCE STANDARDS

- A. Design, manufacturing, and assembly of elements of the equipment herein cited shall be in accordance with the standards of the below listed organizations. Where reference is made to a standard of one of these, or other organizations, the version of the standard in effect at the time of bid opening shall apply.
 - 1. American Gear Manufacturing Association (AGMA).
 - 2. American Institute of Steel Construction (AISC)
 - 3. American Iron and Steel Institute (AISI)
 - 4. American Society of Mechanical Engineers (ASME)
 - 5. American National Standards Institute (ANSI)
 - 6. American Society for Testing Materials (ASTM)
 - 7. American Water Works Association (AWWA)
 - 8. American Welding Society (AWS)
 - 9. Anti-Friction Bearing Manufacturers Association (AFBMA)
 - 10. Hydraulic Institute Standards (HI)
 - 11. Institute of Electrical and Electronics Engineers (IEEE)
 - 12. National Electrical Code (NEC)
 - 13. National Electrical Manufacturers Association (NEMA)
 - 14. Occupational Safety and Health Administration (OSHA)
 - 15. Steel Structures Painting Council (SSPC)
 - 16. Underwriters Laboratories, Inc. (UL)
 - 17. NSF International

1.05 QUALIFICATIONS

- A. To assure unity of responsibility, the pumps, suction cans, supporting sole plates and/or fabricated steel base plates, motors, and couplings shall be furnished by the pump manufacturer or his authorized representative. The CONTRACTOR shall assume full responsibility for the satisfactory installation and operation of the entire

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

pumping system including pumps, motors, connection to the VFDs, and controls as specified. The pumps shall be the standard catalogued product of a single pump Manufacturer.

- B. The pumps covered by these Specifications shall be standard pumping equipment of proven ability as manufactured by a reputable Manufacturer having experience in the production of such pumps. The pumps furnished shall be designed, constructed, and installed in accordance with the best practice and methods and shall operate satisfactorily when installed. Pumps shall be manufactured in accordance with the Hydraulic Institute Standards.
- C. All equipment furnished under this Specification shall be new and unused and shall be the standard product of manufacturers having a successful record of manufacturing and servicing the equipment and system specified herein for a minimum of five (5) years. The pump manufacturer shall assume unit responsibility for proper operation of pumps and motors.
- D. The MANUFACTURER shall be fully responsible for the design, arrangement, and operation of all connected rotating components of the assembled pumping unit to ensure that neither harmful nor damaging vibrations occur at any speed within the specified operating range. Design shall include all supporting sole plates and/or fabricated steel base plate for mounting the units, as may be applicable.
- E. OWNER pre-purchased pumps shall be manufactured to be as listed in Table 11200-1.

1.06 DESCRIPTION OF SYSTEMS

- A. Four (4) new variable speed vertical turbine can pumping units are required under this CONTRACT. The pumping units shall be located and arranged as shown on the Drawings.
- B. The pumping units shall pull suction from barrels that are connected to the potable water ground storage tank via buried piping and discharge into a common header to provide potable water to the distribution network.
- C. All components of the pump that come into contact with water shall be NSF 61 and NSF 372 or NSF 61-G approved and certified. The pump manufacturer shall provide certification during the shop drawing process.
- D. Pump materials should also be compatible with residual chlorine concentrations between 2 and 4 mg/L. Initial disinfection of pumps, which may include suction and discharge piping, shall be limited to concentration between 15-20 mg/L for 30 hours.
- E. All working parts of the new pumps and motors, such as bearings, wearing rings, shaft, sleeves, motor windings, etc., shall be of standard dimensions built to limit gauges or formed to templates, such that parts will be interchangeable between like units, and such that the OWNER may at any time in the future obtain replacement

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

and repair parts for those furnished in the original machine. All parts shall be properly stamped for identification and location in the machine as shown on the assembly drawings in the instruction books furnished.

1.07 OPERATING INSTRUCTIONS

- A. Operating and maintenance manuals shall be furnished by the MANUFACTURER. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operation and maintenance personnel unfamiliar with such equipment.
- B. The number of copies and supplementary requirements shall be as specified in Section 01730.

1.08 TOOLS AND SPARE PARTS

- A. The MANUFACTURER of the equipment specified herein shall furnish a complete list of recommended spare parts necessary for the first five years of operation of the pumping system.
- B. One (1) set of all special tools required for normal operation and maintenance shall be provided. All such tools shall be furnished in a suitable steel tool chest complete with lock and duplicate keys.
- C. Spare parts to be furnished:
 - 1. One (1) impeller
 - 2. Two (2) complete mechanical seals
 - 3. Two (2) sets of bearings
 - 4. Two (2) sets of wear rings
- D. Spare parts shall be properly bound and labeled for easy identification without opening the packaging and suitably protected for long term storage.

1.09 PRODUCT HANDLING

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation. Refer to Section 01600 for additional details.
- B. All equipment and parts must be properly protected against any damage during a prolonged period at the site.
- C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the ENGINEER.
- D. Finished surfaces of all exposed pump openings shall be protected by wooden blanks, strongly built, and securely bolted thereto.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

- E. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
- F. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage, and handling.
- G. Each box or package shall be properly marked to show its net weight in addition to its contents.
- H. Wire motor space heaters while in storage such that they are continuously energized at a selectable temperature.

1.10 WARRANTY

- A. All equipment supplied under this section shall be fully, 100% warranted for a period of one (1) year by the MANUFACTURER from the date of substantial completion, regardless of when the equipment is delivered to the site and no exception to this requirement will be considered. Warranty period shall commence as outlined in the General Conditions.
- B. The equipment shall be warranted to be free from defects in workmanship, design, and materials. If any part of the equipment should fail during the warranty period, it shall be replaced in the machine(s) and the unit(s) restored to service at no expense to the OWNER.
- C. The MANUFACTURER shall warrant performance of the pump pursuant to their approval of the CONTRACTOR's installation. CONTRACTOR shall warrant the overall installation against any installation defects.
- D. Should a failure of the equipment due to material defect occur within the first year, the Warranty period shall reset for an additional year beginning on the day the equipment returns to service.
- E. Warranty shall include all necessary parts, shipping and labor to repair the equipment inclusive of but in no way limited to: Factory authorized personnel inspection and identify cause of equipment issue, electrical disconnection, mechanical disconnection, rigging and removal of equipment, repair inclusive of delivery to and from site as well as all parts and labor, complete reinstallation, initial start up and test services and furnishing of a repair report.

PART 2 – PRODUCTS

2.01 MATERIAL AND EQUIPMENT

- A. The equipment covered by these Specifications is intended to be standard pumping units of proven ability as manufactured by reputable MANUFACTURER having extensive experience in the production of such equipment. The equipment furnished

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

shall be designed, constructed, and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed as shown on the Drawings.

- B. All equipment shall be designed and built for 24-hour continuous service at all points within the specified range of operation, without overheating, without cavitation, and without excessive vibration or strain.
- C. The pumping units required under this section shall be complete, including pumps and motors, with proper alignment and balancing. All parts shall be so designed and proportioned as to have liberal strength, stability, and stiffness and to be especially adapted for the service to be performed. Ample room for inspection, repairs and adjustment shall be provided.
- D. Stainless steel nameplates giving the name of the MANUFACTURER, model number, rated capacity, head, speed, unique manufacturer's serial number and all other pertinent data shall be attached to each pump and motor.
- E. Each pumping unit and its driving equipment shall be designed and constructed to withstand the maximum turbine run-away speed of the units due to back flow through the pump with the maximum TDH specified available at the pump discharge flange. A statement of compliance with this requirement must be furnished with the shop drawing submittal.
- F. The nameplate ratings of the motors shall not be exceeded, nor shall the design service factor be reduced when the pump is operating at any point on its characteristic curve at maximum speed. All rotating parts of the specified equipment shall be mechanically and hydraulically balanced so as to operate throughout the required range without excessive end thrust, vibration, and noise. Vibration readings shall comply with standards established by the Hydraulic Institute.
- G. Mechanical equipment, including drives and electric motors shall be supplied and installed in accordance with applicable OSHA regulations. Stainless steel guards shall be installed on all rotation assemblies. The noise level of motors, unless otherwise noted, shall not exceed 80 dBA measured 1 feet from the units under free field conditions.
- H. All lubrication fittings shall be brought to the outside of all equipment so that they are readily accessible from the outside without the necessity of removing covers, plates, housings, or guards. Fittings shall be buttonhead type. Lubrication fittings shall be mounted together wherever possible. Pressure grease-lubricated fittings shall be the "Zerk Hydraulic" type or the "Alemite" type. Housings of grease-lubricated bearings shall be automatically exhausted to the atmosphere to prevent excessive greasing.

2.02 PUMPS

- A. The pumps shall be of the vertical turbine type designed to pump potable water with chlorine concentrations of up to 4 mg/L.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

- B. The pumps shall be manufactured by Flowserve, Goulds, or Floway without exception and modified as required herein to meet all of the detailed hydraulic and mechanical requirements of these specifications.
- C. Performance Requirements
1. When operating at the maximum output speed of the motor, each pump shall have a characteristic performance curve that meets all the minimum conditions listed in Table 11214-1. Pump head and efficiency as defined herein refers to bowl head and efficiency. The pump and drive motor shall be capable of operating satisfactorily under the full range of conditions as defined by Table 11214-1, the figures at the end of this Section, and as described herein. The manufacturer shall provide written documentation warranting the pump to routinely operate at the minimum and maximum flow as well as warrant that the pump will operate within Hydraulic Institute (HI) standards for vibration at these conditions as demonstrated by factory acceptance testing.
 2. Each pump shall be identical in all respects.
 3. With the pumping units operating at full motor speed, the maximum brake horsepower required by pumps shall not exceed the horsepower listed in Table 11214-1 under any flow rate. If the pumping units require more than the horsepower listed in Table 11214-1 at the motor output shaft at any full motor speed operation point they will be rejected.
 4. When operating at maximum speed, the pumps shall not require a NPSH greater than that shown in the NPSHa curves shown at the end of this Section.
 5. The pumps, motors, and control system shall operate together to produce a flow and pressure as stated in Table 11214-1.
 6. There shall be no significant change in vibration and noise level within the entire normal range of operation as identified in graphical figures at the end of this Section. HI limits for acceptable vibration shall not be exceeded for normal operation points outside the HI defined POR, which manufacturer has warranted for satisfactory operation.
 7. Provide motor size as listed in Table 11214-1. Manufacturer shall certify that motor shall be non-overloading over the entire operating range identified, with actual pump and motor provided.
- D. Pump Construction
1. The discharge head shall be of the above base type and constructed of cast iron or fabricated steel. The discharge head and discharge connection shall be not less than the diameter as shown on the Drawings and as specified on Table 11214-1. The discharge connection shall be provided with 125-lb or 150-lb flat faced flange. The bottom of the baseplate shall be machined to mate with the suction vessel mounting plate.
 2. Incorporated in the fabrication of the discharge head shall be a suitable pump support base of standard dimensions to support both the pump and the motor.
 3. The pump head shaft shall be constructed of ASTM A582-416 Stainless Steel Alloy. Shaft diameter shall be determined by the AWWA Standard for Vertical Turbine Pumps – Line Shaft and Submersible Types, ANSI/AWWA E101 (latest), Section A4.1.5.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

4. MANUFACTURER shall provide a four-piece spacer coupling to allow the mechanical seal assembly to be removed without disturbing the motor.
5. Intermediate column lengths and lineshaft bearing spacing shall not exceed 10 feet. Column pipe shall accept ring spider bearing retainers. Spiders shall be stainless steel material and furnished to accommodate bronze shaft stabilization bearings at each column pipe coupling or flange. Bronze bearing retainer shall be installed in each spider.
6. The pump column shall be constructed of steel pipe in accordance with ASTM A36 or ASTM A53. The column shall not be less than Schedule 40 thickness, shall be the length as shown on the drawings, and shall be flanged at each end. The flanges shall mate with each other, the pump bowl assembly, and the discharge head with rabbeted fits to assure correct alignment. Bolts used to attach column flanges shall be constructed of 316 stainless steel.
7. The pump line shaft shall be constructed of ASTM A316 stainless steel alloy and its diameter determined as described in 2.02 D.4. above.
8. The line shaft may have threaded type connections or split ring and keyed type couplings constructed of 410 or 416 stainless steel. Line shaft couplings of an alternate design acceptable to the ENGINEER may be utilized.
9. The pump impellers shall be of the enclosed type constructed of ASTM C95800 nickel aluminum bronze or 316 stainless steel. The impellers shall be attached to the shaft by means of an ASTM A316 stainless steel key or locking collet for positive driving of the impeller by the shaft.
10. The pump bowls shall be constructed of ASTM A48 class 30 cast iron having a minimum tensile strength of 30,000 psi. The pump bowls shall be of sufficient thickness to withstand stresses and strains at full operating pressure. The bowls shall be subjected to a hydrostatic test 150 percent of that specified at the minimum pump shut-off head condition in Table 11214-1. The bowls shall be designed and manufactured with open and smooth water passages to assure efficient, reliable operation. All bowl and column hardware shall be 316 SS.
11. The pump shall be equipped with cartridge type mechanical seals as manufactured by pump MANUFACTURER, by Chesterton, John Crane, or ENGINEER approved equal. Seal materials of construction shall be 316 SS, stationary face is to be carbon, rotating face reaction bonded silicon carbide or tungsten carbide, and the springs are to be 316 SS and to be isolated from the process. The elastomers shall be Viton.
 - a. Seal glands shall be 316SS and have two flush ports drilled and tapped 180 degrees apart.
 - b. Pump seals shall be furnished with external seal flush piping to be connected to the volute (API Plan 13). The tubing and valves shall be furnished by the MANUFACTURER and installed by the CONTRACTOR.
12. Each pump shall include a drain pipe from the pump piped to the floor as shown on the Drawings such that any leakage from the seals is piped away from the pump. CONTRACTOR shall provide a minimum 1-inch NPT drain connection with minimum 1-inch Schedule 10 316 SS pipe. The MANUFACTURER shall provide tapped connections for mounting brackets to support this piping.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

13. The supporting sole plate, if required by the manufacturer, shall be a separate fabricated steel plate, complete with all accessories required, with tapped holes machined to mate with the discharge head baseplate. The pump manufacturer shall determine the dimensions and thickness.
14. Pump Coating: All coatings (interior and exterior) coming into contact with the pumped product shall be NSF 61 approved for potable water. All portions of the bowls (interior and exterior), column, and pump discharge head not exposed to view shall have an exterior coating of high build modified epoxy of a minimum of 10 to 12 mils dry thickness, compatible with the pump service. Interior surfaces coming into contact with the pumped product shall be coated with a ceramic epoxy or porcelain enamel.
 - a. The CONTRACTOR shall field paint the final exterior coating per Section 09900. Surface preparation and shop priming shall be in accordance with the Manufacturer's recommendations.

2.03 PUMP SUCTION BARRELS (CANS)

- A. The suction barrels for the pumps shall be designed and supplied by the pump Manufacturer and shall be of the length and diameter required to accept pumps which meet the specified conditions. The minimum suction barrel diameter shall not be less than that specified on Table 11214-1. The barrel design shall meet all requirements of the Hydraulic Institute's Pump Intake Design ANSI/HI 9.8-1998.
- B. The barrel diameter shall be determined by the pump MANUFACTURER. However, the annular flow velocity shall not exceed five (5) feet per second at the primary conditions listed in Table 11214-1. The barrels shall be of the minimum dimensions as shown on the Drawings and as specified on Table 11214-1.
- C. Pump Suction Barrel Construction
 1. The pump suction barrel shall be constructed of ASTM A-36 steel in accordance with the recommendations of the pump Manufacturer.
 - a. The barrel interior and exterior shall be coated with an approved epoxy coating of 6 to 8 mils dry thickness suitable for intended use. All coatings shall be NSF 61 approved for potable water.
 - b. The barrel exterior shall be wrapped in an enhanced polyethylene encasement that inhibits the formation of corrosion such as V-Bio by ACIPCO or ENGINEER approved equal. Encasement shall be provided and installed by the CONTRACTOR.
 2. The barrel shall be not less than 3/8-inch minimum wall thickness of ASTM A-36 steel designed for a maximum pressure of 25 psi. The minimum barrel length provided shall meet the dimensions shown on the Drawings.
 3. The minimum distance between the centerline of the suction pipe and the bottom of the pump bowl shall not be less than twice the suction barrel diameter plus the length the shaft protrudes past the suction bell plus an additional minimum 3-inch margin. Refer to drawings for required dimensions.
 4. The barrel support plate dimensions shall be determined by the pump Manufacturer, but shall not be less than 1-1/2 inches in thickness, drilled and

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

tapped ANSI B.16.B2 standard flanged dimensions to attach the pump discharge head base to the barrel support plate. It is desired that the barrel to the pump discharge head base sealing be accomplished using a rubber O-ring mounted in a rabbited channel inside the bolt circle. Alternatively, a 1/8-inch thick (minimum) neoprene gasket shall be used to seal the pump head to the barrel support plate. The barrel support plate shall be precision machined by the Manufacturer to assure proper fit with the pump discharge head base.

5. The suction barrel assembly shall be hydrostatically pressure tested at 25 psi. Test report to be included within operation and maintenance manuals.
6. Manufacturer shall provide a means for vortex suppression. An internal vertical flow splitter or other approved device shall be installed within the pump suction barrel to prevent the possibility of fluid circulation around the pump bowl assembly. The details of installations and dimensions shall be as recommended by the pump Manufacturer and approved by the ENGINEER.

2.04 MOTORS

A. General

1. Motors shall be TEFC, premium efficiency, squirrel-cage induction motors. Motors with shaft diameters greater than 1.5 inches shall be provided with a VERTICAL SOLID SHAFT, without exception.
2. Motors must be designed to accept all loads imposed by pump during starting and running.
3. All motors shall be built in accordance with latest NEMA, IEEE, ANSI and AFBMA standards where applicable.
4. Motors shall be inverter duty rated, Class H insulated, for service with VFD's.
5. Motors shall conform to all requirements of this Section and with the specifications for motors included in Section 16150.
6. Pumps and motors shall be designed and manufactured to operate on VFD systems and to eliminate stray current electrolysis of all components including pump and motor bearings and shafts.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Installation shall be in strict accordance with the MANUFACTURER's instructions and recommendations at the locations shown on the Drawings. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the MANUFACTURER's recommendations. Anchor bolts shall be set in accordance with the MANUFACTURER's recommendations.
- B. Upon completion of the booster pump station, the CONTRACTOR shall submit a certificate from the MANUFACTURER stating that the installation of the equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication, and care of each unit.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

- C. Pump Suction Barrel Alignment
 - 1. The alignment of pump suction barrels shall be checked at regular intervals during suction barrel installation and prior to the construction of booster station pump room slab.
 - 2. Tolerances for pump suction barrel vertical alignment shall be no greater than 1/8- inch per 20 feet of barrel depth.
 - 3. Results of such alignment checks shall be provided to the ENGINEER.

3.02 SHOP PAINTING

- A. Before exposure to weather and prior to shop painting all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt, and other foreign matter.
- B. All exposed portions of the pumps and motors shall be shop primed, with primer compatible with field painting as specified in Division 9.
- C. All nameplates shall be properly protected during painting.
- D. Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to the ENGINEER up to the time of the final acceptance test.

3.03 FIELD PAINTING

- A. Field painting is specified under Painting, Division 9. The primer and paint used in the shop shall be products of the same MANUFACTURER as the field paint to assure compatibility. All intermediate and finish coats shall be field applied by the CONTRACTOR in accordance with Division 9.
- B. Nameplates shall be properly protected during painting.

3.04 INSPECTION AND TESTING

- A. General
 - 1. The ENGINEER shall have the right to inspect, test or witness tests of all materials or equipment to be furnished under these specifications, prior to their shipment from the point of manufacture.
 - 2. The ENGINEER shall be notified in writing prior to initial shipment, in ample time so that arrangements can be made for inspection by the ENGINEER.
 - 3. Field tests shall not be conducted until such time that the entire installation is complete and ready for testing.
 - 4. The pumps shall be tested to HI Acceptance Grade 1U (with the expectation that power shall be limited to +5%) with the selected performance criteria of brake horsepower less than or equal to 100 hp. Should pump power

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

exceedance be identified during testing, Contractor shall confirm that VFD's are sufficiently sized to accommodate increased motor amperage.

B. Factory Pump Tests

1. MANUFACTURER shall record any testing performed on the pump in the factory. MANUFACTURER is not permitted to trim the impeller more than what was in the approved shop drawings submittal without written approval from the ENGINEER and OWNER.
2. Certified factory performance testing shall be performed by the pump manufacturer for the booster pump in accordance with the standards of the Hydraulic Institute. The tests shall be witnessed by a test lab manager employed by the MANUFACTURER. The test data and performance curves shall be signed by the test lab manager who witnessed the test. A shop motor may be utilized for all factory testing to confirm pump performance. Pump shall not be shipped until tests have been submitted and approved by the ENGINEER.
 - a. Factory performance testing shall be performed by the pump manufacturer in accordance with the standards of the Hydraulic Institute shall be required for each pump. Hydraulic and electrical performance tests shall measure capacity, head, power, current, speed, and voltage at a minimum of six evenly spaced points for each speed. Test points shall include shut-off head and a maximum flow of at least 125% of the flow at best efficiency point while operated on a VFD at 10% speed increments from 50% to 100% speed. The remaining points shall be evenly spaced along the curve. This array will result in 36 data points for each pump. Proposed testing method and points shall be submitted to ENGINEER for approval during shop drawing review and prior to testing.
 - b. An NPSH test shall be performed on one pump for each pump model under this specification to substantiate the maximum NPSHr for the pump at the flow rate listed in Table 11214-1, unless historical values of the same model and impeller trim are submitted in lieu of actual test data.
 - c. Provide vibration readings in the X, Y, and Z axes at every test point recording (the 36 points identified above) and reported in mm/s or in/sec RMS in accordance with ANSI/HI 9.6.4. If required by the MANUFACTURER and approved by the ENGINEER, the number of test points may be reduced, but, at a minimum, the vibration recordings shall be taken at points of flow and head as follows: 1 recording at the lower bound of the allowable operating region (AOR), 1 recording at the lower bound of the preferred operating region (POR), 1 recording at the BEP, 1 recording at the higher bound of the POR, and 1 recording at the higher bound of the AOR, for each speed tested. Manufacturer shall identify the AOR within testing submittal.
 - d. Testing data shall identify the BEP and manufacturers minimum recommended flow rate (minimum continuous stable flow, MCSF) at every given speed.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

- e. Certified pump tests shall be conducted through the specified range of flow vs. head/capacity/efficiency curves plotted at pump design speed. During each test, the pump shall be run at each head/capacity condition as specified in the pump schedule for sufficient time to accurately determine and record capacity, head, drawn amperage, pump efficiency, and motor efficiency. If the pump fails to meet any specification requirement, MANUFACTURER shall provide testing data for review by the ENGINEER prior to modifying the pump. Fine polishing or application of coatings to the impeller shall not be performed without the written authorization of the ENGINEER.
 3. All electronic transducers, meters, gauges, and other test instruments shall be calibrated within the required calibration periods as defined by the Hydraulic Institute and the MANUFACTURER'S quality control program. Differential pressure type flow meters, such as venturis shall have been calibrated within 5 years. Mechanical variation of the meter throat diameter will be accepted as verification of calibration validity.
 4. A description of the MANUFACTURER's test equipment, test procedures, and pump/motor/piping configuration shall be submitted and approved prior to conducting the test.
 5. Test configuration shall match HI standard. If test pit water temperature does not match HI standard, MANUFACTURER shall provide hp and amperage adjustment graphs, to account for density differences, with test plan submittal
 6. Mechanical and electrical integrity shall be established both before and after testing by physical inspection and by use of a megger.
 7. A failure of any pumping unit meeting the operating requirements specified, for any reason, shall be considered an incomplete test. Upon correction of the problem causing failure, the pumping unit shall be re-tested.
 8. No pump may be released for shipment without ENGINEER's authorization.
 9. All costs associated with any testing delay, retesting or additional testing shall be the sole responsibility of the MANUFACTURER.
 10. Should resonant frequencies or excessive vibrations be identified during certified factory performance testing of the equipment, these shall immediately be advised to the OWNER and ENGINEER. If determined necessary by the ENGINEER, a Frequency/Vibration Analysis may be required at no cost to the OWNER to prove system.
- C. Field Inspection and Owner Instruction
1. The CONTRACTOR shall furnish the services of the MANUFACTURER's field services technician, who has complete knowledge of proper operation and maintenance of the equipment, for a period of not less than two (2) days to inspect and adjust the installed equipment, supervise the initial test run, and to provide instruction to the plant personnel. One day is defined as 8-hours at the site, travel and lodging time are not included. If there are difficulties in operation of the equipment due to the MANUFACTURER's design or fabrication, additional service shall be provided at no cost to the OWNER.
 2. One day shall be dedicated to checking and inspecting the equipment after it is installed and to operate and supervise the initial field test.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

3. One day shall be dedicated solely to instruction of plant personnel in operation and maintenance of the equipment. The instruction period shall be scheduled at least 10 days in advance with the OWNER and shall take place prior to start up and acceptance by OWNER. The final copies of operation and maintenance manuals specified in Section 01730 must be delivered to the ENGINEER prior to scheduling the instruction period with the OWNER.
- D. Field Pump Tests Performed by CONTRACTOR
1. In the presence of the ENGINEER such tests as necessary to indicate that the pumps, motors, and control system conform to the operating conditions specified shall be performed. The test shall be conducted through three complete start/stop cycles and the field conditions necessary to start/stop the motors shall be coordinated with SJCUD operations staff. Each test cycle shall be observed and approved by the ENGINEER with each cycle providing opportunity for control adjustments as required. If a pump performance does not meet the specified requirements, corrective measures must be taken.
 2. Written test procedures shall be submitted to the ENGINEER for approval 30 days prior to testing. Certified results of tests shall be submitted. Provide, calibrate, and install all temporary gauges and meters, make necessary tapped holes in the pipes, and install all temporary piping and wiring required for the field acceptance tests.
 3. After installation of the pumps and as soon as conditions permit operation, retain the services of a qualified independent mechanical testing firm to perform noise and vibration tests; detailed vibration signature analysis of each unit, including both "Bump Tests" and X-Y vibration profiles, to (a) prove compliance with the specified vibration limitations and (b) prove there are no field installed resonant conditions due to misalignment, the foundation, or the connecting piping and its supports, when operating at any speed within the specified operating range. A written report shall be submitted including a sketch of the unit indicating on where and in which direction the vibration readings were taken and recorded showing (a) peak-to-peak displacement, in mils, (b) frequency and a peak velocity level, in inches per second. The report shall contain a complete analysis of their findings, describing any problems encountered, if any, probable cause, and specific recommendations for any required corrective action.
 - a. Each pump will be tested at a minimum of two different speeds as determined by the ENGINEER after the Factory Acceptance Testing. Points at each speed will include a maximum flow of at least 125% of flow at the best efficiency point and an additional four points along the curve as determined by the ENGINEER at the time of testing.
 - b. Additional speeds may be required if any excessive vibrations are identified during Factory Acceptance Testing.
 - c. Vibration testing of multiple (up to three) pumps operating in parallel will also occur during system performance testing. Testing will be at 100% pump speed and will consist of a maximum of ten (10) scenarios to be selected by the ENGINEER. Modifications to this testing protocol may occur depending on system operation during the time of testing.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

4. Noise and vibration tests shall be conducted in conformance with the Hydraulics Institute Test Codes and OSHA Standards for Occupational Noise Exposure. Maximum allowable noise level, corrected for background sound, shall not exceed 80 dBA when measured at a horizontal distance of 1 feet from the equipment being tested. Maximum allowable vibration shall not exceed the limits established by HI standards. The actual natural frequency of the installed pumping units will be verified using industry accepted procedures.
 5. All pump operating settings, alarms, controls, and shutdown devices shall be calibrated and tested during the field tests.
 6. The CONTRACTOR shall furnish all facilities, labor, materials, supplies, and test instruments required to conduct field test.
 7. Deliver to the ENGINEER, upon completion of satisfactory testing of the equipment, reports as specified in Part 1.
- E. Field Electric Control System Tests
1. The CONTRACTOR shall check all drives for correct clearances, alignment, and lubrication, prior to start up, in accordance with the respective MANUFACTURER's instructions.
 2. Check each alarm and detection device for proper operation.
- F. Field Motor Tests
1. The CONTRACTOR shall megger each motor winding while uncoupled and before energizing the motor, and, if insulation resistance is found to be low shall notify the ENGINEER and shall not energize the motor.
 2. The CONTRACTOR shall check all motors for correct clearances and alignment and for correct lubrication in accordance with MANUFACTURER's instructions. The CONTRACTOR shall check direction of rotation of all motors and reverse connections if necessary.
 3. The CONTRACTOR shall meet all the testing requirements of Division 16.
 4. Proper rotation shall be checked. If motors are found to be turning backward on initial start up, Contractor will be required to correct phasing at the pump motor junction box. Correcting by rephasing at the VFD or by VFD parameter settings will not be permitted.
- G. Field Alarm System Testing:
1. Check each alarm and detection device for proper operation.

SECTION 11214

VERTICAL TURBINE CAN PUMPS (OWNER FURNISHED EQUIPMENT)

TABLE 11214-1

PUMPING UNIT DESIGN REQUIREMENTS

Discharge Location	Booster Pumps
Hydraulic Institute Acceptance Grade	1E
Number of Pumps (Operating/Standby)	4 (3/1)
Nominal Maximum Motor Speed (rpm)	1,800
Pump Motor Horsepower (hp)	100
Minimum Pump Shut-Off Head ^a (feet)	240
Design Capacity ^a (gpm)	1,413
Minimum TDH at Design Capacity ^a (feet)	181
Minimum Overall Pump Hydraulic Efficiency at Design Capacity ^{a,b} (%)	73
Maximum NPSHr (ft) at Design Capacity	25
Maximum Nominal Bowl Diameter (inches)	14.75
Maximum Bell Suction Diameter (inches)	14
Minimum Discharge Head Connection (inches)	8
Minimum Lineshaft Diameter (inches)	1.25
Minimum Impeller Diameter (inches)	7.375
Minimum Column Diameter (inches)	8
Minimum Barrel Diameter(inches) / Quantity	18 / 4
ENGINEER approved pump Manufacturers (models)	Flowserve (12ENL) Floway (14JKL) Goulds (12FLDC)
Reference figures	11214-1

^(a) Condition represents at maximum motor speed as listed herein.

^(b) Conditions shown reflect pump head and efficiency.

END OF SECTION 11214

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. As noted in Section 01010, this project will be executed through three separate contracts. The tanks and all accessories described herein will be constructed under one contract and improvements will be performed by the TANK CONTRACTOR (also referred to herein as MANUFACTURER or tank MANUFACTURER). The electrical and I&C procurement and installation will be by the ELECTRICAL CONTRACTOR. The construction of the re-pump facility and all associated work will be by the general CONTRACTOR. It will be the responsibility of the TANK CONTRACTOR to coordinate construction of the tank with the general CONTRACTOR and other work associated with the tank. All costs associated with such shall be included in the bid price.
- B. The TANK CONTRACTOR shall be responsible for the excavation of the stormwater pond from existing grade to the pond bottom and the import of structural fill for GST construction. All costs associated with such shall be included in the bid price. The general CONTRACTOR will be responsible for all final grading and brining the site and pond to grades reflected on the drawings.
- C. Furnish all labor, materials, and incidentals required to design, construct, and test one (1) circular, 141-foot inside diameter, 3.0 MG (nominal volume; 2.8 MG useable) wire wrapped pre-stressed concrete potable water storage tank with a galvanized steel diaphragm including vent(s), hatch, manway, guardrails, aluminum exterior ladder, FRP interior ladder, gravity ventilator, precast overflow(s), and other accessories as shown on the Drawings and described herein.
- D. The TANK CONTRACTOR shall install all piping, fittings, and appurtenances within the perimeter of the tank and extending to the first pipe fitting or valve outside the tank perimeter as shown on the Drawings. The perimeter concrete curb and gravel and overflow structure will be provided and installed by the general CONTRACTOR. A portion of the tank's piping has been pre-purchased and provided by the OWNER so that construction can begin immediately. The piping pre-purchased by the OWNER is shown in **Appendix C**. The piping shall be coated as per these specifications by the TANK CONTRACTOR. Unloading, storage and handling of the piping shall be the responsibility of the TANK CONTRACTOR.
- E. The TANK CONTRACTOR shall include in their bid the excavation, removal, disposal and backfill for the top 6-inches of soil below the ground storage tank and extending to 5 feet around the perimeter.
- F. The potable water storage tank will require post-loading of the area with water for four weeks after construction and prior to making any piping connections as described in the geotechnical report. The geotechnical report is included in **Appendix A**.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

1.02 RELATED WORK

- A. Excavation, dewatering, and backfill are included in Division 2.
- B. Concrete is included in Division 3.
- C. Miscellaneous metals are included in Division 5.
- D. Pipes, valves, and fittings are included in Division 15.
- E. Level transmitters and appurtenances are included in Division 16.

1.03 SUBMITTALS

- A. Submit shop drawings, design calculations, and product data, showing materials of construction and details of installation for construction of the new potable water storage tank in accordance with Section 01300:
 - 1. Product Data: Manufacturer's information, specifications, and installation instructions for the tank appurtenances. This submittal will be reviewed for operational requirements only. The locations of all appurtenances shall be identified and dimensioned. Appurtenances may include the following:
 - a. Inlet, outlet, overflow, level tap, and drain pipes
 - b. Ladders, dome probe curb, vent curbs, guardrails, and access hatch
 - c. Wall manway
 - d. Settlement monuments
 - e. Liquid level indicators
 - f. Perimeter concrete overflows
 - g. Roof ventilators and fan curbs with fiberglass cover
 - h. Gravity ventilator
 - i. All other appurtenances
 - j. Stainless steel vortex breaker
 - 2. Shop Drawings: Detailed erection shop drawings and construction procedures stamped by a professional ENGINEER licensed in the State of Florida. Provide complete details for the foundation, floor slab, walls, dome, piping, and all other details and accessories necessary to construct the tank. The submittal shall include thicknesses and dimensions of all structure components and the prestressing schedule showing number and placement of prestressing wires. The submittal shall include the size, location, and number of all reinforcing bars. The submittal will be reviewed for operational requirements only and will be used in the field by the OWNER's representative during construction.
 - 3. Submit concrete design mixes including ingredient proportions, minimum cementitious content, and water/cementitious ratio in accordance with this specification.
 - 4. Interior and exterior coating data:
 - a. Product data sheets for each coating product used to coat the interior concrete surfaces and interior metallic surfaces.
 - b. Coating profile including recommended surface preparation, prime coat MDFT and finish coat MDFT.
 - c. Qualifications and record of experience of the coatings applicator actually performing the work.
 - d. Documentation that the coatings are NSF 61 certified.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- e. Documentation that coatings for PVC piping are NSF 14 certified.
 - f. Documentation for cure time based on temperature.
 - g. Color chart
 5. Submit concrete strength reports for 7-day and 28-day breaks taken in accordance with the requirements of Paragraph 3.04 of this specification.
 6. Submit warranty document in Owner's name in accordance with Paragraph 1.08 of this specification.
 7. Submit a cleaning and disinfection plan which complies with Part 3 of this specification.
- B. Design Data
1. Submit design calculations of the tank stamped by a professional ENGINEER licensed in the State of Florida for the project records. These calculations shall be provided at the time of initial shop drawing review. If changes occur during construction, the tank MANUFACTURER will also provide the "as-built tank" design calculations for re-submittal upon completion of construction.
- C. Certification
1. The tank MANUFACTURER shall be responsible for the design and construction of the prestressed concrete tanks. The tank MANUFACTURER shall submit written certification prepared, sealed, and signed by a professional ENGINEER licensed State of Florida that the design, details, and construction conform to the requirements of AWWA D110, this Section, and applicable city and state building codes.
 2. Tank MANUFACTURER shall submit results of the concrete strength test following 28 days of curing.
- D. Statement of Qualification
1. Submit experience record in the design and construction of wire wrapped prestressed concrete tanks as specified herein.
 2. Submit ACI CP-60 certification for each nozzleman and foreman to be employed on the project as specified herein.
- E. Project Record Documents
1. Record actual location layout and final configuration of tank and accessories on shop drawings and submit to ENGINEER after construction of the tank is complete.

1.04 DEFINITIONS

- A. Prestressed Tank System: Consists of an AWWA D110 wire-wound, circular prestressed concrete tank with Type II core wall, concrete dome roof storage tank with galvanized steel diaphragm, concrete base mat, reinforcing, concrete work, accessories, and testing directly related to the tank.
- B. Shotcrete: Mortar projected directly upon intended surface.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

1.05 REFERENCE STANDARDS AND DOCUMENTS

- A. American Society for Testing and Materials (ASTM)
1. ASTM A1008/A1008M - Standard Specification for Commercial Steel, Sheet, Carbon, Cold-Rolled with Improved Formability, Solution Hardened, and Bake Hardenable.
 2. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 3. ASTM A416/A416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
 4. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 5. ASTM A653, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot Dip Process.
 6. ASTM A722 – Standard Specification for Uncoated High-Strength Steel Bars for Prestressing Concrete.
 7. ASTM A821/A821M – Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Tanks.
 8. ASTM A884/A884M – Standard Specification for Epoxy Coated Steel Wire and Welded Wire Reinforcement.
 9. ASTM A1064/A1064M Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 10. ASTM C31/C31M – Test Methods for Making and Curing Concrete Test Specimens in the Field.
 11. ASTM C33/C33M – Specification for Concrete Aggregates.
 12. ASTM C39/C39M – Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 13. ASTM C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 14. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement.
 15. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
 16. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by Pressure Method.
 17. ASTM C881/C881M – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 18. ASTM C1140/C1140M – 11 – Standard Practice for Preparing and Testing Specimens from Shotcrete Test Panels.
 19. ASTM D1056 – Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 20. ASTM D1557, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
 21. ASTM D1752 – Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Filler for Concrete Paving and Structural Construction.
 22. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
 23. ASTM E1745 – Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 24. ASTM F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- B. American Concrete Institute (ACI)
 - 1. ACI 117 – Specification for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 – Specifications for Structural Concrete for Buildings.
 - 3. ACI 305R – Hot Weather Concreting.
 - 4. ACI 306R – Cold Weather Concreting.
 - 5. ACI 318 – Building Code Requirements for Structural Concrete.
 - 6. ACI 347 – Guide to Formwork for Concrete.
 - 7. ACI 350/350R – Environmental Engineering Concrete Structures.
 - 8. ACI 350.1-10 – Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures & Commentary.
 - 9. ACI 372R-13 – Design and Construction of Circular Wire and Strand Wrapped Prestressed Concrete Structures.
 - 10. ACI 506R.2 – Guide to Shotcrete.
 - 11. ACI CP-60 – Shotcrete Nozzlemen Certification Publication.
 - 12. ACI SP4 – Formwork for Concrete.
- C. American Society of Civil Engineers (ASCE): 7 – Minimum Design Loads for Buildings and Other Structures.
- D. American Water Works Association (AWWA)
 - 1. AWWA C652 – Disinfection of Water Storage Facilities
 - 2. Current AWWA D110– Wire- and Strand- Wound Circular-Prestressed Concrete Water Tanks
- E. U.S. Army Corps of ENGINEERS Spec. CRD-C572 - Specification for PVC Waterstop
- F. Florida Building Code, 2020, 7th edition
- G. Occupational Safety and Health Administration (OSHA)
- H. Concrete Reinforcing Steel Institute (CRSI) – Code of Standard Practice
- I. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.06 QUALITY ASSURANCE

- A. The tank shall be wire wrapped prestressed concrete tank with a Type II core wall as manufactured by Crom Corp. Gainesville, Florida, Precon Corporation of Newberry, Florida or ENGINEER pre-approved equal that meet or exceed all quality assurance prequalification requirements. Approved equals will be added by addendum only.
- B. The tank design and construction shall be performed by an established manufacturer of recognized ability, having at least 10 years of experience in the design and construction of wire wrapped circular prestressed concrete tanks as specified herein. The design and construction of all aspects of the floor slab, walls, prestressing, shotcrete, and dome roof of the wire wound circular prestressed concrete tank shall

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

be performed by the tank MANUFACTURER and shall not be subcontracted or otherwise assigned.

1. The MANUFACTURER shall have designed and constructed at least 10 wire wrapped prestressed concrete tanks conforming to ANSI/AWWA D110 with Type II core wall(s) that have been put into service within the last 10 years. The tanks shall equal or greater size than that required for this proposed tank. The tank shall have the diameter and capacity of not less than 75% nor more than 150% of the diameter and capacity of the proposed tank.
 2. The MANUFACTURER's staff shall include a full-time professional engineer registered in the state of Florida, having no less than five years of experience in the design and field construction of circular prestressed composite tanks. All working drawings and design calculations shall carry the seal of such registered professional engineer.
- C. All concrete work including the foundation, base slab/floor, walls, and roof shall be performed by the tank MANUFACTURER, including all tank coatings, using its own trained personnel and equipment.
- D. Foreman supervising the placing of the shotcrete shall have a minimum of five (5) years' experience as a nozzleman. Each shotcrete nozzleman shall have a minimum of five (5) years' experience on similar applications and shall be able to demonstrate by tests, if required, his/her ability to satisfactorily gun shotcrete of the required quality. All shotcrete nozzleman shall be certified by the American Concrete Institute (ACI) as outlined in the ACI certification publication CP-60.

1.07 DESIGN CRITERIA

- A. Tank construction for the one (1) circular wire wrapped prestressed concrete with galvanized steel diaphragm, domed, AWWA D110 Type II, potable water tank.
1. Inside diameter: 141 feet
 2. Tank finished floor elevation: 45.83 feet at bottom of sidewall (NAVD 88)
 3. Finished grade around tank exterior perimeter: 47.50 feet
 4. Nominal Liquid Capacity – 3,000,000 gallons
 - a. Water overflow elevation: 71.20 feet (OVF)
 - b. High water surface elevation: 71.20 feet (HWSE)
 - c. Minimum water surface elevation: 47.00 feet (LLWSE)
 - d. Maintenance water elevation (empty): 45.83 feet
 5. Maximum height of structure (interior floor to top of gravity ventilator housing) 41.14 feet – to be verified and confirmed by the TANK CONTRACTOR.
 6. Maximum Influent Flow Rate – 2,022 gpm
 7. Maximum Effluent Flow Rate – 6,000 gpm
 8. Connections to the tank and piping requirements including tank penetrations, watertight appurtenances, and concrete encasement below tank for the following:
 - a. 16-inch diameter influent ductile iron pipe
 - b. 20-inch diameter effluent ductile iron pipe
 - 1) Provide stainless steel vortex breaker
 - c. 8-inch diameter ductile iron drain pipe
 - 1) Provide drain pipe inlet with 4-foot diameter by 3-inch deep sump
 - d. 12-inch diameter ductile iron overflow pipe with pipe supports on the dome

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- e. 4-inch diameter stainless steel level tap
- f. Flanged pipe sleeve for conduit/instrumentation and sampling penetrations installed in the dome of the tank.
9. Tank accessories furnished and installed to include:
 - a. Tank access hatch curb and cover
 - b. Tank gravity ventilator
 - c. Provide interior fiber reinforced polymer ladder. Provide exterior aluminum ladder. All ladders shall meet OSHA 1910.28(b)(9)(i)(B).
 - d. One wall manhole with sample tap
 - e. Stainless steel pipe brackets
 - f. Fiberglass liquid level indicator
 - g. Provisions for mounting conduit for float switches including conduit mounting brackets and dome probe opening/curb
 - h. Provide thickened bosses for the full height of the wall for mounting conduits, lightning protection, instrumentation and control conduits, and ladder. Ladder shall be centered on boss.
10. Precast concrete overflows in the dome of the roof.
11. Aluminum guardrail and aluminum kickplate around entire tank dome.
12. Dome ventilators.
13. A tank placard shall be installed on the exterior of the tank. Information shall include tank contractor, year of construction, job number, dates of warranty, depth, diameter, and type of interior coating.
14. The interior of the tank dome and walls shall be coated with an epoxy approved for contact with potable water as per Paragraph 2.02 L.
15. Subbase - A granular base material shall be used beneath the membrane and/or slab.
 - a. The base material should consist of a minimum 6-inch thick clean, well-compacted, and angular or sub-angular material that is non-plastic, inorganic, granular soil having less than 10 percent material passing the No. 200 mesh sieve and containing less than 4 percent organic material.
 - b. The gradation of the base material should be selected to permit free drainage without the loss of fines or intermixing with the subgrade material.
 - c. The maximum particle size of the base material should be limited to provide a relatively level working surface without potential intrusion of the base materials into the membrane floor slab concrete.
 - d. Base material should be compacted to 95 percent of the maximum laboratory density determined by ASTM D1557.
16. Floor – Non-prestressed cast-in-place reinforced concrete
 - a. A Class A polyethylene moisture barrier of at least 6 mils thick shall be installed under concrete floor slab.
 - b. The minimum thickness of the floor slab is 4-inch.
 - c. The floor system shall have a thickened edge for the exterior wall footing and where additional loadings are expected or reinforcement is needed. Slabs greater than 12-inch shall have top and bottom reinforcement in each direction.
 - d. The transition from the bottom of the footings and pipe encasements to the underside of the floor slab shall not be steeper than 2 horizontal to 1 vertical. The concrete for all pipe encasement(s) and sump(s) shall not be less than 8 inches thick. All pipe encasements shall be flared at tank wall. The clearance in all directions shall not be less than 12 inches.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- e. A minimum percentage of 0.60 percent reinforcing steel shall be used in the membrane floor. The minimum percentage shall apply to all thickened sections and shall extend a minimum of 2 feet into the adjacent membrane floor.
- f. The floor shall be cast monolithically with no cold joints.
- 17. Hydrostatic Floor/Wall Joint – Fixed, non-hydrostatic, rotating, or translating and shall include plastic waterstop.
- 18. Horizontal prestressing shall be continuous. Discontinuous prestressing tendons or strands will not be allowed.
- 19. All vertical and horizontal joints shall be designed to minimize leakage. Joints with gaps shall not be allowed.
- 20. Equipment/Structural Dead and Dynamic Loads
 - a. Intake hoods and gravity ventilator being installed now, and potential future fans and tray aerator
 - b. Miscellaneous (piping, valves, etc.)
 - c. Guardrails, ladders, and monitoring equipment
- 21. Core Wall
 - a. Shotcrete core wall with continuous internal galvanized steel diaphragm, vertical joint seals, and shotcrete coverings. Walls placed on elastomeric bearing pads, free to move radially, and shall have plastic water stop connection between wall and footing.
 - b. The wire-wound, prestressed concrete tank core wall shall be designed as a thin shell cylindrical element using shotcrete and an embedded, mechanically bonded, galvanized steel shell diaphragm.
 - c. Bonded wire-prestressed wall consisting of Type II shotcrete core wall encasing a mechanically bonded, continuous, galvanized steel diaphragm.
 - d. The design of the core wall shall take into account appropriate edge restraint. To compensate for bending moments, shrinkage, differential drying, and temperature stresses, the top two feet of core wall and the bottom three feet of core wall shall have not less than one percent circumferential reinforcing.
 - 1) Inside Face:
 - a) The inside face of the core wall shall utilize the galvanized steel diaphragm as effective reinforcing.
 - b) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
 - 2) Outside Face:
 - a) Vertical reinforcing steel in the outside face of the core wall shall be: minimum of No. 4 bars at 12-inch center to center.
 - b) Additional vertical and horizontal reinforcing steel bars shall be used as required by design computations.
 - e. The minimum core wall thickness shall be 3½-inch.
 - f. Reinforcing steel used in the core wall shall be designed using a maximum allowable design tensile stress, f_s , of 18,000 psi.
 - g. Allowable compressive stress in the core wall due to initial prestressing force, f_{gi} , shall be:
 - 1) 1250 psi + 75t psi/in. with 0.5 f_{gi} maximum (where f_{gi} is defined as compressive strength required for final prestressing force and t is the thickness of the core wall in inches).

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- 2) Maximum of 2000 psi.
 - h. Allowable compressive stress in the core wall due to final prestressing force, f_g , shall be:
 - 1) 1250 psi + 75t psi/in. with 0.45 f_g maximum (where f_g is defined as compressive strength required for final prestressing force and t is the thickness of the core wall in inches).
 - 2) Maximum of 1800 psi.
 - i. Interior core wall surface shall be finished with a smooth steel trowel finish prior to application of specified surfacer or coating.
- 22. Roof - Concrete dome
 - a. Roof shall be a circumferentially prestressed cast-in-place concrete dome with a minimum thickness of 3-inch except at the edge, where it shall be at least 7.5-inch.
 - b. Dome shell reinforcement shall consist of reinforcing bars or welded wire fabric meeting ASTM A185, not galvanized. Bolsters for wire fabric and reinforcing bars shall be plastic. Steel reinforcement shall meet the requirements of AWWA D110-04. Wire ties shall be galvanized.
 - c. The dome ring girder shall be prestressed with sufficient wire to withstand the dome dead load and design live loads. The ring girder shall have cross section suitable to accept the applied prestressing forces.
 - d. The high-water level in the tank shall be permitted to encroach on the dome shell no higher than the upper horizontal plane of the dome ring girder so that the tank may overflow out of the dedicated overflow pipe. Should the water level continue to rise, it shall flow out of the precast concrete overflows. The precast overflow outlets plus the dome ventilator shall provide an open area no less than three times the largest influent pipe area.
 - e. The dome shall be designed as a free-span, spherical thin shell with one-tenth rise.
 - f. The dome edge and upper wall shall be designed to resist the moments, thrusts, and shears that occur in this region due to dome and wall prestressing and loading conditions.

1) Dome Edge Thickness:

- a) A determination of the buckle diameter shall be made, as defined by:

$$d_b = 2.5 \cdot \sqrt{r_d \cdot t_d} \text{ rounded up to the next foot}$$

Where: d_b = buckle diameter in feet

r_d = dome radius in feet

t_d = typical dome thickness in feet

- b) Dome edge thickening shall begin at a radial location on the dome, defined as s_1 which is at least one buckle diameter away from the tank wall.
- c) A springline haunch shall be provided, which extends radially from the inside face of the tank wall to radial location s_1 which is defined as:

$$s_1 = 0.6 \cdot \sqrt{1.5 \cdot r_d \cdot t_d} \text{ rounded up to the next foot}$$

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

Where:

s_1 = distance from inside face of wall to haunch in feet

s_2 = distance from inside face of wall to typical dome thickness in feet.

This springline haunch shall begin at the inside face of the tank wall with a springline thickness as required by paragraph (f) below and shall end at radial location with the following thickness:

$$t_{d1} = 1.33 \cdot t_d$$

Where:

t_{d1} = minimum thickness at in feet

t_d = typical dome thickness in feet at one buckle diameter from tank wall

- (d) Beginning at s_1 and continuing to s_2 the dome shell shall have a uniform straight line taper.
 - (e) Parameters (b), (c), and (d) above are not required for domes where the calculated typical dome thickness is less than 75% of the actual typical dome thickness.
 - (f) Sufficient concrete thickness at the springline of the dome shall be provided so that no more than 2 ft of the springline haunch is considered in calculating the effective dome edge ring cross sectional area. Compressive stress in this area shall not exceed 1000 psi when subjected to initial prestressing, offset by dead load only.
- 2) Dome Edge Steel Reinforcement:
- a) Throughout the dome edge, the percentage of steel reinforcement, both radially and circumferentially, shall be no less than 0.25% of the gross cross sectional area of concrete.
 - b) Along the dome edge, steel reinforcement shall be distributed between the upper and lower layers unless finite element analysis calculations indicate that tensile stress does not exist in the concrete along the bottom face of the dome edge. In that case, only top bars are required radially and circumferentially. In addition, radial and circumferential reinforcing bars will not be required along the bottom face of the dome edge where the calculated typical dome thickness is less than 75% of the actual typical dome thickness.
 - c) Where reinforcing bars are required in the bottom layer, they shall be placed near the tank wall to insure adequate development at the intersection between dome and wall.
 - d) In all cases, the percentage of circumferential steel reinforcement in the effective dome ring shall be no less than one percent of the gross cross sectional area of concrete. The effective dome ring is defined as $\frac{1}{4}$ of the haunch length not to exceed 2 ft.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- e) Where bottom dome edge steel reinforcement is required, vertical steel reinforcement along the inside face of the tank wall shall be no less than 0.5% of the cross sectional area of wall shotcrete.
 - g. The dome shall be designed to support all accessories that will be included such as probe curbs, access hatches, ventilators, fan curbs and four future fans, precast concrete overflows, gravity ventilator, and guardrail.
 - h. Anodized aluminum dome railing around the tank perimeter with kickplate shall be constructed of 6061-T6 aluminum to meet applicable OSHA standards. The guardrail height shall be 42-inch above the adjacent supporting concrete surface.
 - i. All joints of the plywood deck shall be taped to prevent concrete rundown.
23. Prestressing
- a. Circumferential prestressing of the tank shall be achieved by the application of cold-drawn, high-carbon steel wire placed under high tension.
 - b. A substantial allowance shall be made for prestressing losses due to shrinkage and plastic flow in the shotcrete and due to relaxation in the prestressing steel.
 - c. The prestressing design shall conform to the following minimum requirements:
 - 1) Working stress for the tank wall and dome ring shall be a maximum of 115,000 psi and 120,000 psi, respectively.
 - 2) The allowable design tensile stress in the prestressing wire before losses, psi shall be 145,600 psi or no greater than 0.63 times the ultimate strength of the wire.
 - 3) Areas to be prestressed will contain no fewer than 10 wires per foot of wall for 8-gauge and 8 wires per foot of wall for 6-gauge.
 - 4) A maximum of 24 wires per layer per foot for 8-gauge and 20 wires per layer per foot for 6-gauge will be allowed.
24. Wall Openings
- a. When it is necessary for a pipe to pass through the tank wall, the invert of such pipe or sleeve shall be no less than 18 inches above the floor slab. The prestressing wires required at the pipe elevation shall be distributed into circumferential bands immediately above and below the opening to maintain the required prestressing force while leaving an unbanded strip around the entire tank.
 - b. Unbanded strips shall have a vertical dimension of no more than 36 inches unless an axi-symmetric shell analysis is performed to account for compressive forces plus shear and moments caused by displacement of the prestressing wires into adjacent bands.
 - c. All wall pipes, sleeves, and manholes passing through the wall shall be sealed to the diaphragm by epoxy injection
25. Fan curbs with fan covers for the openings.
- B. The tank MANUFACTURER shall use the following minimum information in the design of the tank and tank appurtenances:
- 1. Unit Weights:
 - a. Concrete and Shotcrete - 150 pcf
 - b. Soil - 120 pcf

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- c. Water – 62.4 pcf
- d. Steel – 490 pcf
- 2. Live Load:
 - a. Floor – 62.4 pcf times the height of water to overflow plus 6-inch
 - b. Assume ground water level at elevation 44.5 feet (top of existing grade).
 - c. Roof – 20 psf horizontal projection to tank roof but the roof live load is reducible as allowed by the current ASCE 7 and the latest Florida Building Code.
 - 1) Live load shall include the load of an operating gravity ventilator.
- 3. Wind Load:
 - a. Shall be calculated using ASCE 7-16 based on an ultimate wind load of 142 mph.
 - b. Building Risk Category III
 - c. Exposure C
- 4. Seismic Load:
 - a. Importance Factor: 1.25
 - b. Spectral Response Accelerations:(S_s,S₁):0.09, 0.047
 - c. Site Class: D
 - d. Spectral Response Coefficients:(S_d,S_{d1}):0.096, 0.075
 - e. Seismic Design Category: B
 - f. Seismic Force Resisting System: Flat Bottom Ground Supported Tanks Reinforced or Prestressed Concrete Reinforced Anchored Flexible Base
 - g. Seismic Response Modification Factor: 2
 - h. Seismic Response Coefficient: 0.06
- 5. Flood Criteria:
 - a. Flood Zone: Zone X, outside of the annual 0.2% chance floodplain
- 6. Allowable Bearing Pressure: 2,000 psf
- 7. Applied Bearing Pressure: Refer to geotechnical report for expected applied bearing pressures with correlating settlements.
- 8. Dead load of potential future tray aerator with a capacity of the fill rate of 2,022 gpm
- 9. Overflow capacity requirement at maximum infill capacity = 2,022 gpm
- 10. Consider loads listed herein to act in combinations, whichever produces the most unfavorable effects.
- 11. It is not necessary to combine wind and earthquake loads but the maximum stress produced by either condition with other applicable loads shall be considered.
- 12. Any ladders connecting to or on the tank shall be coordinated with the Manufacturer for support and connection details. Loads resulting from these appurtenances shall be taken into account in the tank's design.

1.08 WARRANTY

- A. The tank MANUFACTURER shall warrant the tank structure against any defective materials or workmanship for a period of 5 years from the date of tank acceptance with 1 year bond and 4 year written company warranty. If any materials or workmanship proves to be defective within that period, they shall be replaced or repaired by the tank MANUFACTURER at no additional cost to the OWNER.
- B. If any leakage or other defects appear within the warranty period, the tank Manufacturer shall promptly repair the tank at its own expense upon written

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

notification by the Owner that such defects have been found. This warranty shall not apply to any accessory, equipment or other product that is not a structural part of the tank or manufactured by a company other than the tank construction company. Leakage is defined as liquid appearing on the exterior of the tank, the source of which is from inside the tank.

- C. All interior coatings shall be included in the scope of the tank MANUFACTURER and shall not be subcontracted. Coatings shall be included under tank MANUFACTURER 5-year warranty that covers coating system failure.
 - 1. Coating system failure is defined as either (1) delamination of the coating (2) a breach of the coating exposing the substrate below or (3) chipping and peeling of the coating system not caused by physical damage or abrasion to the tank. Changes in color shall not be deemed a coating failure.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Materials shall be new and shall conform to the material specified in AWWA D110 and the following material standards.
- B. Products listed in this section shall be applicable to locations shown in drawings or otherwise specified in the design criteria of this specification. Substitutions to the materials in this specification shall be submitted in writing to the ENGINEER for approval.

2.02 MATERIALS

- A. Concrete and reinforcing steel for the tank core wall and roof dome shall conform to the requirements of AWWA D110. Concrete and reinforcing steel for all other structural elements shall conform to the requirements of Division 3. A 3/8-inch maximum size aggregate may be used for dome concrete if designed for strength and maximum density. Admixtures causing accelerated or retarded set of the concrete shall not be used unless approved in writing by the ENGINEER.
 - 1. Concrete Strength: Minimum concrete strength at 28 days.
 - a. Pipe encasement $f'c = 4000$ psi
 - b. Footing and floors $f'c = 4000$ psi
 - c. Shotcrete $f'c = 4000$ psi
 - d. Dome roof $f'c = 4000$ psi
- B. Shotcrete
 - 1. Shotcrete shall be in accordance with AWWA D110.
 - 2. Shotcrete shall conform to the requirements of ACI 506.2 except as modified herein.
 - 3. All shotcrete mixes shall utilize Type I/II cement. Type II cement may be substituted with a written request to the ENGINEER.
 - 4. A maximum of 25 percent cementitious material may be flyash.
 - 5. All shotcrete in contact with diaphragm or prestressing wire shall be proportioned to consist of not more than three parts sand to one part Portland cement by weight. All other shotcrete shall be proportioned to consist of not more than four parts sand to one part Portland cement by weight.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

6. Admixtures shall not contain more than trace amounts of chlorides, fluorides, sulfides, or nitrates.
7. Shotcrete mixes used in the tank construction shall conform to the following.
 - a. $f'_c = 4000$ psi
 - b. Maximum w/c ratio = 0.42
 - c. Slump = $4" \pm 1"$

C. Fine Aggregates (Sand)

1. Saturated, surface dry, hard, dense, uncoated rock fragments free from injurious amounts of foreign or deleterious substances
2. Fineness Modulus for Sand: Range from 2.70 to 3.00 with maximum particle size of 1/4-inch.
3. Maintain sand at 3 to 6 percent moisture content; dampen or dry with sand dryers if necessary.
4. Screen sand for finish coat to produce uniform dense surface in texture and appearance.
5. Gradation:

Sieve Size	Percent Passing by Weight
No. 4	97 - 100
No. 8	90 - 98
No. 16	70 - 85
No. 30	35 - 55
No. 50	12 - 25
No. 100	2 - 8

6. Mix proportions:
 - a. Adjacent to steel diaphragm and over prestressing wire shall be proportioned to consist of not more than three parts sand to one part Portland cement by weight.
 - b. All other areas shall be proportioned to consist of not more than four parts sand to one part Portland cement by weight.

D. Non-prestressed Reinforcement

1. Shall meet the requirements of ACI 318.
2. Shall have a maximum allowable tensile stress of 18,000 psi, exclusive of shrinkage and temperature effects.
3. Shall not be credited for resisting any portion of primary circumferential tension resulting from fluid pressure.
4. Non-prestressed mild reinforcing steel shall be new billet steel meeting the requirements of ASTM A615/A615M with a minimum yield strength, f_y , of 60,000 psi.
5. Welded wire reinforcing shall be plain wire conforming to the requirements of ASTM A1064/A1064M with a minimum yield strength, f_y , of 65,000 psi.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- E. Prestressed Wire
1. Unless otherwise approved in writing by the ENGINEER, prestressed wire shall conform to ASTM A821, suitable for redrawing and having a minimum ultimate strength of 231,000 psi.
 2. The prestressing wire shall conform to the requirements of ASTM A821/A821M, Type B.
 3. The prestressing wire size shall be 0.162-inch (8 gauge), 0.192-inch (6 gauge) or larger, but no larger than 0.250-inch.
 4. The ultimate tensile strength shall be 231,000 psi or greater for 8 gauge wire, and 222,000 psi or greater for 6 gauge.
 5. Splices for horizontal prestressed reinforcement shall be ferrous material compatible with the prestressing reinforcement and shall develop the full strength of the wire.
- F. Galvanized Steel Diaphragm
1. Tank galvanized diaphragm in accordance with ASTM A653 for commercial quality cold-rolled steel sheet. Minimum of 26-gauge sheet and form corrugations of a pattern to form a continuous positive watertight seal and a strong mechanical key between shotcrete and steel. Furnish steel sheets in one continuous length to full height of wall. Vertical joints between sheets. Weight of zinc coating shall be not less than G90 or a minimum coating weight of 0.9 oz/ft² total for both sides with a minimum average coating weight per side of 0.32 oz/ft². Testing of the galvanic coating shall be completed at three locations on the surfaces of the galvanized diaphragm as per the ASTM standard.
 2. The galvanized diaphragm shall be supported off the mat foundation and shall be continuous to within 3 inches of the top of the wall. Horizontal joints or splices will not be permitted.
 3. All vertical joints in the galvanized diaphragm shall be rolled seamed, crimped, and sealed watertight using epoxy injection.
 4. At the floor/wall joint, the steel shell galvanized diaphragm shall be epoxy bonded to the waterstop.
 5. In all tanks designed to use a waterstop at the floor/wall joint, the galvanized steel shell diaphragm shall be epoxy bonded to the waterstop.
- G. Elastomeric Materials
1. Waterstops
 - a. Waterstops shall be extruded from an elastomeric plastic compound with virgin polyvinyl chloride as the basic resins. The waterstop shall meet the performance criteria in the Corps of Engineers Specifications CRD-C572.
 - b. The profile and size of the waterstop shall be suitable for the hydrostatic pressure and movements to which it is exposed.
 2. Elastomeric Bearing Pad
 - a. Elastomeric Bearings Pads shall be a neoprene or natural rubber pad conforming to ASTM D2000, line call-outs 2BC415A14B14 and 4AA420AB respectively.
 3. Sponge filler at the floor/wall joint shall be closed-cell neoprene.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- H. Moisture Barrier
 - 1. The moisture barrier shall be polyethylene Class A conforming to ASTM D4397. The thickness shall not be less than 6 mil.

- I. Epoxy
 - 1. Epoxy Sealants
 - a. Epoxy used for sealing the steel shell shall conform to the requirements of ASTM C881/C881M.
 - b. Epoxy used for sealing the steel shall be Type III, Grade 1, and shall be a 100 percent solids, moisture insensitive, low modulus epoxy system.
 - c. Epoxy used for placing the waterstop shall be Type II, Grade 2, and shall be 100 percent solids, moisture insensitive, low exotherm epoxy.
 - d. When pumped, maximum viscosity of the epoxy shall be 10 poises at 77-degree F.
 - e. The epoxy sealants used in the tank construction shall be suitable for bonding to concrete, shotcrete, PVC, and steel.
 - 2. Bonding Epoxy
 - a. Epoxy resins used for enhancing the bond between fresh concrete and hardened concrete shall conform to the requirements of ASTM C 881/C 881M.
 - b. Epoxy resins shall be a two-component, 100% solids, moisture-insensitive epoxy and shall be Type II, Grade 2.

- J. Seismic Resistant Cables
 - 1. Seismic restraint cables shall be seven-wire strand conforming to ASTM A416/A416M.
 - 2. The strand shall be protected with a fusion-bonded, grit-impregnated epoxy coating conforming to ASTM A882/A882M.
 - 3. The minimum yield strength of the seven-wire strand shall be 270,000 psi.

- K. Appurtenances
 - 1. Wall Manway
 - a. One rectangular opening access manway for access to the interior of the tank. Frame, cover, and anchor bolts shall be type 316 stainless steel. The removable watertight wall manhole shall be designed to resist hydraulic loading without excessive deflection. Centerline of wall manhole shall be as shown on the Drawings.
 - b. The manway shall also include hinges and a sample tap and valve as detailed on the Drawings.
 - c. The centerline of the manway shall be as shown on the Drawings. If the distance from the bottom of the opening of the manway to the floor is 2 feet or greater, FRP manhole rung(s) shall be provided and cast into the tank wall by the tank MANUFACTURER for each manway to provide safe access into the tank. Rungs shall be completely inert and rated for installation within a potable water tank.
 - 2. Roof hatch
 - a. Provide 7-foot by 7-foot square fiberglass roof hatch cover with Type 316 stainless steel fasteners. The hatch opening in the tank dome shall be a 6-foot by 6-foot opening with a fiberglass cover. The fiberglass cover shall have clear opening dimensions as shown on the Drawings with a lockable hinged access door. Hatch shall be furnished with stainless

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

steel hardware throughout. A suitable stainless steel anchor system for attachment to concrete curb on roof shall be provided. Provide continuous 1/4-in thick, 60 durometer neoprene sheet gasket under hatch flange and fasten flange through gasket. Hatch shall be watertight.

3. Concrete Overflows
 - a. Provide eight (8) precast concrete emergency overflows on the dome at the locations shown in the Drawings. The total cross-sectional areas of emergency overflows shall be a minimum three times the area of the inlet pipe. Emergency overflows shall be provided with fiberglass insect screens (24-inch by 24-inch mesh). The screen shall meet the following requirements.
 - 1) Fiber: Polyester.
 - 2) Mesh Opening: 800 microns.
 - 3) Thread Count: 24 by 24 per inch.
 - 4) Thread Diameter: 254 microns.
 - 5) Open Area Percent: 58 percent.
 - 6) Overflow and screens shall be provided by tank manufacturer.
4. Fans and Ventilators
 - a. Provide four (4) fan curbs at the locations shown on the Drawings for future fans.
 - b. Provide four (4) roof ventilators at locations shown on the Drawings. Roof ventilator shall be provided by Markair Model RIH, 60 x 60 inch intake hoods with 28-inch throat and of aluminum construction. The ventilators shall be provided with a 24-mesh aluminum fail safe pop out insect screen in case of blocked up screens. Ventilators shall be designed for operational and rapid draw down events. A suitable stainless steel anchor system for attachment to concrete curb on roof shall be provided.
5. Guardrail
 - a. Guardrail and kickplate shall be of 6061-T6 anodized aluminum conforming to OSHA requirements. Railing shall be around the entire perimeter of the tank and as shown on the Drawings. The guardrail and kickplate shall be as detailed on the Drawings. Guardrails shall be rolled to the proper curvature and shall be of welded construction. Mechanical field splices between guardrails shall be provided to provide continuity between sections of shop assembled guardrails assemblies. Guardrails shall extend a minimum of 42-inches above the top edge of the concrete surface.
6. Ladders
 - a. Interior ladder shall be fiber reinforced polymer. Ladder shall be installed at location shown on the Drawings. Ladder, ladder accessories, and ladder clearances shall conform to the requirements of OSHA. Interior ladder does not require a cage.
 - b. Exterior mill finish ladder, cage, and lockable security gate shall be provided. Ladder shall be installed at the location shown on the Drawings.
 - c. All ladders shall meet OSHA 1910.28(b)(9)(i)(B).
 - d. Provide 316 stainless steel hardware and fasteners, accessories, and all other materials required for the complete installation.
 - e. All ladders shall be fitted with a fall prevention device and removable extension conforming to OSHA requirements. Two climbing belts shall be provided to the OWNER.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

7. Liquid Level Indicator and Transmitter
 - a. The liquid level indicator shall have a half travel gauge with an interior float. The glass shall be fiberglass with 4-inch black numbers on a white board. The level indicator shall be a red fiberglass target. The zero mark shall be set even with the top of the tank wall. The interior float shall be fiberglass or PVC and shall be guided vertically true.
 - b. One 10-inch dome probe curb to mount the level switch(es) shall be included.
 - c. One 4-inch 316 Sch 40 SS floor penetration for mounting the gate valve and pressure transmitter assembly.
 8. One 316 SS vortex baffle plate on the tank discharge with 316 SS mounting hardware.
 9. All wall pipe sleeves and pipe brackets shall be Type 316 stainless steel.
 10. Gravity Ventilator
 - a. A 6-foot 4-inch diameter gravity ventilator suitable for contact with potable water shall be provided at the peak of the dome. The outside surface color shall be white. The gravity ventilator shall be supplied with 24/24 stainless steel screens with ten (10) screened openings. Four (4) stainless steel safety hooks shall be supplied at 90 degrees around the ventilator with a maximum load rating in any direction of 3,100 lbs unfactored load. The bottom shall be covered with a 24/24 mesh polyester removable screen.
 11. Accessory hardware, unless otherwise noted, shall be Type 316 stainless steel conforming to ASTM F593.
 12. Settlement monuments shall be 2-inch by 2-inch by 4-inch aluminum angle, 4-inches wide.
- L. Coatings
1. The interior coatings of the tank, (tank dome, walls (full height), and all ductile iron pipe surfaces) shall be coated by the tank vendor and the tank vendor shall have system responsibility for all interior coatings.
 2. Internal and external tank colors shall be selected by OWNER during the shop drawing process.
 3. Interior Coatings - System A:
 - a. Underside of dome and interior walls (full height)
 - 1) Surface preparation: Sweep blast to CSP5.
 - 2) Surfacer across the interior dome surface and on walls to fill all pinholes and inconsistencies in texture of concrete: Sherwin Williams Dura-Plate 2300 (formerly Corobond 300) at 1/16-inch to 1/8-inch above the inconsistencies.
 - 3) Conduct a detailed inspection of the surfacer application paying attention to pin holes that have not been properly covered.
 - 4) Apply a second application of surfacer (Sherwin Williams Dura-Plate 2300) to areas where pin holes are discovered. Assume 1000 sf of surfacer is required.
 - 5) First Coat: Sherwin Williams Macropoxy 5500 PW at 6.0-8.0 mils DFT.
 - 6) Second Coat: Sherwin Williams Macropoxy 5500 PW at 6.0-8.0 mils DFT.
 - 7) "Holiday" test the entire surface

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- b. Interior floor
 - 1) No coatings.
 - c. All interior metal surfaces including pipes and pipe supports.
 - 1) Surface Preparation: Shop blasted and primed prior to being installed. Pressure wash at 4000 psi and abrade primer with sandpaper to develop a surface profile.
 - 2) Prime Coat: Sherwin Williams Macropoxy 5500 at 5.0-8.0 mils DFT.
 - 3) Stripe Coat: All edges and sharp points shall be coated with a brush or roller to within 3 inches of the edge with Sherwin Williams Macropoxy 5500 at 5.0-8.0 mils DFT.
 - 4) Spot Prime: Sherwin Williams Macropoxy 5500 at 5.0-8.0 mils DFT.
 - 5) Top Coat: Sherwin Williams Macropoxy 5500 at 5.0-8.0 mils DFT.
4. Interior Coatings – System B:
- a. Underside of dome and interior walls (full height)
 - 1) Surface Preparation: NACE No. 6/SSPC-SP13 Joint Surface Prep Standards to ICRI CSP5 surface profile.
 - 2) Apply surfacer across the interior dome surface and wall to fill all pin holes and coat all inconsistencies in texture of concrete: Tnemec Series 218 Mortarclad (1/16"-1/4" Per Lift Max 1/2").
 - 3) Conduct a detailed inspection of the surfacer application paying attention to pin holes that have not been properly covered.
 - 4) Apply a second application of surfacer (Tnemec Series 218) to areas where pin holes are discovered. Assume 1000 sf of surfacer is required.
 - 5) Stripe Coat: All concrete edges and sharp points shall be coated with a brush or roller to within 3 inches of the edge with Tnemec Series N140 Pota-Pox at 6-8 mils.
 - 6) First Coat: Tnemec Series N140 Pota-Pox at 6-8 mils
 - 7) Second Coat: Series 22 Epoxoline at 20 to 24 mils DFT.
 - 8) Total Thickness: 26 mils DFT min.
 - 9) "Holiday" test the entire surface.
 - b. Interior floor
 - 1) No coatings.
 - c. All interior metal surfaces including pipes and pipe supports.
 - 1) Surface Preparation: SSPC-SP-10/NACE2 to a minimum anchor profile of 1.5 mils
 - 2) Prime Coat: Tnemec Series N140 6-8 mils DFT.
 - 3) Stripe Coat: All edges and sharp points shall be coated with a brush or roller to within 3 inches of the edge with Tnemec Series N140 at 6-8 mils DFT.
 - 4) Spot Prime: Tnemec Series N140 at 6-8 mils DFT.
 - 5) Top Coat: Tnemec Series 22 at 20-24 mils DFT.
5. Exterior Coating
- a. Provide an elastomeric breathable coating for the exterior of the new prestressed concrete tank (walls and dome). Exterior coating shall be a modified waterborne acrylate applied to two coats. Colors shall be coordinated and selected by the OWNER.
 - 1) Surface preparation: remove all contaminants by powerwashing per SSPC-SP1.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- 2) First Coat
 - a) Tnemec Series 156 Enviro-crete – 5 mils DFT
 - b) Sherwin-Williams Loxon XP at 6-8 mils DFT
- 3) Second Coat
 - a) Tnemec Series 156 Enviro-crete – 5 mils DFT
 - b) Sherwin-Williams Loxon XP at 6.0-8.0 mils DFT

2.03 STRUCTURAL DESIGN

- A. Construct the tank from prestressed concrete.
- B. Design, fabricate, erect, inspect, and test the structures in accordance with Florida Building Code 2020 7th edition, ACI 318, ACI 350, ACI 350.1, and ACI 372.
- C. The tanks shall be free of abrupt changes in the meridional profile throughout the operating liquid depth.
- D. Include the effects of localized stresses in the design of the tank and structural attachments and connections.
- E. Design each prestressed concrete tank in accordance with ACI 372 and AWWA D-110 and follow the recommendations for environmental engineering concrete structures in ACI 350.
- F. Maximum initial prestress shall not exceed 0.55 of the concrete compressive strength at time of tensioning.
- G. Provide a minimum 200 psi compressive residual stress under operating conditions circumferentially at any point in the tank wall if the standard design approach is utilized in the tank wall design. (Design References ACI 372R-13 Sections 3.3.5.2 and 3.3.5.3) & (ANSI/AWWA D110-13 Section 3.5.2.1). The 25,000 psi prestressing loss in the standard design approach will require the additional 200 psi residual compressive stress to be accounted for in the wall design. If the Alternative Design is utilized as illustrated in (ANSI/AWWA D110-13 Sections 3.4.4 and 3.5.2.2), the 200 psi residual compressive stress is already taken into account due the long term prestressing loss of 30,600 psi and the 200 psi residual compressive stress will not be required. On the design plans and calculations, please indicate which design option was utilized in the design of the tank.
- H. Tank design shall include the following basic loads that act upon the structure:
 1. Full hydrostatic load.
 2. Partial hydrostatic load.
 3. No hydrostatic load.
 4. Loads from ladders.
 5. Wind load.
 6. Wind vortex shedding.
 7. Seismic load.
 8. Pressure loads.
 9. Unbalanced backfill loads.
 10. Vehicle load GVWR 12,000 on the backfill.
 11. Construction loads.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

12. Buoyancy loads, if required due to seasonal high groundwater conditions as specified herein and the geotechnical report.
 13. Minimum roof live load or snowload.
 14. Gravity ventilator load and winds/seismic loads induced by gravity ventilator.
- I. Consider loads listed herein to act in combinations, whichever produces the most unfavorable effects.
 - J. It is not necessary to combine wind and earthquake loads but the maximum stress produced by either condition with other applicable loads shall be considered.
 - K. In addition to these loads, the design shall provide for the effects on the structure from the following stresses:
 1. Losses from shrinkage, plastic flow, wire creep, anchorage loss, maximum friction loss, and allowance for residual compression in concrete.
 2. In no case shall the losses used for design (exclusive of residual compression requirements) be less than 25,000 psi, regardless of calculations.
 3. Support stresses at the junction with the vessel support structure.
 4. Prestressing during and after tensioning.
 5. Calculate differential drying stresses and the required reinforcement.
 - L. The stresses for concrete shall not exceed ACI 318 except as recommended in ACI 372 and unless otherwise specified herein.
 - M. Under no combination of conditions due to specified load conditions, prestressing, backfilling, and temperature or dryness differential shall maximum extreme fiber tensile stresses under severe load conditions in the wall exceed $3f_c$ during construction or after the tanks are in service.
 - N. The maximum effective steel prestress, after deducting losses due to shrinkage, plastic flow, reinforcement creep, and an allowance for residual compression, shall not exceed 63 percent of the ultimate strength of the prestressed reinforcement.
 - O. The maximum initial prestress, in any single wire or strand, shall not exceed 75 percent of the minimum ultimate strength of the prestressed reinforcement.
 - P. Any stairs, ladders, or platforms connecting to or on the tank shall be coordinated with the Manufacturer for support and connection details. Loads resulting from these appurtenances shall be taken into account in the tank's design.
 - Q. Nonprestressed Reinforcement
 1. Shall meet the requirements of ACI 318.
 2. Shall have a maximum allowable tensile stress of 18,000 psi, exclusive of shrinkage and temperature effects.
 3. Shall not be credited for resisting any portion of primary circumferential tension resulting from fluid pressure.
 4. Non-prestressed mild reinforcing steel shall be new billet steel meeting the requirements of ASTM A615/A615M with a minimum yield strength, f_y , of 60,000 psi.
 5. Welded wire reinforcing shall be plain wire conforming to the requirements of ASTM A1064/A1064M with a minimum yield strength, f_y , of 65,000 psi.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

PART 3 – EXECUTION

3.01 ENVIRONMENTAL INSTALLATION REQUIREMENTS

- A. Delay of work under the following conditions:
 - 1. During high winds causing sand to separate at the nozzle.
 - 2. When weather approaches freezing defined as below 40 degrees F when temperature is falling, or until temperature is 35 degrees F when temperature is rising.
 - 3. During rains of high intensity to wash cement out of fresh material.
- B. Cold Weather: Take precautions to avoid low temperatures detrimental to epoxy grout or the ability to pump. If grouting procedure cannot be postponed, keep wall temperatures within the required temperature range
- C. Hot Weather: When temperatures exceed 90 degrees F, obtain approval for method used to protect shotcrete from excessive heat and drying.
- D. Do not expose circumferential prestressing on walls to weather for more than 72 hours. Exercise precautions during adverse weather conditions.

3.02 INSTALLATION

- A. All subgrade elevations shall be verified prior to starting tank construction.
- B. Reinforcing Steel
 - 1. Reinforcing steel shall be installed in accordance with the CRSI, Code of Standard Practice.
- C. Placing Concrete
 - 1. General Placement
 - a. Cast-in-place concrete floor and dome roof shall be installed in accordance with ACI 301, ACI 318, ACI 347, and ACI 350 except as specified herein.
 - b. No concrete shall be mixed or placed during freezing weather without explicit permission. When placing concrete when air temperature is below 40 degrees F, the water, sand and gravel shall be heated so that the temperature of the concrete will be at least 50 degrees F. This temperature shall be maintained for 72 hours after placing. No concrete shall be placed on frozen ground.
 - c. In hot weather, concrete, when deposited, shall have a placing temperature that will not cause difficulty from loss of slump, flash set, or formation of cold joints. In no case shall the temperature of concrete being placed exceed 95 degrees F.
 - d. All concrete shall be consolidated by means of a vibrator for proper encasement of reinforcing steel and welded wire fabric.
 - 2. Floor Slab
 - a. The subgrade shall be prepared by fine grading to ensure proper placement of reinforcing steel with proper bottom cover.
 - b. Prior to placement of the floor slab, a 6 mil vapor- barrier per ASTM D 4397, Below grade vapor retarders shall be placed over the subbase.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- c. Form and screed boards shall be of proper thickness and sufficiently braced to ensure that the floor is constructed within proper thickness tolerances.
 - d. Plate bolsters shall be used to support reinforcing steel supported directly on the subgrade to ensure positive control of placement of reinforcing steel.
 - e. The floor shall be vibratory screeded to effect consolidation of concrete and proper encasement of floor reinforcing steel.
 - f. The floor slab including the thickened portion for the wall footing shall be placed in one continuous concrete placement. Construction joints between the floor slab and footings shall not be allowed. Where a construction joint is approved in writing by the ENGINEER, the joint shall have 6-inch wide, 3/8-inch thick PVC waterstop conforming to the same requirements as the wall - base slab waterstop.
 - g. The tank floor shall be wood/bull float finished first followed by a broom finish. No water shall be added to the slab during finishing. Curing of the tank floor shall be accomplished by ponding the entire area within the waterstops with 2-inch minimum of water within 24 hours after concrete placement. The floor shall be kept wet for a minimum of 7 days.
 - h. Provide four settlement monuments on the perimeter of the tank at 90-deg increments, four at 30 feet from the center of tank at the same 90-deg increments as those on the perimeter, and one at the center of the tank to survey and monitor total, differential, and angular settlement for compliance with ACI 372R and settlement estimates.
3. Concrete Dome
- a. The roof shall be wood/bull float finished and then receive a light broomed surface finish. No water shall be added during the finishing of the roof. Precast dome panels, if used, shall have a surface designed to receive a cementitious coating.
- D. Core Walls
- 1. Prestressed Core wall(s)
 - a. Exterior wall details including the galvanized steel diaphragm, PVC waterstops, elastomeric bearing pads, sponge rubber fillers, prestressing steel, prestressing earthquake cables, and shotcrete shall conform to the requirements of AWWA D110.
 - 1) Seismic Resistant Cables
 - a) Seismic restraint cables shall be seven-wire strand conforming to ASTM A416/A416M.
 - b) The strand shall be protected with a fusion-bonded, grit-impregnated epoxy coating conforming to ASTM A882/A882M.
 - c) The minimum yield strength of the seven-wire strand shall be 270,000 psi.
 - b. A PVC waterstop shall be installed in the wall to base joint. Field splices shall be in accordance with the MANUFACTURER's specifications. The waterstops shall be installed so as to form a continuous watertight dam. Adequate provisions shall be made to support and protect the waterstop during the progress of the work. Where the waterstop is placed in a

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- concrete cove attached to the inner face of the wall, the cove shall attain 60 percent of its 28-day strength prior to the start of prestressing the wall.
- c. Circumferential Prestressing
- 1) Stress readings on a calibrated stressometer, furnished by the tank MANUFACTURER, shall be made on each prestressing wire. The stress measuring equipment shall include: electronic direct reading stressometer accurate to within 2%, calibrated dynamometers and a test stand to verify the accuracy of the equipment. A running log shall be maintained by the tank manufacturer of the stress readings and used to determine the final number of wires required.
 - 2) The initial tension in each wire shall be read and recorded to verify that the total aggregate force is no less than that required by the design. Averaging or estimating the force of the wire on the wall shall not be considered satisfactory evidence of correct placement of prestressing wires.
 - 3) In computing the final tension in the wires, an allowance for prestress loss due to creep, shrinkage, elastic deformation, and residual compression shall be provided for. The tank manufacturer shall submit an "as-built" revision to the design diagram showing the location and number of wires actually used for the project records only.
 - 4) Placement of the prestressing steel wire shall be in a continuous and uniform helix of such pitch as to provide in each lineal foot of core wall height an initial force and unit compressive force equal to that shown on the design drawings. Splicing of the wire shall be permitted only when completing the application of a full coil of wire or when removing a defective section of wire.
 - 5) Shotcrete shall be used to completely encase each individual wire and to protect it from corrosion. To facilitate this encasement, the clear space between adjacent wires is to be no less than one wire diameter.
 - 6) Prestressing shall be accomplished by a machine capable of continuously inducing a uniform initial tension in the wire before it is positioned on the tank wall. Tension in the wire shall be generated by methods not dependent on cold working or re-drawing of the wire. In determining compliance with design requirements, the aggregate force of all tensioned wires per foot of wall shall be considered rather than the force per individual wire, and such aggregate force shall be no less than that required by the design and as shown on approved drawings.
 - 7) After circumferential prestressing wires have been placed, they shall be protected by encasement in shotcrete. This encasement shall completely encapsulate each wire and permanently bond the wire to the tank wall. A shotcrete cover having a thickness of no less than 1-inch shall be placed over the prestressing wires
- d. The galvanized steel diaphragm shall be protected against damage before, during, and after erection. Nail or other holes shall not be made in the galvanized steel diaphragm for erection except in the top 3 inches. Holes shall not be made in the galvanized steel diaphragm except for inserting wall pipes or sleeves, reinforcing steel, bolts, or other special

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

appurtenances. Such penetrations shall be sealed with an epoxy sealant which complies with Paragraph 2.02.I. Epoxy.

e. Shotcreting

- 1) All shotcrete shall be applied by an experienced nozzlemen certified by the American Concrete Institute (ACI) as outlined in ACI certification publication CP-60.
- 2) Each shotcrete layer shall be broomed prior to final set to effect satisfactory bonding of subsequent layers.
- 3) No shotcrete shall be applied to reinforcing steel or galvanized steel diaphragm which is encrusted with shotcrete overspray.
- 4) A minimum of 1/8-inch thick shotcrete shall separate reinforcing steel and prestressing wire.
- 5) No prestressing wire shall remain exposed during inclement weather over a holiday or weekend; it shall be covered with shotcrete and subsequently wet cure.
- 6) Vertical shooting wires shall be installed to establish uniform and correct thickness of shotcrete. Shooting wires shall be at 2-ft on center around the circumference of the tank. The final coat shall be applied true to shooting wires so as to form a cylindrical surface.
- 7) At the end of the day's work, or similar stoppage period, the shotcrete shall be sloped off at an angle of approximately 45 degrees. Before placing adjacent sections, the sloped portions shall be thoroughly cleaned and wetted by means of air and water blast. Shotcrete with a strength lower than specified due to cold weather shall be removed and replaced with sound material.
- 8) The shotcrete shall be cured by keeping the shotcrete continuously wet for 7 days. No natural curing allowed.
- 9) Shotcrete on the inside of the tank shall receive a light broom finish, and shotcrete on the exterior shall receive a sponge float finish.
- 10) Keep shotcrete between layers of wire and cover damp by hand watering or fine mist spray.
- 11) Remove laitance from wall prior to placing successive layers of shotcrete.
- 12) Do not use curing compounds.
- 13) Horizontal sections of the wall shall form true circles without flat areas, excessive bumps or hollows. The covercoat shall receive a sliced trowel or sponge float finish.
- 14) All rebound concrete shall be completely removed after construction.

E. Finishing of Shotcrete

1. Underlayers or Exposed Surfaces:

- a. On completing surfaces, bring shotcrete to an even plane and to well-formed corners by working up to ground wires or other thickness or alignment guides, using lower placing velocity than normal.
- b. Screed exposed surfaces or underlayers by working upward against gravity with thin-edged screed using a slicing motion to trim off high spots and expose low spots.
- c. Avoid pulling and breaking surface with subsequent checking.
- d. The interior core wall shall have a smooth steel trowel finish.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

2. Finish Coat:
 - a. Apply coat to remove rough areas after ground wires have been removed.
 - b. Carefully screen sand for finish coat to remove oversize particles which rebound and mar surfaces.
 - c. Surface of finish coat shall be of natural texture and coloration; free from spotting, cement or dust streaking, lap lines, uneven surfaces, and rebounded material.
 - d. Do not hand-patch.
 - e. Check coatings for bond by tapping lightly to test for hollow sounding spots.
 - f. Cut out areas where bond is not fully developed and repair.

- F. Curing
 1. Dome Concrete:
 - a. The dome shall be water cured for a minimum 7 days after casting or until dome band prestressing is complete.
 - b. Schedule wire wrapping and application of shotcrete so curing shall not be interrupted, and water from curing shall not wash or damage shotcrete wire coats.
 - c. Begin curing after initial concrete set has occurred.
 2. Shotcrete:
 - a. Keep shotcrete between layers of wire and cover damp by hand watering or fine mist spray.
 - b. Continuously water cure completed shotcrete surfaces for period of 7 days after application, or until subsequent shotcrete coats are applied prior to end of the 7-day curing period.
 - c. Remove laitance from wall by light abrasive blasting after curing period.
 - d. Do not use curing compounds.

- G. Epoxy Injection
 1. Epoxy injection shall be carried out from bottom to top of wall using a pressure pumping procedure.
 2. Epoxy injection shall proceed only after the diaphragm has been fully encased, inside and outside, with shotcrete.

- H. Dome
 1. All concrete shall be consolidated by means of a vibrator for proper encasement of reinforcing steel and welded wire fabric.
 2. All surfaces at the joint between the wall and the dome shall be coated with bonding epoxy which complies with PART 2 – Products: Epoxy.
 3. Plastic bolsters shall be used to support reinforcing steel and welded wire reinforcement to ensure positive control on placement of steel.
 4. The exterior surface of the dome shall receive a light broom finish.
 5. Plywood shall be used for dome scheduled to receive interior protective coatings. All plywood butt joints shall be taped.
 6. Dome wall interface shall be formed as such the minimum tolerance should be 1/4-inch.
 7. All form board gaps greater than 1/16-inch shall be caulked prior to dome pour.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- I. Roof Hatch
 - 1. Roof hatch shall be installed at locations shown on the Drawings. The hatch shall be installed on a concrete curb with a minimum finished height of 4 inches above dome and a minimum of 3 inches wide. The hatch shall be installed with a watertight gasket and 316 stainless steel expansion bolts.

- J. Interior Tank Coating
 - 1. Provide interior coating on the tank as per section 2.02L. The interior core wall shall have a smooth trowel finish. The coatings shall be applied after hydrostatic watertightness test.

- K. Exterior Tank Coating
 - 1. Provide exterior coating on the tank as per section 2.02L. The coatings shall be applied after hydrostatic watertightness test.

- L. Ladders
 - 1. Ladders shall be installed at locations shown on the Drawings. Ladders, ladder accessories and ladder clearances shall be installed to conform to the requirements of OSHA. The ladder shall have a safety climbing device and extension manufactured from Type 316 stainless steel to meet applicable OSHA standards.
 - 2. Ladder supports shall be installed by stainless steel expansion bolts or stainless steel bolts with cast-in-place threaded inserts. Prior to installing expansion bolts, the reinforcing bars shall be located with a "rebar locator" supplied by the tank manufacturer. The location of the reinforcing bars shall be marked on the concrete surface indicating the spacing and direction of the bars.
 - 3. Where interference occurs, adjust anchor locations to clear reinforcing bars and alter supports at no additional cost to the Owner.

- M. Guardrail and Kickplate
 - 1. Anodized aluminum guardrail and kickplate shall be installed as described herein and shall conform to the requirements of OSHA.
 - 2. Ladder supports shall be either by stainless steel expansion bolts or cast-in-place threaded inserts. Prior to installing expansion bolts, the reinforcing bars shall be located with a "rebar locator". The location of the reinforcing bars shall be marked on the concrete surface indicating the spacing and direction of the bars.
 - 3. Where interference occurs, adjust anchor locations to clear reinforcing bars and alter supports at no additional cost to the OWNER.

- N. Liquid Level Indicators and Transmitters
 - 1. Liquid level indicators and transmitter shall be installed at locations shown on the Drawings. The ELECTRICAL CONTRACTOR shall procure and install the transmitter, but the TANK CONTRACTOR shall install the process piping required for the transmitter.

- O. Accessory hardware, unless otherwise noted, shall be Type 316 stainless steel conforming to ASTM F593.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- P. The tank exterior ladder shall be centered on a 6-foot wide thickened boss the full height of the tank wall. This will provide enough space for routing conduit along the height of the tank.

3.03 TANK SETTLEMENT BY OPERATIONAL-LEVEL POST-LOADING

- A. The tank must be allowed to settle following satisfactory testing and prior to attaching pipes. The settlement will be achieved by loading the tank to operating level. The hydraulic watertightness test may be conducted concurrently with the operational-level tank settlement.
- B. CONTRACTOR and tank MANUFACTURER shall coordinate to provide a detailed plan for monitoring total and differential tank settlement, including the settlement monuments, means and frequency of monitoring both total and differential tank settlement, and log of settlement at each monument and cumulative settlement, as shown in total settlement and differential settlement. Submit a proposed monitoring plan for review and approval by the ENGINEER.
- C. The tank settlement must last at least four weeks and will continue until the majority of expected settlement has occurred, as determined by ENGINEER.
- D. During operational-level loading of the tank, the changes in elevation to the outside edge of the tank foundation and center of the tank must be surveyed weekly to monitor differential and total tank settlement. The tank MANUFACTURER shall hire a registered land surveyor certified in the State of Florida to implement the tank settlement monitoring plan. A survey of the interior midpoint settlement monuments shall be taken immediately prior to and after the post-loading has been completed and the tank has been drained.
- E. Results from monitoring tank settlement data shall be submitted every week to the ENGINEER.
- F. At the end of the minimum four-week tank settlement period, ENGINEER shall review final monitoring data to determine whether majority of expected settlement has occurred. More time shall be allowed for tank settlement if deemed necessary by ENGINEER.
- G. Review report of geotechnical exploration for the anticipated post loading settlement and settlement after post loading. Refer to geotechnical report for required post loading requirements. Refer to geotechnical report for required waiting time period before piping connections are completed after the post loading sequence of construction.

Estimated Settlement	
Post Loading Settlement	Differential Settlement between Center of Tank and Perimeter of Tank
$\leq 2.5''$	1.0" to 1.5"

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

- H. If operational settlement testing is successful and after the results are approved by the ENGINEER, CONTRACTOR can proceed with connecting the inlet and outlet piping.

3.04 TESTING

- A. Payment for testing shall be made from the testing allowance. Any costs for coordination of these efforts, markups, or incidentals by the TANK CONTRACTOR shall be included in their bid price and will not be allowed as part of the allowance.
- B. Compression Tests
 1. Compression test specimens shall be taken during construction from the first placement of shotcrete. At least one set of test specimens shall be made for each 50 cubic yards of shotcrete placed. Additional tests shall be made if deemed necessary by the ENGINEER to ensure continued compliance with these Specifications. Each set of specimens shall be a minimum of 5 cylinders.
 2. Compression test specimens for shotcrete shall conform to ASTM C172/C172M for sampling and ASTM C31/C31M for making and curing test cylinders. Test specimens shall be 6-inch diameter by 12-inch high or 4-inch diameter by 8-inch high cylinders.
 3. Compression test shall be performed in accordance with ASTM C39/C39M. Two test cylinders will be tested at 7 days and two at 28 days. The remaining cylinder will be held to verify test results, if needed.
- C. Air Content Tests (concrete only)
 1. Air content tests shall conform to ASTM C231/C231M (Pressure Method for Air Content).
 2. Test for air content shall be made prior to concrete placement and whenever compression test specimens are made.
- D. Slump Test (concrete only)
 1. Slump tests shall be made in accordance with ASTM C143/C143M.
 2. Slump tests shall be made whenever compression test specimens are made.
- E. Shotcrete testing shall follow ASTM C1140/C1140M – 11 and shall be performed at no additional cost to the OWNER through the concrete testing allowance.
- F. Hydraulic Watertightness Testing
 1. After the tank has been completed, but prior to applying any coatings and before any backfill is placed, the tank shall be filled slowly in the presence of the ENGINEER. Careful observation for leaks shall be made and any leaks that occur shall be immediately repaired. The tanks shall not be filled any higher than 8 feet over a 24-hour period.
 2. The tank shall be kept full of water until the ENGINEER is satisfied that all defects have been discovered and repaired. There shall be no flowing water allowed through the walls or floor slab. Damp spots that glisten on the surface of the tank and spots where moisture can be picked up on a dry hand will not be allowed. Damp spots on the top of footing projections that are not from flowing water shall not be considered to be leakage.
 3. Allowable tank leakage shall be zero.

SECTION 13216

WIRE WRAPPED PRESTRESSED CONCRETE TANK

4. The water required for leakage tests shall be provided by the OWNER at no cost. However, the TANK CONTRACTOR shall be responsible for supplying the water to the tank at a rate and means acceptable to the OWNER. If additional piping, valves, or pumps are needed the TANK CONTRACTOR shall supply and install for testing.
5. Water tightness testing shall be performed prior to application of any coatings.

3.05 CLEANING AND DISINFECTION

- A. The interior of the tank shall be cleaned to remove debris, construction items, and equipment prior to testing and disinfection.
- B. The following disinfection procedure shall be used to disinfect storage tanks used for potable water:
 1. Method 2 or 3 will be used for disinfection of the tank in accordance with ANSI/AWWA C652.
 2. When Method 3 is used, the disinfection plan shall address any compatibility issues with the form of chlorine used for disinfecting the storage tank with the type of disinfectant used in the normal production of the water used to fill the tank.
 3. The disposal plan shall address the dechlorination and discharge plan of the water at an acceptable rate to sewer or storm structures.

END OF SECTION 13216

SECTION 15100

VALVES AND APPURTENANCES

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required and 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. Valve boxes
 - 2. Gate valves
 - 3. Swing check valve
 - 4. Pressure gauges
 - 5. Air release valves
 - 6. Ball valves
 - 7. Reduced pressure backflow preventer assembly
 - 8. Hose bibbs
 - 9. Wash hose stations
 - 10. Proportional pressure reducing valve
 - 11. Pressure sustaining fill valve
- C. The SJCUD's Manual of Water, Wastewater, and Reclaimed Water Standards Manual, latest version will be used for the following items:
 - 1. Valve boxes Section 3.8.7
 - 2. Gate valve Section 3.8.2
 - 3. Swing check valves Section 3.8.3
 - 4. Air Release Valves Section 3.8.5
 - 5. Reduced pressure backflow preventer Section 3.12.1
 - a. These items must conform to those standards and shall be submitted for review and approval to the ENGINEER under this specification section.
- D. All valves or appurtenances that come into contact with potable water shall be certified as NSF 61 and NSF-372 (NSF 61-G) approved.
- E. For any buried valves provided by the TANK CONTRACTOR, the CONTRACTOR shall be responsible for providing the final valve pad as per the detail.

1.02 RELATED WORK

- A. Excavation, Backfill, Fill and Grading for pipe is included in Division 2.

1.03 DESCRIPTION OF SYSTEMS

- A. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, air, etc., depending on the applications.

SECTION 15100

VALVES AND APPURTENANCES

1.04 QUALIFICATIONS

- A. 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 the best practices and methods and shall comply with these specifications as applicable.

1.05 SUBMITTALS

- A. Complete shop drawings of all valves and appurtenances shall be submitted to the ENGINEER for approval in accordance with the requirements of Section 01300.
- B. Valve Submittals
 1. Valve tag number
 2. The manufacturer and supplier
 3. The address at which equipment will be fabricated or assembled
 4. Drawings showing assembly details, materials of construction and dimensions
 5. Descriptive literature, bulletins and/or catalogs of the equipment
 6. The total weight of each item
 7. A complete bill of materials
 8. Additional submittal data, where noted with individual pieces of equipment
 9. Actuator mechanical outline and electrical drawings with valve tag information
 10. Wiring diagrams, field wiring terminal diagrams, power requirements, and control panel drawings
- C. Test Reports
 1. Provide certified hydrostatic test data, per manufacturer's standard procedure or MSS-SP-61 for all valves.
 2. Each actuator shall be performance tested in accordance with AWWA and other standards. The valve manufacturer shall supply, mount, and test all electric actuators on valves at the factory.
- D. Certificates
 1. For each valve specified to be manufactured, tested and/or installed in accordance with AWWA and other standards, submit an affidavit of compliance with the appropriate standards, including certified results of required tests and certification of proper installation.
- E. Operation and maintenance manuals for each type valve in accordance with Section 01370.

1.06 SPARE PARTS AND TOOLS

- A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

SECTION 15100

VALVES AND APPURTENANCES

1.07 VALVE DESIGNATIONS AND SCHEDULE

- A. All valves shall be identified by a unique valve tag as identified in the valve schedule prepared by the CONTRACTOR. The specific type of valve to be used will be identified by the symbol and/or call out on the Drawings. The CONTRACTOR shall identify each valve by its assigned tag number on all shop drawings and equipment submittals or as designated on the drawings.

- B. The CONTRACTOR shall refer to the P&IDs and mechanical plans for type of each valve called out by abbreviation or drawing symbol. Prior to the first valve submittal, CONTRACTOR shall submit a detailed valve schedule listing all of the process valves to be furnished along with the Contract Drawing and P&IDs edited electronically to include the valve tag numbers prepared by the CONTRACTOR identifying each valve. The valve schedule shall include: valve tag number, valve designation, valve size, end connections, operator type and other information required by SJCUD details for buried valves. The valve tag shall be 4 digits long; numbering shall be linked to the P&ID Sheet on which it is shown. Identical valves in the same position in parallel processes (EX. Pump inlet/outlet isolation valves where there are 3 parallel pumps of same type) shall have same tag number followed by a hyphen and quantifier -1, 2, 3 etc. Where electric, hydraulic or pneumatic actuators are supplied their type shall be so noted with an E, H or P. Modulating duty actuators shall be noted with an M following the actuator type notation. An excerpt of an EXAMPLE schedule is as follows:

- C. Valve tags shall comply with requirements listed below.

Valve Tag	Designation	Size	Ends	Operator	Notes
1000-1	BFV1	8-in	Flanged	Gear/Handwheel	Extra descriptions necessary
1000-2	BFV1	8-in	Flanged	Gear/Handwheel	
1005	PV1	6-in	Flanged	EM	

1.08 WARRANTY

- A. All equipment supplied under this section shall be warranted for a period of one (1) year from substantial completion by the MANUFACTURER.

- B. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced in the machine(s) and the unit(s) restored to service at no expense to the OWNER.

- C. The MANUFACTURER'S warranty period shall run concurrently with the CONTRACTOR'S warranty period. No exception to this provision shall be allowed.

SECTION 15100

VALVES AND APPURTENANCES

PART 2 – PRODUCTS

2.01 GENERAL

- A. All valves and appurtenances shall be of the size shown on the Drawings and as far as possible all equipment of the same type shall be from one manufacturer.
- B. All valves and appurtenances shall have the name of the maker and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.
- C. The valve manufacturer shall supply, mount, and test all actuators on valves at the factory. The valves and their individual actuators shall be shipped as a unit.
- D. Unless otherwise noted on the Drawings, valves shall be manually actuated; non-buried valves shall have an operating wheel, handle or lever mounted on the operator; those with operating nuts shall have a non-rising stem with an AWWA 2-inch nut. At least two tee handles shall be provided for all operating nuts. Unless otherwise noted, operation for all valves shall be CCW open.
- E. Each operating device shall have cast on it with the word "OPEN" and an arrow indicating the direction of operation.
- F. Buried valves shall have nut operator and valve box arrangement as shown on the Drawings.
- G. The valve manufacturer shall supply, mount, and test all actuators on valves at the factory. The valves and their individual actuators shall be shipped as a unit.
- H. All actuators shall be capable of moving the valve from the full open to full close position and in reverse and holding the valve at any position part way between full open or closed.
- I. For all valves, all exposed hardware including nuts and bolts shall be 316 stainless steel and shall remain unpainted to allow easy removal.

2.02 VALVE BOXES

- A. Valve boxes shall meet the standard specifications as listed in Section 3.8.7 of SJCUD Standards Manual.

2.03 GATE VALVES

- A. Gate valves shall meet the standard specifications as listed in Section 3.8.2 of the SJCUD Standards Manual.

SECTION 15100

VALVES AND APPURTENANCES

2.04 SWING CHECK VALVES

- A. Swing check valves shall meet the standard specifications as listed in Section 3.8.3 of the SJCUD Standards Manual.

2.05 PRESSURE GAUGES

- A. Each pressure gauge shall be direct mounted, 304 SS with a minimum 4 inch diameter dial and furnished with a clear glass window, ¼ inch shut-off valve, and a bronze pressure snubber. Provide diaphragm seals between shut-off valve and pressure gauge. 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.
- B. Pressure gauges shall be liquid filled and equal to Series 750 as manufactured by H.O. Trerice Co., Detroit, Michigan; Marshalltown Instruments, Marshalltown, Iowa; or equal.
- C. Install as per details provided on the drawings.
- D. Gauge rating shall be the range as shown on the Drawings and confirmed during the shop drawing process, provide a table of all pressure gauges, location, application, and pressure range for review and approval.
- E. Diaphragm seals shall be installed for all pressure gauges and pressure switches to protect pressure gauges and pressure switches from contact with the fluid in the pipeline. Gauges shall be furnished as part of a complete factory assembly including gauge, snubber, diaphragm seal, liquid fill, bar stock isolation valve and threaded Type 316 stainless steel interconnecting piping. Furnish also a ½-in backflushing connection and valve.
- F. Diaphragm seals shall be minimum 2-1/2-inch diameter, or as required for the connected pressure gauges. The diaphragm shall be "thread attached" to both piping and pressure switches or gauges. Furnish mineral oil fill between the diaphragm seal and the gauge.
 - 1. Diaphragm seals shall have an upper housing of Type 316 stainless steel, with the lower housing of a material specifically chosen according to the fluid type and pressure being monitored, with Type 316 stainless steel bolts. Diaphragms shall be Type 316 ELC stainless steel.
 - 2. Each diaphragm seal shall be connected to its respective piping or equipment with threaded Type 316 stainless steel pipe and fittings. Pipe size and diaphragm tap size shall match the size of the gauge tap on the equipment, but shall not be less than ¾-inch, except for connections to plant water piping which shall be minimum ½-inch. Furnish a plug valve shut-off valve between the pipeline or equipment and the diaphragm seal.
 - 3. Each diaphragm seal shall have a minimum ¼-inch NPT flush connection with plug valve and gauge tap to match the size of the gauge.

SECTION 15100

VALVES AND APPURTENANCES

4. Furnish pulsation dampeners adequate to prevent pulsation and/or vibration of the gauge indicator under all system operating conditions.

2.06 AIR RELEASE VALVES

- A. Air release valves shall meet the standard specifications as listed in Section 3.8.5 of SJCUD Standards Manual.
- A. The CONTRACTOR shall provide connecting stainless steel piping, valves, and appurtenances to route ARV drain piping to drain as shown on the Drawings.

2.07 BALL VALVES

- A. Stainless Steel
 1. Ball valves shall be 316 stainless steel body per ASTM A351 Grade CF8M, two piece split body, full port, and fire safe as per API 607 4th edition.
 2. Ball valves shall be manufactured with 150 lb flanges.
 3. The design of the valves shall be such that it shall provide suitable seating in both directions. In order to determine the position of the ball within the valve (open or closed), there shall be an easily visible, permanent indicator on the valve. Ball valves shall have a 316 stainless steel ball.
 4. Seats shall be TFM 1600 enhanced Teflon seats. The fully open port area shall be approximately 100 percent of the nominal pipe area.
 5. Valve shafts shall be ground and polished and shall be type 304 stainless steel Teflon-lined bearings shall be supplied in both trunnions of the valve body.
 6. Stainless handles on sizes ½ – 2-inch with travel stops and lockout devices and carbon steel handles on sizes 2 ½ – 12-inch with travel stops and lock out devices.
 7. Valves to be furnished with an actuator shall have ISO 5211 secure mount actuator mounting pad. Valve actuators shall conform to AWWA C507 as specified herein.
 8. Stainless steel ball valves shall be model F150 as manufactured by Flo-tite, F15 by Flow-tek, Apollo Series 76, or Ohio Valve Fig. 166RT.

2.08 REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY

- A. Reduced pressure backflow preventer assembly shall meet the standard specifications as listed in Section 3.12.1 of SJCUD Standards Manual.

2.09 HOSE BIBBS

- A. Hose bibbs shall be brass, polished chromium plated, as manufactured by Chicago Faucet Company. Potable water bibbs shall be No. 952, 1-inch with vacuum breaker and shut off valve as detailed on the Drawings.
- B. CONTRACTOR shall provide hose, mounting hardware and supports, and pipe supports at all locations as detailed on the drawings.

SECTION 15100

VALVES AND APPURTENANCES

2.10 WASH HOSE STATION

- A. Shall be a single supply, wall-mounted, guardrail mounted, or free standing hose station as shown on the Drawings.
- B. Hoses shall be red, 1-inch rubber at all locations.
- C. Hose nozzle shall be lever operated, encased in rubber equal to Strahman No. 70.
- D. Wall anchors for hose rack shall be 5/16-inch 316 stainless steel hex bolts.
- E. Isolation valve shall be a stainless-steel ball valve as specified herein.

2.11 PROPORTIONAL PRESSURE REDUCING VALVE

- A. The pressure reducing valve shall automatically reduce a higher upstream pressure to a lower downstream pressure at a fixed ratio. The valve's control loop shall not consist of any pilot.
- B. The main valve shall be a hydraulically operated, diaphragm actuated globe valve of either angle or oblique (Y) pattern design, having semi- straight flow with no right angle turns. The valve shall be center guided, having an unobstructed flow path with no stem guides, bearings, or supporting ribs. The valve shall have a maximum pressure rating of 250 psi for ANSI Class 150# flanges and 400 psi for all other end connections (threaded, grooved, or Class 300# flanges). All necessary repairs shall be possible without removing the valve from the line. The valve body shall be provided with a 1/2 inch NPT port on the upstream portion of the valve for a CONTRACTOR installed 1/2 inch tube to be run to the sensing chamber of the pressure sustaining valve. The proportional pressure reducing valve shall have an integral downstream pressure gauge.
- C. The actuator assembly shall be a double-chambered diaphragm design with a sealed inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly shall be removable from the valve as a single, integral unit. The seal shall be rectangular in cross section contained on three- and one-half sides, and the seal disc shall be capable of accepting a V-Port throttling plug. The diaphragm within the main valve actuator assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.
- D. The control system shall consist of a control tube connecting the upper control chamber to the valve outlet. The valve shall be factory assembled with all control tubing.
- E. The valve body and cover shall be ductile iron to ASTM A536, with an approved fusion bonded epoxy coating. External nuts and bolts shall be SAE 316 stainless steel. The interior trim shall be stainless steel. Valve bearing shall be tin bronze

SECTION 15100

VALVES AND APPURTENANCES

C90500. The nylon reinforced diaphragm and all O-rings shall be EPDM, with the seat seal being Buna-N. The control loop accessories, tubing and fittings shall all be SAE 316 stainless steel.

- F. The valves shall be Bermad Model WW-8"-720-EN-PD-P2-Y-C-A5-EB-NN-N.

2.12 PRESSURE SUSTAINING FILL VALVE

- A. The valve shall be installed as shown on the drawings. The pressure relief/sustaining valve shall fulfill either of two separate functions. When installed in-line, it shall sustain minimum pre-set, upstream (back) pressure regardless of fluctuating flow or varying downstream pressure. When installed as a circulation valve, it shall relieve excessive line pressure when above maximum pre-set.
- B. The main valve shall be a hydraulically operated, diaphragm actuated globe valve of either angle or oblique (Y) pattern design, having semi- straight flow with no right angle turns. The valve shall be center guided, having an unobstructed flow path with no stem guides, bearings, or supporting ribs. The valve shall have a maximum pressure rating of 250 psi for ANSI Class 150# flanges and 400 psi for all other end connections (threaded, grooved, or ANSI Class 300# flanges). All necessary repairs shall be possible without removing the valve from the line.
- C. The actuator assembly shall be a double-chambered diaphragm design with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly shall be removable from the valve as a single, integral unit. The seal shall be rectangular in cross section contained on three and one-half sides, and the seal disc shall be capable of accepting a V-Port Throttling Plug. The diaphragm within the main valve actuator assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.
- D. The pressure sustaining pilot control shall be a direct-acting, adjustable, spring-loaded, normally closed, diaphragm valve designed to permit flow when controlled pressure is greater than the spring setting. The standard spring setting range shall be 15-230 psi, with options for 15-430 psi. The valve shall be factory assembled with all control tubing, isolations ball valves, control filter and pilot. The control system shall also include a 120V 3-way ASCO 8320 series solenoid which shall allow the valve to be closed by a remote signal. Port 1 or 3 shall include ½-inch tube fitting to connect the sensing line to the upstream port on the proportional pressure reducing valve. It is the CONTRACTOR's responsibility to coordinate the length and appurtenances required to connect the pilot on the pressure sustaining valve to the proportional pressure reducing valve.
- E. The valve body and cover shall be ductile iron to ASTM A536, with an approved fusion bonded epoxy coating. External nuts and bolts shall be SAE 316 stainless steel. The interior trim shall be stainless steel. Valve bearing shall be tin bronze

SECTION 15100

VALVES AND APPURTENANCES

C90500. The nylon reinforced diaphragm and all O-rings shall be EPDM, with the seat seal being Buna-N. The control loop accessories, pilot, tubing and fittings shall all be SAE 316 stainless steel.

- F. The valve shall be Bermad Model WW-8"-730-EN-55-P0-Y-C-A5-EB-5AC-NN-N.
- G. SPARE: Provide one spare three-way solenoid valve properly packaged for long-term storage.
- H. STARTUP SERVICES: The manufacturer shall provide a factory-authorized service representative to commission and verify the installation meets the requirements of the manufacturer and prepare the valve for operation in accordance with design requirements. Representative shall prepare and submit a signed certificate of installation prior to ENGINEER witnessed site acceptance testing. Commissioning and verification shall be provided for a total of 16 hours over a 2-day period. CONTRACTOR shall engage a factory-authorized service representative to train OWNER's maintenance personnel to adjust, operate, and maintain the equipment provided under this specification and all accessories associated therewith. Training shall be provided for a total of 8 hours over a single day. This work is inclusive of the proportional pressure reducing valve above.

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 2 hours 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.
- C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the CONTRACTOR shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.
- D. Pipe for use with flanged couplings shall have plain ends as specified in the respective pipe sections in Division 15.

SECTION 15100

VALVES AND APPURTENANCES

- E. Fire hydrants shall be set at the locations designated by the ENGINEER and bedded on a firm foundation. Each hydrant shall be set in true vertical alignment and properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the Drawings. Felt roofing paper shall be placed around hydrant elbow before placing concrete. If directed, the hydrant shall be tied to the pipe with suitable rods or clamps, galvanized, painted, or otherwise rustproof treated. Concrete used for backing shall be no leaner than 1 part cement, 2-1/2 parts sand, and 5-1/2 parts stone. Hydrant paint shall be touched up as required after installation.
- F. Flanged joints shall be made with stainless steel bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.
- G. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.
- H. Prior to the installation of sleeve-type couplings, the pipe ends shall be clean thoroughly for a distance of 8 inches. Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6 inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts.
- I. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

3.02 SHOP PAINTING

- A. Ferrous surfaces of valves and appurtenances shall receive an exterior coating of rust-inhibitive primer as specified in Section 09900. Interior coatings shall be the manufacturer's standard except that valves on raw and potable water pipes shall be

SECTION 15100

VALVES AND APPURTENANCES

coated with paints approved by both EPA and AWWA NSF 61 approved for potable water service. All pipe connection openings shall be capped after shop painting to prevent the entry of foreign matter prior to installation.

3.03 FIELD PAINTING

- A. All metal valves and appurtenances specified herein and exposed to view will be painted as part of the work in Section 09900. All exposed pipe joints on pipe, valves and fittings shall be caulked 360 degrees prior to painting.

3.04 INSPECTION AND TESTING

- A. Completed pipe and valves shall be subjected to hydrostatic pressure test for 2 hours at 150 psi. All leaks shall be repaired and lines retested as approved by the ENGINEER. Prior to testing, the gravity pipelines shall be supported in an approved manner to prevent movement during tests.

END OF SECTION 15100

SECTION 16000

ELECTRICAL WORK – GENERAL

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. In general, the work specified in this division of the specifications includes the furnishing of all labor, material, auxiliaries, and services necessary to install complete and properly operating electrical systems, including all fees, charges, and permits necessary.
- B. The ELECTRICAL CONTRACTOR shall furnish and install all wire, cables, conduits, wiring, wiring devices, lighting fixtures, motor controllers, safety switches, relays, control equipment, and all other apparatus and accessories indicated, specified, or required for complete lighting, power, control and instrumentation systems for the project facilities.
- C. The ELECTRICAL CONTRACTOR shall refer to every section of these specifications for installation and coordination requirements applicable to the work specified in this division. The ELECTRICAL CONTRACTOR shall furnish and install all wiring and connections to all electrical equipment furnished under other sections of these specifications, except where specified or indicated otherwise.
- D. The ELECTRICAL CONTRACTOR shall coordinate all electrical work with other project construction trades, installation requirements, sequence of construction schedule, etc., including coordination and installation of required conduit sleeves and supporting devices.
- E. The ELECTRICAL CONTRACTOR shall be required to coordinate all electrical system connections with each appropriate utility company and shall furnish and install all equipment or material necessary to provide complete electrical and communication services in accordance with all utility company requirements.
- F. Unless otherwise indicated, the basic materials and methods included in this section of the specifications shall be applicable throughout the project.

1.02 GENERAL REQUIREMENTS

- A. Design drawings are diagrammatic and intended to show approximate installation and equipment locations. All dimensions shall be verified in the field and coordinated with shop drawings issued. Equipment schedules are intended to serve as a guide only and do not relieve the ELECTRICAL CONTRACTOR of the responsibility for the complete furnishing and installation of all wiring, cable, conduits, or additional apparatus required.
- B. The ELECTRICAL CONTRACTOR shall furnish, install, maintain, and remove upon completion of the project, all temporary service required for construction and testing. The service shall be for general power and lighting and shall include distribution system, panelboards, grounding, branch circuits, general lighting, and receptacles as required.

SECTION 16000

ELECTRICAL WORK – GENERAL

- C. The ELECTRICAL CONTRACTOR shall furnish and install reinforced concrete pads, for electrical equipment, of size as shown on the drawings or required. Unless noted otherwise, pads for indoor equipment shall be 4 inches high and exceed the equipment dimensions by 6 inches on all sides not flush to a wall; pads for outdoor equipment shall be a minimum of 12 inches thick and exceed the equipment dimensions by 2-1/2 feet on sides equipped with door access and 6 inches on all remaining sides. Motor control centers, switchboards, etc., located indoors and equipped with a wireway at the base, shall be centered on a continuous reinforced concrete curb, 5.5" high and 6 inches wide. Electrical apparatus operator handle extensions shall be provided as required to comply with the NEC two meter rule.
- D. The ELECTRICAL CONTRACTOR shall furnish a covered, weather-protected facility, providing a clean, dry, non-corrosive environment for storage of all electrical and instrumentation equipment incorporated into this project in accordance with the provisions of the General Conditions.
- E. The ELECTRICAL CONTRACTOR shall furnish and install a system of engraved, laminated nameplates (black lettering on a white background), designed to identify each major piece of equipment.
- F. Motors will be furnished with the equipment they drive unless indicated otherwise. Motors shall be premium efficiency design. Motors located outdoors or within corrosive environments shall be severe duty construction.
- G. The ELECTRICAL CONTRACTOR shall remove all existing electrical equipment within areas to be demolished and shall return all reusable material to the OWNER. Equipment feeder conductors shall be removed up to the first remaining circuit disconnect.
- H. Existing receptacles, light switches, lighting fixtures, etc., which become inaccessible or nonfunctional as a result of the new construction, shall be relocated to become accessible and functional. Replace or reroute the existing branch circuits as required to accommodate the relocated devices.
- I. All electrical equipment exposed in wet wells, on treatment structures, in direct exposure to process, chlorine, or chemical atmospheres, or otherwise subject to accelerated corrosion, shall be furnished as specified for "corrosive atmospheres".

1.03 SUBMITTALS

- A. For each individual section of this division, there shall be submitted for approval a single, complete shop drawing submission. All elementary and schematic diagrams shall be provided with indication of system coordination and complete description of sequence of operation. Deviations from the contract documents shall be clearly identified. One copy of each shop drawing submittal shall be provided in PDF format.

SECTION 16000

ELECTRICAL WORK – GENERAL

- B. Complete operation and maintenance instruction manuals, including system schematics which reflect "as-built" modifications, shall be provided. All wire terminations shall be numbered and identified on as-built drawings included as part of the operations and maintenance manuals. All drawings included within the operation and maintenance manuals shall be reduced to a maximum dimension of 17 inches x 11 inches, and shall be legible and reproducible. Special maintenance requirements particular to the system shall be clearly defined along with special calibration and test procedures. One copy of each operation and maintenance manual submittal shall be provided in PDF format.
- C. Following approval of the operation and maintenance instruction manual submittals, an electronic copy of all as-built electrical apparatus drawings, schematic diagrams, control wiring diagrams, instrumentation drawings, etc. shall be provided. A drawing index, identifying each electronic drawing file name and a description of the contents, shall be included within the operation and maintenance instruction manuals.
 - 1. Unless otherwise approved prior to submittal, all electronic drawings shall be provided on compact disk in both PDF and AutoCAD 2013 format.
- D. One complete set of design drawings shall be neatly marked daily as a record of job progression and "as-built" installation. The drawings shall reflect the actual installed locations of all equipment and indicate the exact routing and elevations of all concealed conduits. Upon completion of the project, the drawings shall be coordinated with the as-built drawings and submitted to the ENGINEER. One copy of the final as-built drawings shall be provided in PDF format.
- E. The ELECTRICAL CONTRACTOR shall maintain a record of all construction documentation including construction survey data, inspection reports, test reports, startup logs, etc. Upon completion of the project, copies of all construction documentation shall be submitted to the ENGINEER. One copy of the final construction documentation shall be provided in PDF format.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All material shall be new and shall conform with the standards of the Underwriter's Laboratories, Inc., American National Standards Institute, National Electrical Manufacturers' Association, Insulated Power Cable Engineers Association, and Institute of Electrical and Electronic Engineers in every case where such a standard has been established for the particular type of materials in question.
- B. The use of a manufacturer's trade name and catalog number is not intended to indicate preference but only the type and quality of the product desired. Products of reputable manufacturers of equal quality and functional type will be acceptable. Substitutes which tend to lower the quality of the work will not be permitted.

SECTION 16000

ELECTRICAL WORK – GENERAL

- C. Acceptance of alternate equipment does not relieve the ELECTRICAL CONTRACTOR of the responsibility of compliance with the performance and accuracy requirements of these specifications. Where such substitutions alter the design or space requirements indicated on the Contract Drawings, detailed drawings shall be prepared and submitted by the ELECTRICAL CONTRACTOR delineating any changes in or additions to the work shown on the Contract Drawings, and such drawings and changes or additions to the work shall be made by the ELECTRICAL CONTRACTOR at no additional expense to the OWNER. In all cases, the burden of proof that the material or equipment offered for substitution is equal in construction, efficiency, and service to that named on the Contract Drawings and in these Contract Documents shall rest on the ELECTRICAL CONTRACTOR and, unless the proof is satisfactory to the ENGINEER, the substitution will not be approved.
- D. Wherever possible, equipment items having the same or similar rated capacity or function shall be identical.
- E. All equipment and apparatus shall be the manufacturer's latest proven design, neither presently scheduled for obsolescence nor developmental prototype.
- F. All electrical apparatus and lighting equipment shall be in compliance with the Federal Energy Policy Act of 1992, including all subsequent updates, revisions, and replacements.

2.02 RACEWAYS

- A. Metallic Conduit (Aluminum): All conduit shall be heavy wall rigid aluminum of standard pipe weight unless noted otherwise.
 - 1. Couplings, conduit unions, conduit fittings, etc., shall be aluminum, shall have conventional trade dimensions, and shall be internally threaded with a tapered thread at each end to fit the tapered thread specified for the corresponding size conduit. Conduit outlet body covers shall be cast construction.
 - 2. All conduits, couplings, and fittings run exposed to corrosive atmospheres, and all conduit elbows and risers within concrete encasement shall have a gray or black factory-applied PVC coating, or field applied heat shrink jacket, of not less than 20 mils thickness. Damaged PVC coatings shall be repaired with an approved compound. Conduit supports, channels, and mounting apparatus shall be type 316 stainless steel.
 - 3. Conduit concealed in areas above the ground floor slab of office buildings, office areas of other buildings, or other approved locations, shall be threadless steel, electro-galvanized electrical metallic tubing (EMT). All EMT fittings shall be compression-type only.
- B. Flexible Conduit: All flexible conduit shall be Type LTA liquid-tight flexible aluminum conduit made with flexible aluminum core covered with an extruded PVC jacket, unless noted otherwise. Fittings shall be the type specifically designed for

SECTION 16000

ELECTRICAL WORK – GENERAL

flexible conduit use and shall form watertight connections. Flexible conduit fittings shall be aluminum construction.

1. Flexible conduit shall only be used for connections from conduits, junction boxes, or motor controllers to mechanical equipment or where the location of the connection is such that it is impractical to make a rigid conduit connection, where vibration isolation is required, or where specifically called for on the drawings. Flexible conduit shall be used for connection to all motors.
 2. Flexible conduit for use in hazardous areas shall be Crouse-Hinds EC Series, Appleton EX Series, or equal.
 3. Flexible conduit for use in concealed locations in dry areas of office buildings, office areas of other buildings, or other approved areas, shall be flexible zinc-coated steel conduit.
- C. Non-Metallic Conduit: Non-metallic conduit, couplings, and fittings shall be Schedule 40 PVC unless noted otherwise. All PVC conduit joints shall be solvent-welded in accordance with the manufacturer's recommendations.
1. Non-metallic conduit, couplings, and fittings subject to physical damage as required by NEC shall be Schedule 80 PVC.
 2. Underground conduits and conduit embedded within slabs on grade shall be non-metallic; however, conversion shall be made to rigid metallic conduit before conduit runs exit encasement. Conversion elbows, fittings and risers within the concrete encasement shall be PVC coated rigid metallic conduit.
 3. Underground conduits shall be installed not less than 24 inches below grade.
 4. Underground pull boxes shall be provided for all miscellaneous underground conduit runs over 200 feet long.
 5. A minimum 3-inch wide polyethylene warning tape, yellow for electrical and orange for telephone, with imprinted legend, shall be installed in the backfill above all underground conduits. Warning Tape shall be Allen Terra Tape, or equal and shall be guaranteed not to discolor. Unless indicated otherwise, the tape shall be 12 inches below the finished ground grade.

2.03 WIRES AND CABLE

- A. Low Voltage Cable: Low voltage wire and cable shall be 600 volt, single-conductor copper, rated 90 degrees C dry and 75 degrees C wet. Unless indicated otherwise, low voltage building wire shall have XHHW-2 insulation.
1. Low voltage multi-conductor power and control cable shall be 600 volt, Type XHHW copper conductors with an overall neoprene jacket, rated 90 degrees C dry and 75 degrees C wet and shall be suitable for cable tray installation.
- B. VFD Cable: VFD power cables shall be shielded, flexible motor supply cable for variable speed drives subject to non-linear power distortions. VFD cable shall be used to interconnect AC variable frequency drives or control systems, to compatible AC motors. VFD cables shall be 1000V rated UL flexible motor supply cable, 3 stranded tinned copper circuit conductors with XLPE insulation, 1 stranded tinned copper ground wire with PVC insulation, overall combination tinned copper braid and foil shield, and black PVC jacket; Belden VFD cable, or equal.

SECTION 16000

ELECTRICAL WORK – GENERAL

1. VFD cables are subject to a harsh operating environment characterized by high voltage spikes, high noise levels and adverse environmental conditions. VFD cables shall be specifically designed to overcome the shortcomings of single conductor lead wire installed in conduit, unshielded tray cables, or continuously welded armored cable typically used for this application.
- C. Instrumentation Cable: Instrumentation cable shall be single twisted pair, 600 volt, stranded, tinned copper conductors with cross-linked polyethylene primary insulation, overall foil shield with tinned copper braid, and chlorinated polyethylene jacket; Belden 3072F.
- D. Inner Panel Wiring: Wiring for instrumentation and control panels shall be single conductor, 600 volt, 125 °C rated UL Type AWM stranded tinned copper conductors with cross-linked polyethylene insulation, Belden 356 series.
- E. Fiber Optic Cable: Unless otherwise indicated or required to meet the specific installation requirements, fiber optic cables shall be UL listed, OFNR-rated, UV, water and fungus resistant, all dielectric, tight buffered construction, consisting of tight buffered, single-mode (OS2) optical fibers with central strength member, aramid yarn strength member, ripcord, and PVC outer jacket.
1. Optical fibers shall be TIA-598 color-coded 9 micron TBII buffered single-mode (OS2) fibers. Fiber optic cables shall be Corning FREEDM One Tight-Buffered, Indoor-Outdoor Riser Cable, Single-Mode (OS2).
 2. Unless otherwise indicated, fiber optic cable connectors shall be Corning Unicam High-Performance Type LC connectors, Single-Mode (OS2).
 3. Fiber optic cable patch panels shall be provided within each network rack, instrumentation control panel, PLC panel, etc. That has a fiber optic cable connection.
 4. Rack mounted fiber optic cable patch panels shall be Corning Closet Connector Housing (CCH), with minimum 24 type LC single mode (OS2) port adapters.
 5. Instrumentation and control panel mounted fiber optic cable patch panels shall be Corning Wall-mountable Interconnect Center panels (WIC) with minimum 24 type LC single mode (OS2) port adapters.
 6. Fiber optic cable patch panels for space limited control panels with end of the line single fiber optic cable terminations shall be Corning Single-Panel Housing (SPH) with minimum 6 type LC single mode (OS2) port adapters.
 7. Each fiber of each fiber optic cable shall be terminated within a fiber optic patch panel.
 8. All fiber optic cable patch panels and all required patch cables shall be provided by the associated control panel equipment supplier.
 9. All fiber optic cable installation, connectors, terminations, and testing shall be provided by the fiber optic cable supplier.
 10. All fiber optic cable terminations and testing shall be performed by a Certified Fiber Optic Technician. Prior to installation, documentation of Fiber Optic Association certification shall be submitted for approval. Following installation, fiber optic test reports for each fiber shall be submitted for approval.

SECTION 16000

ELECTRICAL WORK – GENERAL

2.04 TERMINAL BLOCKS AND WIRE MARKING

- A. Terminal blocks for power conductors shall be 600 volt, three pole unit construction type with high pressure solderless connectors, headless socket screws, and ampere rating equal to or greater than the ampacity of the maximum conductor size to be terminated; Square D Type LBC, or equal.
- B. Terminal blocks for control and instrumentation conductors shall be 600 volt, sectional rail mounted terminal blocks with plastic pre-printed terminal numbering markers on both the inside and outside tracks, and provisions for center terminal bridge jumper cross connections with no loss of space on terminal or rail; Siemens 8WA1 011-1DF11, or equal. Terminal blocks for general control connections shall be feed-through terminal blocks; terminal blocks for instrumentation signal circuits shall be knife type test/disconnect terminal blocks; and terminal blocks for cable shield termination and grounding shall be ground blocks.
- C. Cable and conductor markers shall be heat shrinkable sleeve markers with permanent legible machine printed markings.

2.05 BOXES

- A. General: Boxes shall be installed at all locations necessary to facilitate proper installation and equipment connection, including each conduit/cable transition.
 - 1. Minimum dimensions of boxes shall not be less than NEC requirements and shall be increased if necessary for practical reasons or where required to suit job condition.
 - 2. Boxes shall have only the holes necessary to accommodate the conduits at point of installation. All boxes shall have lugs or ears to secure covers.
 - 3. All boxes shall be rigidly secured in position. All boxes, except on unfinished ceilings and walls, and where conduit is run exposed, shall be so set that the front edge of box shall be flush with or recessed not more than 1/4-inch behind the finished wall or ceiling line.
- B. Outlet Boxes: The location of outlets as shown on the drawings will be considered as approximate only. It shall be the work of this section to study all plans with relation to spaces surrounding each outlet in order that the work may fit and that when fixtures or other fittings are installed they shall be symmetrically located to best suit each condition. All outlets shall be coordinated with the work of other sections of these specifications to prevent outlets or fixtures from being covered by pipe, duct, etc.
 - 1. Where conduit is concealed, outlet boxes shall be steel, 1 piece standard gang boxes.
 - a. Wiring device boxes shall be minimum 4 inches x 4 inches x 1-1/2 inches deep with covers of proper size and configuration.
 - b. Ceiling fixture boxes shall be minimum 4-inch octagonal by 1-1/2 inches deep and shall be equipped with fixture studs.
 - c. Wall fixture boxes shall be minimum 4-inch octagonal by 2-1/8 inches deep.

SECTION 16000

ELECTRICAL WORK – GENERAL

2. Where conduit is exposed, outlet boxes shall be cast aluminum one piece hub type standard gang boxes with rubber gaskets.
 - a. Wiring device boxes shall be equipped with cast screw-type covers; Crouse-Hinds Series FS or equal.
 - b. Fixture boxes shall be of sufficient diameter to provide a seat for the fixture canopy; Crouse-Hinds Series GRF or equal.
 3. Unless indicated otherwise, receptacle boxes shall be centered 1 foot 6 inches; wall switch boxes shall be centered 4 feet; and wall fixture boxes shall be centered 7 feet 6 inches above finished floor.
 - a. Where shown at door locations, wall switch boxes shall be installed on lock side of door.
 - b. Where shown on columns or over doors, wall fixture boxes shall be installed symmetrically.
- C. Pull Boxes: Pull boxes, including junction boxes and terminal boxes, shall be installed at all necessary points, whether indicated or not, to prevent injury to the insulation or other damage that might result from pulling resistance or other reasons during installation.
1. Unless indicated otherwise, pull boxes shall be NEMA 12 construction with gasketed screw covers and gray baked enamel over a rust-inhibiting primer finish. Pull boxes installed outdoors or in corrosive atmospheres shall be NEMA 4X aluminum or 316 stainless.
 2. Pull boxes in excess of 36 inches x 36 inches x 12 inches shall be fabricated from code gauge aluminum or 316 stainless steel, suitably reinforced to provide a rigid, self-supporting construction. Each large pull box shall be equipped with a gasketed hinged cover fastened with screws on three sides. Dimension and installation details, for each large pull box, shall be approved prior to fabrication.
 3. Pull boxes in hazardous areas shall be explosion proof, cast aluminum construction with hinged, threaded, screw-on covers. Explosion proof pull boxes shall be equipped with threaded conduit openings as required for the initial installation, all identified future connections, and a minimum of one spare conduit opening sized to match the largest otherwise required conduit opening.
 4. Branch circuit pull boxes shall be appropriate outlet boxes with blank covers.
- D. Wireways: Wireways, as indicated on the drawings or approved for installation, shall be NEMA 12 construction with gasketed screw covers and gray baked enamel over a rust-inhibiting primer finish. Wireways installed outdoors on in corrosive atmospheres shall be NEMA 4X type 316 stainless steel.
1. Wireways shall be furnished and installed with required conduit knockouts only.
- E. Underground Pull Boxes: Underground pull boxes shall be minimum 30-inch x 17-inch x 18-inch deep composolite service boxes constructed of reinforced polymer concrete suitable for light traffic loading, with locking cover and molded logo; Quazite Composolite, or equal.

SECTION 16000

ELECTRICAL WORK – GENERAL

1. Unless otherwise indicated underground pull boxes shall have solid bottoms. Where open bottom pull boxes are indicated or approved for installation, a bed of gravel, minimum 12" thick and exceeding the pull box footprint by 6" on all sides, shall be placed beneath each open bottom pull box.
- F. Floor Boxes: Floor boxes shall be cast iron, watertight, fully-adjustable, under-floor type with appropriate round, flush, aluminum, screw-type covers.

2.06 WIRING DEVICES

- A. Wall Switches: Wall switches shall be specification grade, totally-enclosed, toggle switches rated 20 ampere, 120/277 volt. Switches shall be single pole, double-pole, 3-way, or 4-way as indicated; GE-5951 through 5954, Hubbell 1221 through 1224, Leviton 1221 through 1224, or equal.
 1. Wall switches shall be furnished with suitable plates. The material, colors, and finishes of switch plates shall be as directed to harmonize with the surroundings. In general, standard switches shall be brown with Sierra S-1N, Hubbell S-1N, or equal, 302 stainless steel plates.
 2. Unless specified otherwise, wall switches installed outdoors or in corrosive atmospheres shall be weatherproof and vapor-tight. Weatherproof and vapor-tight switches shall consist of standard wall switches as previously specified, enclosed in Series FS condulets equipped with vapor-tight gasketed covers; Crouse-Hinds Series DS128, Appleton Series FSK-1VTS, or equal.
 3. Switches requiring pilot lights shall be similar in quality and construction to the standard switches previously specified with neon pilot light in lexan handle; Hubbell 1221-PL, GE-SP121-8G, or equal.
 4. Switches located in hazardous areas shall be front-operated, explosion-proof, tumbler switch condulets; Crouse-Hinds Series EFS, Appleton EFS, or equal.
 5. Unless indicated otherwise, time switches shall be main spring-operated, 0-60-minute cycle with hold feature, rated 20 ampere 120 volt; Mark-Time 90,000 Series or equal.
- B. Receptacles: Receptacles shall be specification grade, grounding type, totally-enclosed, duplex receptacles rated 20 ampere, 125 volt; GE 8300-9, Hubbell 5362-GRY, Leviton 5362-GY, or equal.
 1. Each receptacle shall be provided with a single gang plate for flush mounting. The materials, colors, and finishes of the plates shall be as directed to harmonize with the surroundings. In general, receptacles shall be gray with Hubbell S-8N, Sierra S-8N, or equal, 302 stainless steel plates.
 2. Unless specified otherwise, receptacles installed outdoors or in corrosive atmospheres shall be weatherproof. Weatherproof receptacles shall each consist of standard duplex receptacles as previously specified, enclosed in Series FS conduit equipped with a weatherproof cover; Crouse-Hinds WLRD or equal. Outdoor receptacles installed on circuits without ground fault protection shall be type GFCI.
 3. Explosion-proof receptacles shall each consist of a 20 ampere, 125 volt, 2-pole, 3-wire receptacle enclosed in Series FS conduit equipped with an angle cover with third pole grounded to body; Appleton U-Line, Crouse-Hinds

SECTION 16000

ELECTRICAL WORK – GENERAL

- ENR, or equal. Explosion-proof plugs shall insert, twist, and lock to activate and shall also fit standard receptacles.
4. Special purpose outlets shall be black melamine locking receptacles with voltage, phase, and current ratings in accordance with the connected service and intended duty. Special purpose outlets shall be grounding type with permanent rating identification following installation; GE NEMA-Line, Hubbell Twist-Lock, Leviton Spec-Master, or equal, equipped with plates, boxes, etc., as indicated for standard receptacles.
 5. The ELECTRICAL CONTRACTOR shall connect the grounding terminal in each receptacle to the inside of the metal enclosure.

2.07 MOTOR STARTERS

- A. Manual Motor Starters: Manual motor starters shall be 600 volt, toggle-type suitable for installation within standard outlet boxes. Enclosures for all starters not installed in outlet boxes, and all starters located outdoors, shall be NEMA 4X type 316 stainless steel.
 1. Where required, starters shall be equipped with overload protection on each pole.
 2. Starters located in hazardous areas shall be front-operated explosion-proof, manual motor starting switch condulets; Crouse-Hinds Series EDS, Appleton EDS, or equal.
 3. Each starter for automatic control shall be equipped with an H-O-A selector switch.
- B. Magnetic Motor Starters: Unless indicated or required otherwise, each motor starter shall be of the combination type complete with molded case motor circuit protector; full-voltage magnetic starter; manual resetting, 3-pole, bimetallic thermal overload relay; individual 120 volt control power transformer; door-mounted pilot control devices; and required accessory control components.
 1. Starter enclosures shall be NEMA 12 construction with oil-resistant gasketing and full-size single door. Starter enclosures located outdoors or in corrosive atmospheres shall be NEMA 4X type 316 stainless steel with oil-resistant gasketing and door-in-door construction.
 2. Motor starters for submersible motors shall be equipped with ambient-compensated, bi-metallic, quick-trip type overloads.
 3. Unless indicated otherwise, motor starters for all motors 25 hp and above shall be of the solid state reduced voltage type.

2.08 DISCONNECT SWITCHES

- A. Disconnect switches shall be 600 volt rated heavy-duty safety switches with full cover interlocks and quick-make, quick-break mechanisms. Switches shall be fused or non-fused, of capacities noted; General Electric Type TH or equal.
 1. Unless indicated otherwise, switches shall have NEMA 12 enclosures with gray baked enamel over a rust-inhibiting primer finish. Switches located outdoors or in corrosive atmospheres shall have NEMA 4X type 316 stainless steel enclosures.

SECTION 16000

ELECTRICAL WORK – GENERAL

2.09 CIRCUIT BREAKERS

- A. Circuit breakers shall be 600 volt thermal magnetic, quick-make, quick-break molded case air circuit breakers, with trip-free operation, incorporating an internal trip bar and a single external handle. Breaker ratings shall be coordinated with the installed service and loads supplied. Circuit breaker current interrupting rating shall exceed the available short circuit current. Unless indicated otherwise, breakers shall be rated not less than 35,000 amperes RMS symmetrical.
 - 1. Unless indicated otherwise, circuit breakers shall have NEMA 12 enclosures with gray baked enamel over a rust-inhibiting primer finish. Breakers located outdoors or in corrosive atmospheres shall have NEMA 4X type 316 stainless steel enclosures.
 - 2. Circuit breakers used as a service disconnecting device shall be 100% rated and UL service entrance rated; shall be equipped with long time, short-time, instantaneous and ground fault adjustments for system selectivity; and shall be fully rated for the maximum fault current, without the use of current limiters.

2.10 ELECTRICAL HEAT TRACE

- A. Electrical heat trace systems shall be self-regulating type which shall automatically regulate output in response to temperature.
- B. Unless indicated otherwise, heating elements shall be 8 watt/foot, 120/1/60 with 16 AWG copper bus conductors, self-regulating conductive core, thermoplastic inner jacket, tinned copper shield and thermoplastic outer jacket. Heating elements shall be suitable for corrosive and hazardous atmospheres.
- C. Each independent section of each heat trace system shall be equipped with a power connection kit and line-sensing thermostat. Thermostats shall be NEMA 4 die cast aluminum with tamper-proof cover and SPDT contacts rated minimum 20 amps. Thermostats for hazardous atmospheres shall be explosion-proof.
- D. Each heat trace system shall be equipped with all necessary accessories for proper installation and operation. Unless noted otherwise, heat trace systems shall be designed to maintain a minimum of 40 degrees F in a 10 degrees F ambient.

2.11 SUPPORT SYSTEMS

- A. Groups of two or more conduits, and all boxes and equipment, shall be mounted on a system of minimum 1-5/8-inch x 1-5/8-inch heavy wall aluminum or 316 stainless steel channel with a minimum of 25% unused capacity.
- B. Overhead conduits shall be supported on trapeze hangers from approved concrete inserts and shall be grouped with pipes wherever possible.
- C. Support system hardware, including hanger rods, shall be aluminum or stainless steel.

SECTION 16000

ELECTRICAL WORK – GENERAL

2.12 LIGHTING FIXTURES

- A. Lighting fixtures shall be of specification grade and listed or labeled by Underwriters Laboratories (UL) or an approved Nationally Recognized Testing Laboratory (NRTL).
- B. LED fixtures shall comply with the following:
 - 1. UL Standard 8750 “Light Emitting Diode Equipment for Use in Lighting Products”
 - 2. IES Standard LM-79 “Electrical and Photometric Measurements of Solid-State Lighting Products”
 - 3. IES Standard LM-80 “Measuring Lumen Maintenance of LED Light Sources”
 - 4. IES Standard TM-21 “Projecting Long Term Lumen Maintenance of LED Light Sources”.
 - 5. ANSI C78.377 “Specifications for the Chromaticity of Solid State Lighting Products” with LEDs binned within a maximum three-step MacAdam Ellipse to ensure color consistency amongst luminaries of the same type.
- C. For LED fixtures, lamps, drivers, and components, provide a complete warranty for parts and labor for a minimum of five years from the date of Substantial Completion.
- D. Provide only LED fixtures with a Design Lights Consortium (DLC) listing, a U.S. Department of Energy (DOE) “LED Lighting Facts” label, or a U.S. Environmental Protection Agency (EPA) ENERGY STAR label, which have demonstrated third-party testing verification.
- E. Recessed lighting fixtures shall be thermally protected.
- F. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be replaceable from the room side.
- G. Dimmable LED fixtures shall have either a 0-10 volt, 3-wire dimming driver, or a two-step (50%-100%) line voltage, two switch controlled dimming driver, as shown on the drawings.
- H. Unless otherwise indicated, LED lamps shall have a color temperature of 3500 degrees K, a CRI of 80 minimum, and a lumen maintenance L70 rating of 50,000 hours minimum.
- I. LED drivers shall be electronic-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 “Electronic Drivers for LED Devices, Arrays, or Systems”. LED drivers shall have a sound rating of “A”, have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.

SECTION 16000

ELECTRICAL WORK – GENERAL

- J. Dimmable LED drivers shall be 0-10V type. Dimmable LED drivers shall be capable of dimming without LED strobing or flicker across their full dimming range.
- K. Battery-backed LED emergency lighting fixtures shall consist of a normal LED fixture with some or all of the LEDs connected to a battery and charger. The battery shall be nickel cadmium and sized for a minimum of 90 minutes of fixture operation. The charger shall be solid-state and provide overload, short circuit, brownout and low battery voltage protection. The battery and charger shall include self-diagnostic and self-exercising circuitry to exercise and test itself for 5 minutes every month and for 30 minutes every 6 months. The fixture shall include a test/monitor module with LED status indicating lights mounted so as to be visible to the public. The fixture shall not contain an audible alarm.

PART 3 - EXECUTION

3.01 CODES, PERMITS, AND INSPECTIONS

- A. The installations shall be in accordance with the regulations of the latest editions of the National Electrical Code, National Electrical Safety Code, applicable city, state, and local codes and regulations and other applicable codes, including utility company codes.
- B. All permits required by state or local ordinances shall be obtained and after completion of the work, a certificate of final inspection and approval from the electrical inspector shall be furnished to the OWNER. All permits for installation, inspections, connections, etc., shall be taken out and paid for as part of the work under this section.

3.02 CONDUIT INSTALLATION

- A. Conduit Installation: All conduits shall be run in such a manner as to cause the least interference with other trades. Conduits shall be joined by means of couplings or 3-piece coupling type conduit unions. Joints shall be set up tight. Runs shall be straight and true; elbows, offsets, and bends shall be uniform and symmetrical. Installation workmanship shall be of the best quality and skill.
- B. Conduits shall be of sizes required to accommodate the number of conductors in accordance with the tables given in the current edition of National Electrical Code or as noted on the drawings. The minimum size of conduit shall be 3/4-inch.
- C. Conduit runs shall terminate below the particular section of the motor control center or equipment to which their respective circuits run. Concealed conduits shall be run in as direct a line as possible. Exposed conduits shall be run parallel to or at right angles with the lines of the building. All bends shall be made with standard conduit elbows, conduit bent to not less than the same radius, or malleable iron conduit outlet bodies with gasketed cast iron covers. Adjacent conduit runs shall be installed with concentric bends. All bends shall be free from dents or flattenings. Not more than the equivalent of four quarter bends shall be used in any one run between

SECTION 16000

ELECTRICAL WORK – GENERAL

terminals at cabinets, outlets, and junction or pull boxes. Boxes shall be located in accessible locations.

- D. Conduit shall be continuous from outlet to outlet and from outlets to cabinets, junctions, or pull boxes and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from point of service to all outlets. Insulated grounding bushings shall be used on all metallic conduit. Terminals of all conduits shall be plugged with an approved cap to prevent the entrance of foreign materials when exposed during construction.
- E. As far as practicable, all exposed conduits shall be run without traps. Where dips are unavoidable, a pull box or approved conduit outlet body shall be placed at each low point. Conduit systems shall be completed before conductors are drawn in. Where conduits must be run exposed, except as indicated in the drawings, locations of the runs shall be subject to approval.
- F. Where exposed conduit needs clamping to the structures, clamps shall consist of galvanized malleable iron 1-hole pipe straps and pipe spacers, galvanized steel bolts of appropriate size to fill the holes in the straps and spacers, and approved expansion shields. Clamps used with aluminum conduit, and clamps located outdoors or in “corrosive atmospheres”, shall be PVC coated, aluminum or type 316 stainless steel. Clamps shall be bolted to the structure or where necessary to intermediate galvanized steel brackets. Spacing between conduit supports shall not exceed the recommendations published by the National Electrical Code. No deformed, split, or otherwise defective conduit or fitting shall be installed. Conduit shall be installed with a minimum number of joints.
- G. Where conduit has been cut in the field, it shall be cut square using a hand or power hacksaw or approved pipe cutter using cutting knives. The use of pipe cutters with cutter wheels will not be permitted. The cut ends of the field-cut conduit shall be reamed to remove burrs and sharp edges. Where threads have to be cut on conduit, the threads shall have the same effective length and shall have the same thread dimensions and taper as specified for factory-cut threads on conduit. Conduits installed in the work with threads not complying with these requirements shall be removed and replaced.
- H. Where conduit installed in concrete or masonry extends across building joints, expansion joints with approved type grounding straps and clamps shall be installed. Expansion joints shall be Type XJ as manufactured by Crouse-Hinds, Appleton, or equal. Where conduit enters a building through the concrete foundation, below final grade, approved type FSK entrance seals shall be used.
- I. All conduit shall be cleaned, prior to pulling in wire and cable, by pulling a stiff wire brush of the size of the conduit through it. This cleaning shall remove all foreign matter, including water, from the conduit. All boxes in which the conduit terminates shall be cleaned of all concrete, mortar, or other foreign matter and all threads in boxes shall be left clean and true upon completion of the work.

SECTION 16000

ELECTRICAL WORK – GENERAL

- J. All spare, future, or empty conduits shall be equipped with a pull wire prior to capping.

3.03 WIRE AND CABLE INSTALLATION

- A. The installation of wires and cables includes all splicing of these wires and cables to each other and connecting them to receptacles, switches, control boxes, lighting fixtures, motors, and all other electrical apparatus installed under this Contract. All cable installation methods shall correspond to manufacturer's recommendations.
- B. Wire and cable shall be suitably protected from weather or damage during storage and handling and it shall be first-class condition when installed.
- C. The minimum size of wire or cable conductor shall be No. 12, unless indicated otherwise on the drawings. Wire sizes No. 8 and larger, and all wire sizes utilized for control or instrumentation, shall be stranded. All sizes called for in the specifications or shown on the drawings are American Wire Gauge sizes.
 - 1. No wire smaller than No. 12 shall be used for any branch circuit unless noted otherwise on the drawings. Larger sizes shall be used where required or indicated on the drawings. If the single distance from the panelboard to the first device exceeds 50 feet, the minimum size for this run shall be No. 10 AWG with the minimum between devices as No. 12 AWG.
- D. All sizes of wire and cable furnished and installed under these specifications shall be color-coded with a separate color for each phase and neutral used consistently throughout. Each conductor shall have factory color-coded insulation. As an alternative, wire sizes No.8 and larger shall have black insulation and shall be color-coded with waterproof phasing tape at each termination, junction box, pull box, etc. All 277/480 volt wiring shall be color-coded yellow, brown, and orange for hot legs (Phase A, B, and C, respectively). All 120/208-240 volt wiring shall be color-coded black, blue, and red for hot legs (Phase A, B, and C, respectively). The grounded neutral conductor of each circuit shall be color-coded white. Grounding conductors shall be color-coded green.
- E. All wires and cables shall, as far as practicable in the judgment of the ENGINEER, be continuous from origin to destination without running splices in intermediate pull boxes, junction boxes, or wireways. At the ends of these wires and cables, only sufficient slack shall be left as may be required for making proper connections. There shall be no unnecessary slack.
- F. In connecting wires and cables to apparatus, various methods shall be used depending upon the local conditions as detailed on the drawings. In general, solderless pressure connectors shall be used for terminals, taps, and splices for all wires and cables. Solderless pressure connectors or vinyl-covered steel spring-type connectors shall be securely fastened and shall not loosen under vibration or normal strain. All connections shall be in accordance with manufacturer's recommendations and shall be with connectors approved for the particular connection conditions.

SECTION 16000

ELECTRICAL WORK – GENERAL

- G. Where wires and cables are connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the mechanical connector. The lacquer coating of the conduits shall be removed where a ground clamp is to be installed.
- H. All soldered joints shall be made mechanically strong before soldering and shall be carefully soldered without the use of acid and shall be taped with insulating tape to a thickness equal to that of the insulation.
- I. The installation of wires and cables shall include the furnishing and installing of all hangers, racks, cable cleats, and supports that may be necessary to make a neat and substantial wiring installation in all pull boxes, wireways, cable channels, and in such other locations as may be required. Plastic ties shall be used to hold the wires and cables together and to the racks or supports.
- J. Each junction box, terminal box, control cabinet, or other terminal location containing a total of 4 or more conductor terminations or splices, shall be equipped with 1 or more terminal boards, as required, for connecting each wire including the spare wires. Each wire terminal shall be permanently marked throughout the entire system using, wherever possible, the notation of the wires given on the manufacturer's wiring diagrams. Sufficient terminal blocks shall be provided to terminate all wires routed to the enclosure including all spare conductors. In addition, the greater of 20 percent or four unused spare terminals shall be provided. All connections for future functions shall be wired to numbered terminal blocks, grouped separate from the terminal blocks in use. Terminal blocks shall be grouped to isolate power conductors from control conductors and to separate AC circuits from DC circuits.
- K. Each control, instrumentation, and power cable and conductor shall be marked with the proper feeder symbol or termination number in each manhole, handhole, pull box, wireway, terminal cabinet, panelboard, switchboard and all additional locations required to provide positive identification. Each conductor shall be marked at each point of termination following final installation.
- L. The electrical installation shall maintain suitable isolation between power, control and instrumentation conductors. Approved isolation barriers shall be provided within each pull box, terminal box, wireway, cable tray, handhole, manhole, etc.

3.04 TESTING

- A. Upon completion, the ELECTRICAL CONTRACTOR shall provide all necessary instruments and special apparatus to thoroughly test the complete installation and shall conduct all tests that may be required to insure system is free of all improper grounds and short circuits, and that all the feeders are properly balanced. All electrical equipment shall be tested to determine proper polarity, phasing, relay settings, and operation. System shall be checked for quality and completeness in accordance with the provisions of the General Conditions. Any objectionable noise, heating, voltage drop, or excessive current draw, after in operation, shall be identified and corrected.

SECTION 16000

ELECTRICAL WORK – GENERAL

- B. Prior to energization, the electrical system ground resistance shall be tested. Additionally, the insulation resistance of all electrical gear, power feeders, and electric motors shall be measured. Upon completion of all corrective measures required, certified acceptance reports, including tabulations of all initial and final resistance measurements, shall be submitted for approval in accordance with the provisions of the General Conditions.
- C. Each motor starter overload element, and each motor circuit protector, shall be selected and adjusted to coordinate with the nameplate full-load current and service factor of the actual motors installed. Improper units shall be replaced. Upon completion of all corrective measures required, certified compliance reports, including tabulation of the actual full load current and voltage measurements for each phase of each motor, together with the nameplate current rating, overload element rating, and motor circuit protector setting, shall be submitted for approval in accordance with the provisions of the General Conditions.
- D. System testing shall include complete circuit breaker tests for each power circuit breaker and complete thermal surveys of all new and existing electrical apparatus. Upon completion of all corrective measures required, certified acceptance reports, including satisfactory infrared photographs, shall be submitted for approval.

3.05 SPARE PARTS

- A. The ELECTRICAL CONTRACTOR shall furnish, upon completion of the project, one year's supply of all consumable parts utilized within the electrical system.
- B. Spare parts shall include pilot lights (minimum 12 of each part number), fuses (minimum 12 of each part number below 100 amps and 6 of each part number 100 amps and above).
- C. A spare lamp supply consisting of a minimum of 24 of each size incandescent, 12 of each size fluorescent, and 6 of each size H.I.D. lamp utilized shall be provided.
- D. One year supply of 24 hour charts shall be provided for each chart recorder with six extra cartridge pens for each pen.

3.06 GUARANTEES

- A. All materials and workmanship shall be guaranteed to be free from defects. Any part of the system considered defective by the ENGINEER within the guarantee period shall be immediately replaced or corrected to the ENGINEER's satisfaction without further expense to the OWNER.
- B. Upon final completion, the ELECTRICAL CONTRACTOR shall furnish certification from each equipment manufacturer that all equipment has been installed in accordance with the requirements of these specifications, is ready for permanent operation, and that nothing in the installation shall render the warranty null and void.

SECTION 16000
ELECTRICAL WORK – GENERAL

END OF SECTION 16000

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide both a preliminary and a final short circuit, device evaluation, protective device coordination, and arc flash study of the complete electrical distribution system as specified herein and as shown on the Drawings. The study shall include motor starting/running calculations.
- B. Provide both a preliminary and final harmonic study of the complete electrical distribution system as specified herein and as shown on the drawings.
- C. Obtain and pay for the services of an independent engineering specialty firm, subject to the approval of the ENGINEER, to provide a complete fault current, device evaluation, protective devices selective coordination, arc flash study, harmonic study and motor starting study. The selective coordination study shall begin with the utility company's feeder protective device and include all of the electrical protective devices down to and including the largest feeder circuit breaker and motor starter in the low voltage motor control centers and power distribution panelboards. The study shall also include variable frequency drives, harmonic filters, Uninterruptible Power Supplies (UPS), power factor correction equipment, transformers and protective devices associated with emergency and standby generators, and the associated paralleling equipment and distribution switchgear. The arc flash study shall begin with the utility company's feeder protective device and include all of the electrical distribution equipment down to and including low voltage motor control centers and power distribution panelboards and lighting panels. All information required to perform the study shall be obtained by the entity performing the study.
- D. Submit the preliminary short circuit, protective device coordination and motor starting/running study prior to submittal of medium voltage switchgear, the 480-Volt switchgear, and motor control centers shop drawings. The aforementioned shop drawings will not be reviewed until the preliminary power system study is approved by the ENGINEER. No exceptions will be allowed. The preliminary study shall include but not limited to:
 - 1. Short circuit, device evaluation, protective device coordination, arc flash study, harmonic study and motor starting studies shall be performed on SKM PowerTools ®. No exceptions permitted.
 - 2. Obtain and verify with the utility company all information needed to conduct the study. Obtain and verify with the OWNER ratings of existing electrical equipment that shall be included in the study.
 - 3. Current transformer ratio and burden calculations shall be based on a 10 percent maximum ratio error per ANSI C57.13. Identify current transformers that will not allow the protective devices to operate within acceptable ANSI error margins and recommend corrective action.
 - 4. The preliminary study shall verify equipment is being applied within their design ratings and electrical protective devices will coordinate.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

5. Recommend changes and/or additions to equipment as required providing adequate protection and coordination based on the actual equipment supplied and the results of the short circuit and protective device selective coordination studies. Submit any such changes and additions as a part of the study. Field settings of devices, adjustments, and minor modifications to equipment that are required to accomplish conformance with the approved short circuit and protective device selective coordination studies shall be carried out by the ELECTRICAL CONTRACTOR at no additional cost to the OWNER.
- E. After release of electrical equipment by the manufacturer, but prior to energizing the electrical equipment, submit the final short circuit and selective coordination study including all calculations, tabulations, protective devices coordination graphs, etc. as specified herein.
1. Provide a complete short circuit study and protective device selective coordination study for both the utility power distribution system and the emergency/standby power distribution system under the scope of this study. The study shall include but shall not be limited to:
 - a. Full compliance with applicable ANSI and IEEE Standards.
 - b. Performed on SKM PowerTools[®] No exceptions permitted.
 2. Provide a report summarizing the selective coordination and motor starting/running study including: one-line diagram of the system, relay and breaker setting tabulation, coordination curves, relay curves, circuit breaker curves, motor starting/running curves, protective device coordination and short circuit calculation, all prepared by the specialty firm.
 3. Recommend changes and/or additions to equipment as required providing adequate protection and coordination based on the actual equipment supplied and the results of the short circuit and protective device selective coordination studies. Submit any such changes and additions as a part of the study. Field settings of devices, adjustments and minor modifications to equipment that are required to accomplish conformance with the approved short circuit and protective device selective coordination studies shall be carried out by the ELECTRICAL CONTRACTOR at no additional cost to the OWNER.

1.02 SUBMITTALS

- A. Submit, the following:
1. The number of years the specialty firm has been in the business of performing power system studies.
 2. Identification of each of the three qualifying projects for each of the past three years including:
 - a. A brief description of each study.
 - b. Name of OWNER of installation on which study was performed with address, telephone number, and contact person.
 - c. Date of study.
 - d. Any other information indicating the firm's experiences and ability to perform the work and business status.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- B. Preliminary Short Circuit and Coordination Study Report shall include but not limited to:
1. The coordination study report shall be bound in a standard 8-1/2-in by 11-in size report.
 2. Electrical distribution system one-line diagram. One line diagrams shall be legible on printed paper and shall not exceed 11 x 17-in in size unless required to clearly illustrate the system and related data.
 3. Provide detailed "Input Data" report that identifies all input parameters associated with the equipment depicted on the system one line diagrams including but not limited to Utility data, conductor sizes and lengths, protective device sizes and rating, transformer sizes and ratings, motor types and sizes, etc.
 4. Provide current transformers' ratio and burden calculations to confirm that the current transformers will not saturate prior to operation of the protective relays and confirming the current transformers used with differential protection will not saturate under any fault condition.
 5. Tabulation of each protective device, its short circuit rating, the available fault current available at the device and an indication whether or not the device is adequately rated for the available fault current and voltage at which it is applied.
 6. Preliminary graphic time-current curves showing how the protective devices proposed by the equipment suppliers will coordinate as being applied. TCC's shall be produced and printed in color to assist the reviewing ENGINEER in the graphical analysis of the protective device coordination. Each device on a TCC shall be a different color and where devices are shown on multiple TCCs the color for the device shall be constant on each TCC that the devices are shown on.
- C. Final Short Circuit and Protective Device Coordination Study Report shall include but not limited to:
1. The coordination study report shall be bound in a standard 8-1/2-in by 11-in size report. The selection of all protective relays types, current transformers, fuse types and ratings shall be the responsibility of the manufacturer and shall be based on the preliminary coordination study, which shall be submitted prior to the equipment shop drawings in accordance with Section 01300. The complete study shall be approved by the ENGINEER before any equipment is shipped. The report shall include the following sections and information:
 - a. An executive summary outlining the distribution system, the information received from the power company, assumptions made to complete the report, statement of the adequacy of the distribution equipment to safely clear any fault currents, the adequacy of the distribution equipment to close in on a fault, identify any problem areas with recommendations for resolving the problem.
 - b. Electrical distribution system one-line diagram. One line diagrams shall be legible on printed paper and shall not exceed 11 x 17-in in size unless required to clearly illustrate the system and related data.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- c. Provide detailed "Input Data" report that identifies all input parameters associated with the equipment depicted on the system one line diagrams including but not limited to Utility data, conductor sizes and lengths, protective device sizes and rating, transformer sizes and ratings, motor types and sizes, etc.
 - d. Provide current transformers' ratio and burden calculations to confirm that the current transformers will not saturate prior to operation of the protective relays and to confirm the current transformers used with differential protection will not saturate under any fault condition.
 - e. Transformer differential protection calculations including current transformer mismatch relay setting and charts. Provide differential current transformer wiring schematics including polarity and wiring connections based on the winding configuration of the actual power transformers being supplied.
 - f. Tabulation of all protective devices, circuit breakers, fuses, current transformers, etc. The tabulation shall indicate the device, manufacturer, catalog number, recommended setting, etc.
 - g. Industry standard graphic time current, protective relay and protective device curves, showing equipment and material damage curves, relay, circuit breaker, fuse curves, available fault currents at the equipment, transformer inrush currents, etc, for each piece of equipment. TCC's shall be produced and printed in color to assist the reviewing ENGINEER in the graphical analysis of the protective device coordination. Each device on a TCC shall be a different color and where devices are shown on multiple TCCs the color for the device shall be constant on each TCC that the devices are shown on.
 - h. Tabulation of each protective device, its short circuit rating the available fault current at the device and an indication whether or not the device is adequately rated for the available fault current and voltage at which it is applied.
 - i. Calculations and required documentation including copies of correspondence with involved entities such as utility fault contribution coordination.
- D. Preliminary Arc Flash Study shall be performed as detailed in the "Guidelines for Performing and Reporting Results of Arc Flash Studies" issued by SJCUD dated March 2013. It is the ELECTRICAL CONTRACTOR's responsibility for obtaining this guideline from the OWNER and complying with the requirement therein. The arc flash study report shall include but not be limited to:
- 1. The report shall be structured as indicated in the guidelines and in the "Sample Report" appended to the guideline.
 - 2. The Arc Flash study report shall be bound in a standard 8-1/2-in by 11-in size report.
 - 3. An executive summary outlining the distribution system, the information received from the power company, assumptions made to complete the report and recommendations to reduce the arc flash values.
 - 4. Specific recommendations to reduce the arc flash incident energy levels in the plant. The recommendations shall not propose general and widely applied

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

arc flash mitigation measure such as arc resistant gear but shall detail specific equipment or setting adjustments of new or existing equipment that could be applied to the system and the mitigation that could be realized from such an application.

- E. The Final Arc Flash Study report shall be bound in a standard 8-1/2-in by 11-in size report. The report shall be structured as specified in the Guideline and shall include the following sections and information:
1. An executive summary outlining the distribution system, the information received from the power company, assumptions made to complete the report and recommendations to reduce the arc flash values.
 2. Provide a single detailed, customized bus label for each fault location. Each label shall include a listing of the protective device settings and incident energy at several different working distances. Sample label acceptable to SJCUD is included in the Guideline. Multiple labels depicting different hazard risk categories as a result of arc flash mitigation devices shall not be acceptable. Labels shall contain all information required by NFPA 70E for arc flash hazard and shock protection calculations.
 3. Where arc flash reduction maintenance settings are available and utilized on protective devices to reduce incident energy levels while operating at temporary set points the report shall include an additional table that provides the OWNER with detailed information resulting from the reduced arc flash hazard category. The table should include all of the information required by NFPA 70E on a standard arc flash label for both the normal operating protection settings and with the maintenance mode engaged on the device.
 4. Provide a customized NFPA 70 E work permit form for the client and specific installation.
 5. PPE Table – Provide a PPE table that defines the Personnel Protective Equipment classes and clothing descriptions identified in the reports and labels.
- F. Preliminary Harmonic Study Report shall include but not limited to:
1. The harmonic study report shall be bound in a standard 8-1/2-in by 11-in size report.
 2. Electrical distribution system one-line diagram.
 3. Provide the minimum available fault current available from the utility and show the calculations of plant load vs. available fault current to determine the appropriate THD threshold as defined in IEEE 519.
 4. Provide the harmonic parameters assumed for use in the study for the harmonic generating equipment, i.e., VFD units, UPS units, static inverters, Ozone units, etc.
- G. Final Harmonic Study Report shall include but not limited to:
1. The harmonic study report shall be bound in a standard 8-1/2-in by 11-in size report. The selection of the harmonic mitigation equipment shall be the responsibility of the manufacturer and shall be based on the preliminary harmonic study, which shall be submitted prior to the equipment shop drawings in accordance with Section 01300. The complete study shall be

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

approved by the ENGINEER before any equipment is shipped. The report shall include the following sections and information:

2. An executive summary outlining the distribution system, the information received from the power company, assumptions made to complete the report, document harmonic profile for all harmonic producing equipment.
3. Electrical distribution system one-line diagram.
4. Recommended parameters for harmonic mitigation equipment, if required. Recommendations shall detail the projected effects of the mitigation effects and shall prove them via a revised harmonic study.
5. Calculations and documentation indicated.

1.03 REFERENCED STANDARDS

- A. Institute of Electrical and Electronic Engineers, Inc. (IEEE):
 1. IEEE Std 141 - Recommended Practice for Electrical Power Distribution for Industrial Plants, Latest Edition
 2. IEEE Std 241 - Recommended Practice for Electrical Power Systems in Commercial Buildings, Latest Edition
 3. IEEE Std 242 - Recommended Practice for Protection and Coordination of Industrial and Commercial Systems, Latest Edition
 4. IEEE Std 399 - Recommended Practice for Industrial and Commercial Power System Analysis, Latest Edition
 5. IEEE Std. 519 - Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems, Latest Edition
 6. IEEE Std. 1584 - IEEE Guide for Arc Flash Hazard Calculations, Latest Edition
 7. NFPA 70E, Latest Edition
 8. IEEE Std. 242- IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, Latest Edition
- B. American National Standards Institute (ANSI):
 1. Standard C37.90, IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus
 2. Standard C37.91, IEEE Guide for Protective Relay Applications to Power Transformers
 3. Standard C37.95, IEEE Guide for Protective Relaying of Utility-Consumer Interconnections
 4. Standard C37.96, IEEE Guide for AC Motor Protection
 5. Standard C57.12.59, IEEE Guide for Dry-Type Transformer Through-Fault Current Duration
 6. Standard C57.13, IEEE Standard Requirements for Instrumentation Transformers
 7. Standard C57.109, IEEE Guide for Liquid-Immersed Transformer Through-Fault-Current Duration

1.04 QUALITY ASSURANCE

- A. Independent Engineering Specialty Firm's Experience

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- B. Specialty firm shall have been in the business of the type of work specified, for at least the past five years.
 - 1. The specialty firm shall have a minimum of three projects of equal or greater size, service, with the type of equipment specified for each of the past three years.
 - 2. Specialty firm shall be incorporated in the State of Florida and shall have a licensed professional ENGINEER as a full time employee, to supervise and seal the report.
- C. The specialty firm shall be an independent organization, which can function as an unbiased authority, professionally independent of the manufacturers, suppliers and installers of equipment or systems evaluated by the specialty firm.
- D. All electrical studies shall be stamped and signed by a professional electrical ENGINEER licensed in the State of Florida.

1.05 SHORT CIRCUIT STUDY AND DEVICE EVALUATION

- A. Perform a short circuit study in accordance with ANSI Standards C37.010 and C37.13 to check the adequacy and to verify the correct application of circuit protective devices and other system components within the construction package. The study shall address the case when the system is being powered from the utility source as well as from the on-site generating facilities, normal and alternate (bus tie closed) modes of operation. Minimum and maximum possible fault conditions shall be covered in the study. It shall be the responsibility of the ELECTRICAL CONTRACTOR performing the study to determine the operating parameters of the system and to derive the worst case fault conditions. Assumptions of plant operation shall not be allowed.
- B. Consider the fault contribution of all motors operating during the maximum demand condition of the motors.
- C. Calculate short-circuit momentary duties and interrupting duties on the basis of an assumed bolted 3 phase short circuit at each high and medium voltage switchgear bus and controller, low voltage switchgear bus, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboard and other significant locations throughout the systems. The short circuit tabulations shall include X/R ratios, asymmetry factors, KVA and symmetrical fault-current. Provide a ground fault current study for the same system areas. Include in tabulations fault impedance, X/R ratios, asymmetry factors, motor contribution, short circuit KVA, and symmetrical and asymmetrical fault-currents.
- D. The studies shall include representation of the site power system, the base quantities selected, impedance source data, calculation methods and tabulations, one-line diagrams, conclusions and recommendations.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- E. Provide the following:
1. The available fault current at each bus within the limits of the study shall be identified and listed.
 2. The momentary and interrupting rating of all elements of the distribution system shall be listed. The maximum available fault current available at each element shall be calculated
 3. Determine the adequacy of the electrical protective devices to withstand the maximum available fault at the terminals of the equipment. Provide an equipment list, the equipment rating (both momentary and withstand), the maximum available fault rating and the adequacy of the equipment to withstand the fault. The results shall be tabulated in the form of a PASS/FAIL device evaluation table Equipment that does not have adequate ratings shall be identified immediately and brought to the attention of the ENGINEER.
 4. The short circuit portion of the report shall include:
 - a. Executive summary describing the distribution system, the procedures used to develop the study, utility related information furnished by the utility company including the name and telephone number of the individual supplying the information, identify all assumptions made in the preparation of the study, identify any problem areas and provide a definitive statement concerning the adequacy of the distribution system to interrupt and withstand the maximum possible fault current.
 - b. Computer printout of the input data.
 - c. Computer printouts for the three phase and ground fault studies. Printouts shall indicate the fault current available at each major equipment, distribution bus within the high, medium and low voltage distribution systems.
 - d. Table listing all the electrical distribution and utilization equipment (including VFDs), the equipment interrupting and withstand ratings, the available fault current at the terminals of the equipment and the ability of the equipment to interrupt and/or withstand the fault.
 - e. The short circuit study shall be prepared using approved computer software and must include complete fault calculations as specified herein for each proposed and ultimate source combination. Source combinations may include present and future Power Company supply circuits, large motors, or generators.
- F. Automatic Load Transfer
1. Provide a detailed study demonstrating the interrupting capacity of automatic transfer bus ties and switches, as well as the fault withstand capabilities. The following shall be considered:
 - a. X/R ratio fault-current of circuit at point of transfer.
 - b. X/R ratio and fault-current rating of the transfer device.
 - c. Length of time fault may persist prior to protective device opening.
 - d. Magnetic stress withstand rating.
 - e. I²t withstand rating.
 - f. Transfer device maximum interrupting duty compared to load interrupting duty.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

1.06 PROTECTIVE DEVICE COORDINATION

- A. Provide a protective device time-current coordination study in accordance with ANSI/IEEE Std. 242, with coordination plots of protective devices plus tabulated data, including ratings and settings selected. In the study, balance shall be achieved between the competing objectives of protection and continuity of service for the system specified, taking into account the basic factors of sensitivity, selectivity and speed.
- B. Provide separate plots for each mode of operation: (1) "double-ended mode" (double-ended substation with bus tie open); (2) "singled ended mode" (single incoming utility feeder energized all switchgears single ended with bus ties closed); (3) "stand-by mode" (on-site generation solely providing power to the system); (4) "peak shaving modes" (a.) (double-ended substation with bus tie open with on-site generation paralleled) and (b) (single-ended with bus ties closed with on-site generation paralleled). Show maximum and minimum fault values in each case. Multiple power sources shown in one plot is not acceptable.
- C. Each primary protective device required for a delta-to-wye-connected transformer shall be selected so the characteristic or operating band is within the transformer parameters, which, where feasible, shall include a parameter equivalent to 58 percent of the ANSI C37.91 withstand curve to afford protection for secondary line-to-ground faults. Separate the low voltage power circuit breakers from each other and the associated primary protective device, by a 16 percent current margin for coordination and protection in the event of line-to-line faults. Separate the protective relays by a 0.3-second time margin for the maximum 3 phase fault conditions to assure proper selectivity. The protective device characteristics or operating bands shall be terminated to reflect the actual symmetrical and asymmetrical fault-currents sensed by the device. Provide the coordination plots for 3 phase and phase-to-ground faults on a system basis. Include at least all devices down to largest branch circuit and largest feeder circuit breaker in-each motor control center and/or power distribution panelboard. Include all adjustable setting ground fault protective devices.
- D. Select relay types (i.e., inverse, very inverse, extremely inverse, over current with or without voltage restraint, timers, etc.), current transformer ratings and types, fuse, residually or zero sequence connected ground faults protection, etc., that will allow the system to be protected to within the equipment fault ratings and provide the maximum possible coordination between the protective devices.
- E. Multifunction Solid State Relays
 1. Where multifunction solid state relays are already installed, it shall be the responsibility of the ELECTRICAL CONTRACTOR to obtain the current and complete list of software set points programmed into the device. These set points shall be evaluated for potential impacts on the protective device coordination.
 2. Where multifunction solid state relays are being installed, it shall be the responsibility of the ELECTRICAL CONTRACTOR to provide all set points

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

needed for the specified operation of the relay. These settings include but are not limited to:

- a. The complete pickup settings of all protective elements specified by the designer and shall not be limited to only the overcurrent pickup settings. Settings for protective elements such as reverse power, synchronization, frequency and voltage control, etc. shall be provided in full.
 - b. Differential pickup and zone settings necessary for the relay to operate as specified and designed and to protect the zone it is intended for. Zone of protection calculations and balance equations shall be completed entirely by the ELECTRICAL CONTRACTOR based on the equipment as furnished and designed.
 - c. The complete protective relay logic map and logic equations. The relay logic is responsible for translating the pickups of the protective elements into relay output events and device trips. All logic necessary to create the specified output of the relay based on the specified protective elements shall be furnished with the protective device coordination report.
 - d. Any and all miscellaneous settings necessary for the relay to communicate with the installation systems and the mirroring of data to other installation systems as specified or designed.
3. ELECTRICAL CONTRACTOR shall be responsible for the programming of relays prior to the field testing and start up requirements of this contract. The ELECTRICAL CONTRACTOR shall be responsible for all time needed to complete the relay settings in order to furnish a completely functional system as specified and required by the approved protection device settings.
- F. Arc Flash Mitigation and Reduction Modes
1. Where devices are furnished with alternative trip settings intended to mitigate arc flash hazards, the ELECTRICAL CONTRACTOR shall coordinate these alternative pickup settings and provide representation of their tripping characteristics via TCC's. The alternative pickup settings shall be coordinated with the associated load and shall be set to provide the fastest device response time while avoiding nuisance trips during normal plant operation.
- G. Generator Protective Devices
1. The study shall address all of the protective devices provided for generator protection.
 2. Protective relays requiring settings shall be included.
 3. The Electrical CONTRACTOR shall obtain all necessary generator information to perform this study.
- H. Motor Protection and Coordination
1. Provide a complete and independent set of current-time characteristic curves for all motors 50 Hp and above indicating coordination between the protective relays and the thermal and starting characteristics of the motor.
 2. The ELECTRICAL CONTRACTOR shall obtain from the motor supplier the necessary information to perform the study. Certified curves for "Safe Time

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

vs. Current at 100% Voltage" and "Accelerating Time vs. Current at 100% Voltage" are necessary and shall become part of the final report.

- I. Call discrepancies to the attention of the ENGINEER in the conclusions and recommendations of the report.
- J. The Time current Characteristic Curves shall include:
 1. The coordination plots shall graphically indicate the coordination proposed for the several systems centered on full-scale log forms. The coordination plots shall include complete titles, representative one-line diagrams and legends, associated upstream power system relays, fuse or system characteristics, significant motor starting characteristics, significant generator characteristics, complete parameters for power, and substation transformers, complete operating bands for low voltage circuit breaker trip devices, fuses, and the associated system load protective devices. The coordination plots shall define the types of protective devices selected, together with the proposed coil taps, time-dial settings and pick-up settings required. The short-time region shall indicate the relay instantaneous elements, the magnetizing inrush, and ANSI transformer damage curves, the low voltage circuit breaker and instantaneous trip devices, fuse manufacturing tolerance bands, and significant symmetrical and asymmetrical fault-currents.
 2. No more than six devices shall be shown on one coordination plot. Of these six curves, two (the largest upstream device and the smallest downstream device) shall repeat curves shown on other coordination plots in order to provide cross-reference. Give each curve in the study a study-unique number or letter identifier to permit cross-reference between plots.
 3. The coordinating time interval between primary and back-up protective devices shall be as per Table 15-3, Section 15.6, IEEE Std. 242-2001.
 4. Include a detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time delay settings. A tabulation shall include settings for every overcurrent protective device, timer, power system relays (e.g., ANSI 25, 27, 32, 67, 87, etc), circuit breaker, recommended fuse and current transformer ratings, etc. Include C.T. ratio, burden and all other calculations required for the determination of settings. Provide recommended settings for all protective devices furnished under Division 16 and furnished with Variable Frequency Drives and associated transformers, generators and associated paralleling and distribution switchgear.

1.07 ARC FLASH

- A. Provide an arc flash study that utilizes the fault current values calculated in the short circuit study and the minimum clear times of the upstream protective device selected in the coordination study to calculate the incident energy at each fault location.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- B. The Arc Flash study shall be in accordance with the procedure outlined in IEEE Standard 1584 and NFPA 70E-2015.
- C. Calculate the incident energy levels at each faulted bus for each mode of operation: (1) "double-ended mode" (double-ended substation with bus tie open); (2) "singled ended mode" (single incoming utility feeder energized all switchgears single ended with bus ties closed); (3) "stand-by mode" (on-site generation solely providing power to the system); (4) "peak shaving modes" (a.) (double-ended substation with bus tie open with on-site generation paralleled) and (b) (single-ended with bus ties closed with on-site generation paralleled). Determine arc flash incident energy values for both maximum and minimum fault values in each case.
- D. Extent of Study
 - 1. The arc flash study shall include analysis for all equipment that would normally be serviced while energized and cannot be easily shut down during maintenance periods. The ELECTRICAL CONTRACTOR shall coordinate with the OWNER to ensure that all equipment that is expected to be analyzed is included in the study. The extent of the analysis includes but is not limited to:
 - a. Switchgear, MCC's and distribution equipment
 - b. Low voltage lighting panels, even those covered by certain calculation exceptions must be modeled and provided with a unique device label
 - c. Low voltage control equipment such as 120-600V control panels.
- E. Arc Flash Labels
 - 1. The arc flash study shall produce a single set of label templates that shall not be printed until the final arc flash study has been approved.
 - 2. A single set of labels shall be printed and affixed to the equipment analyzed if the equipment is continuous. Double ended equipment shall have individual labels for each side of the gear. Equipment that is not continuous shall have a single label placed on each piece of continuous gear.
 - 3. Where applicable, LINE and LOAD labels shall be produced for equipment. Examples of equipment that require these labels include the main breakers of switchgear and MCC's. In these cases, the LINE side labels shall be affixed to indicate the hazard associated with the line side of the equipment and the LOAD side label shall be affixed to indicate the hazard associated with the rest of the gear.
 - 4. Labels shall be affixed where they are clearly identifiable with the equipment they depict. Labels shall not obscure any other signage on the equipment unless they are used to completely cover a previous arc flash label.
 - 5. Labels shall meet the following requirements:
 - a. Labels shall be DANGER/WARNING type conforming to the NFPA 70E and ANSI Z534.4 standards. Labels are required to have the minimum information specified by these standards printed on them.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- b. Labels shall identify the calculated incident energy and the SJCUD Site-Specific Arc Flash PPE Category values as follows:
 - Category 1 Incident Energy (cal/cm²) 0 - 4.0
 - Category 2 Incident Energy (cal/cm²) 4.01 - 8.0
 - Category 3 Incident Energy (cal/cm²) 8.01 – 25.0
 - Category 4 Incident Energy (cal/cm²) 25.01 – 40.0
 - Category D Incident Energy (cal/cm²) 40.01 and above
 - c. Labels shall be indoor/outdoor rated weather resistant vinyl or polyester with a UV resistant overlamine. The label shall have a minimum thickness of 5 mil. Labels shall be backed with pressure sensitive permanent cold temperature adhesive rated for a minimum 5 year life in the environment in which they are installed.
 - d. All lettering shall be black and printed via thermal transfer. Backgrounds shall be orange for hazard risk categories 1-4 and red for “Dangerous” areas.
 - e. Where subjected to degrading or corrosive environments, the labels shall be provided with a tinted fiber glass cover.
 - f. The label shall match any pre-existing facility or client specified formatting. The ELECTRICAL CONTRACTOR shall be responsible for obtaining this formatting information prior to submitting label templates.
 - g. A single label for equipment is acceptable where equipment is continuous. In the event of split busses or equipment not arranged in a continuous fashion, multiple labels shall be provided.
 - h. Line side labels for equipment main breakers shall be included in addition to load side labels.
 - i. Labels shall be legible and standard throughout the plant.
 - j. Labels templates shall be provided to the ENGINEER and client for final approval and shall be printed and affixed by the ELECTRICAL CONTRACTOR. The ELECTRICAL CONTRACTOR shall be responsible for all work required to print and affix the labels to the equipment. Labels shall be affixed in accordance with the direction of the client.
6. ELECTRICAL CONTRACTOR shall produce all arc flash labels and coordinate affixing them onto all equipment.
- F. Arc Flash Mitigation and Reduction Devices
- 1. Where devices are furnished with alternative trip settings intended to mitigate arc flash hazards, the ELECTRICAL CONTRACTOR shall provide an alternative arc flash lookup table associated with these alternative settings.
 - 2. Labels shall have only the worst case hazard risk category (without the arc flash reduction settings) depicted. Multiple labels for different device settings shall not be accepted.
 - 3. Devices such as differential protection relays which limit incident energy by limiting the magnitude of the available fault and/or minimizing the fault clearing time may be used to calculate hazard risk categories. The use of these devices in the calculations shall only be permitted where permitted by the standards and code guidelines used to complete the arc flash analysis. If

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

not explicitly stated by the standard as an acceptable method for calculating arc flash hazard, it shall not be permitted.

- G. Arc Flash Hazard Mitigation
 - 1. Acceptable hazard risk categories shall be coordinated by the ELECTRICAL CONTRACTOR between the OWNER and ENGINEER. Where there are no guidelines determining acceptable arc flash levels, the ELECTRICAL CONTRACTOR shall actively attempt to reduce all hazard risk categories greater than 2. ELECTRICAL CONTRACTOR shall list all areas greater than category 2 in the conclusion of the report and shall give reasons for the high incident energy.
 - 2. The ELECTRICAL CONTRACTOR shall be responsible for proposing and evaluating arc flash mitigation measures including but not limited to:
 - a. Adjustment of protective devices in an attempt to better balance the system coordination and the incident energy available to an arcing fault.
 - b. Equipment that could be used to physically remove the operator from the arc flash hazard boundary (mimic panels, remote switching/racking).
 - c. Equipment that could be used to limit the amount of incident energy or reduce the protective device pickup time (maintenance mode bypass, differential relaying).
 - 3. Proposing and evaluating these arc flash mitigation measures shall include evaluating the cost and implementation of the options as well as reevaluating and reporting the hazard risk category associated with their installation.

1.08 MOTOR STARTING/RUNNING

- A. Provide a motor starting study for all electric motors rated above 500 HP to determine voltage dip or power inrush limitations at selected locations due to starting of motors. Include in the study problems created by reclosing of Power Company feeders in 20 cycles with a dead time of 15 cycles. Provide relay protection on breakers as the study recommends.
- B. The motor starting/running study shall provide a voltage profile for the complete electrical distribution system. At a minimum, the voltage profile shall include voltage values at the utility service point, each switchgear/switchboard bus, and each motor control center and at the terminals of each motor identified in Paragraph 1.09A.
- C. A complete voltage profile shall be provided for each of the following operating conditions:
 - 1. All tie circuit breakers open with electrical distribution system operating double-ended.
 - a. One profile for all equipment running (steady state condition)
 - b. One profile for each motor starting scenario as identified in Paragraph 1.09A.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

2. All tie circuit breakers closed with the electrical distribution system operating single-ended.
 - a. One profile for all equipment running (steady state condition)
 - b. One profile for each motor starting scenario as identified in Paragraph 1.09A.

- D. The ELECTRICAL CONTRACTOR shall obtain from the motor supplier the necessary information to perform the study. Certified curves for "Safe Time vs. Current at 100% Voltage" and "Accelerating Time vs. Current at 100% Voltage" are absolutely necessary and shall become part of the final report.

- E. Multifunction Solid State Motor Protection/Management Relays
 1. Following a starting study, the ELECTRICAL CONTRACTOR shall produce all settings necessary for the programming of any and all motor protection and/or management relays. Generation of these settings shall take into account the motor starting parameters assessed during the motor starting study and shall incorporate all parameters coordinated with the motor manufacturer.
 2. ELECTRICAL CONTRACTOR shall develop all settings necessary to safely start and run any motor evaluated in the study and controlled by a motor protection/management relay. Settings generated shall include but shall not be limited to:
 - a. Starting parameters including start and stall times, torque settings and transition timing where applicable.
 - b. Motor protection settings coordinated with the motor manufacturer such as the number of starts per hour, safe stall times, overcurrent protection and mechanical jams.
 - c. Logic required for the motor to start, transition and run as specified and designed.

1.09 HARMONIC STUDY

- A. Provide a harmonic study for all harmonic producing equipment to determine the harmonic currents and voltages of the electrical distribution system.

- B. The harmonic study shall provide a harmonic current and voltage profile for the complete electrical distribution system. At a minimum, the voltage profile shall include voltage values at the utility service point, each switchgear/switchboard and motor control center bus.

- C. A complete Harmonic current and voltage profile shall be provided for the minimum anticipated fault current available from the utility and the standby generator for each of the following operating conditions:
 1. All tie circuit breakers open with electrical distribution system operating double-ended.
 - a. One profile for all equipment running (Full speed condition for VFD units)

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- b. One profile for all equipment running (70% of full speed condition for VFD units).
 2. All tie circuit breakers closed with the electrical distribution system operating single-ended.
 - a. One profile for all equipment running (Full speed condition for VFD units)
 - b. One profile for all equipment running (70% of full speed condition for VFD units).
- D. The ELECTRICAL CONTRACTOR shall obtain from the harmonic generating equipment suppliers the necessary information to perform the study. Certified harmonic information is absolutely necessary and shall become part of the final report.
- E. The harmonic study shall contain, as a minimum, the following:
 1. Explanation of method used to perform the study.
 2. Explanation of study results with specific recommendations on filters and/or other measures that will be implemented to meet the specified limits.
 3. All calculations and/or computer printouts used to arrive at the recommendations.
 4. Individual drive voltage and current harmonic content up to the fiftieth harmonic, and the combined total of all the drive harmonic contents reflected in the system source supply voltage and current as a percent of the 60 Hz fundamental under actual load conditions from 0 to 60 Hz at 10 Hz increments.
- F. If the harmonic distortion for voltage and current distortion levels and line notching do not meet the requirements of IEEE 519. The ELECTRICAL CONTRACTOR shall specify the appropriate filter traps that provide the filtering required to meet the requirements of IEEE 519 as specified herein.
- G. The manufacturer shall be responsible to provide all data necessary to perform the study. This includes nonlinear load producing equipment signature, feeder cable sizes, approximate feeder length, motor data, switchgear data, utility data, alternate source data, existing field data (if required) and any other information relevant to the study.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 QUALITY ASSURANCE

- A. Adjust relay and protective device settings according to values established by coordination study. Setting shall be made in accordance with Section 16950.
- B. Make minor modifications to equipment as required to accomplish conformance with the short circuit and protective device coordination studies.

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

- C. Notify Consulting ENGINEER in writing of any required major equipment modifications.

END OF SECTION 16015

SECTION 16150

ELECTRIC MOTORS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. In general, the Work specified in this section of the Specifications includes the furnishing of all labor, material, and services necessary for the installation and placing in operation of all electric motors indicated or required for the proper operation of all mechanical equipment installed.

1.02 SUBMITTALS

- A. Motor manufacturers' product literature, nameplate data, and outline drawings shall be incorporated into the appropriate shop drawing submittals of all associated equipment. Additionally, manufacturers' test reports shall be provided for each motor 100 HP and above.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All electric motors shall be built in accordance with current NEMA, IEEE, ANSI, and AFBMA Standards where applicable. Each motor shall be of the type and quality described by these specifications and/or as indicated on the drawings, fully capable of performing in accordance with the manufacturer's nameplate rating and free from defective material and workmanship.
- B. Electric motors shall be of sufficient capacity to operate the driven equipment, under all load and operating conditions, without exceeding 85% of the motor's nameplate horsepower rating with service factor, and without exceeding its rated temperature limits.
- C. Electric motors for variable speed applications shall be designed for operation at the rated maximum speed and at reduced speeds throughout the variable range, without overloading. Each variable speed motor shall be compatible with all associated control equipment and operating conditions including increased electromagnetic noise (harmonics).
 - 1. Each motor for variable speed operation shall be equipped with internal temperature detectors, in addition to all accessory equipment recommended by the variable speed equipment manufacturer.
 - 2. Electric motors for variable frequency drive applications shall be inverter duty rated in accordance with NEMA MG1 Part 31, and shall be capable of being continuously pulsed at the motor terminals with a voltage of 1600 VAC.
- D. Unless indicated otherwise or required by the specific application, all electric motors shall be suitable for continuous operation at maximum load and required starting duty, in a 40°C ambient temperature, at an altitude not to exceed 3,300', in a moist and corrosive atmosphere.

SECTION 16150

ELECTRIC MOTORS

- E. Where indicated, or necessary to meet noise level requirements, electric motors shall be designed for quiet operation. Unless indicated otherwise, when operated at nameplate voltage and frequency the average overall sound pressure level on the A scale shall not exceed 85 ± 3 decibels 5' from the motor, as measured in accordance with NEMA Standards.
- F. All motors shall be furnished with permanent, highly visible stainless steel nameplates. Nameplates shall include all motor ratings, special features, and accessories.
- G. All motors shall be furnished with oversize main terminal boxes. Motor terminal boxes shall be gasketed and shall allow rotation to accommodate conduit entrance. Motor terminal boxes shall be equipped with grounding lugs.
- H. All motors shall be equipped with lifting lugs. All motor enclosures shall be equipped with stainless steel screens for all openings in accordance with NEMA Standards for guarded construction.
- I. Motor output shafts shall be suitable for connection as required. Vertical hollow-shaft motors shall be equipped with non-reverse ratchets to prevent backspin.
- J. Unless indicated otherwise, AC induction motors shall be manufactured by Baldor, Nidec, TECO-Westinghouse, Toshiba, U.S. Motors, or pre-approved equal.

2.02 SQUIRREL-CAGE INDUCTION MOTORS

- A. General:
 - 1. These specifications are intended to cover the functional requirements, features, and general construction of induction motors of the squirrel-cage, horizontal, vertical solid-shaft, vertical hollow-shaft, normal thrust, and high thrust type.
 - 2. Each motor shall be IEEE-tested, NEMA-rated, premium efficiency energy-saving design, incorporating increased active electrical material and optimum electrical and mechanical design, to provide maximum operating efficiency and power factor. All motors shall be premium efficiency.
- B. Rating:
 - 1. When operated at nameplate voltage and frequency, squirrel-cage induction motors shall be rated normal or high starting torque, as required, low starting current not to exceed 600% full load current, low slip, 1.15 service factor, premium efficiency, and continuous duty at rated horsepower and rpm, with open drip-proof, weather-protected Type 1, totally-enclosed, fan-cooled, or explosion-proof construction, as indicated. Temperature rise shall be in accordance with NEMA Standards for the design employed.
 - 2. Unless otherwise indicated, single speed, three phase squirrel-cage induction motors less than 50 HP shall be 200-230/460 volt, 3 phase, 60 hertz. Multi-speed motors, and motors 50 HP and larger shall be single voltage, as required.

SECTION 16150

ELECTRIC MOTORS

3. Single phase squirrel-cage induction motors shall be split-phase or capacitor-start, rated 115/230-208 volt, 1 phase, 60 hertz.
- C. Electrical Characteristics:
1. Each motor shall be suitable for full voltage starting and non-injurious heating when operated on power systems with a variation in voltage of not more than $\pm 10\%$ nameplate rating and a variation in frequency of not more than $\pm 5\%$ nameplate rating.
 2. Locked rotor torque shall be at least 125% full load torque at 100% rated voltage. Output torque shall exceed the maximum full load torque requirements of the driven equipment by at least 20% throughout the full operating range of the driven equipment, from start to full load. Locked rotor torque, breakdown torque, and locked rotor currents shall be in accordance with NEMA Standards for the design employed.
 3. Open drip-proof and WP-1 motors shall have a non-hygroscopic Class B insulation system treated with a minimum of 2 extra dips and bakes using 100% solid epoxy varnish.
 4. TEFC and explosion-proof motors shall have a non-hygroscopic Class F insulation system and shall operate with a Class B temperature rise.
- D. Mechanical Characteristics:
1. Motors, frames, and end shields shall be cast iron or heavy fabricated steel of such design and proportions as to hold all motor components rigidly in proper position and provide adequate protection for the type of enclosure employed. TEFC and explosion-proof motors shall be severe duty, all cast iron construction.
 2. Windings shall be adequately insulated and securely braced to resist failure due to electrical stresses and vibrations. Winding and insulating materials shall consist of one or more of the following as dictated by the motor design: silicone rubber, polyester film, synthetic varnish, or glass cloth.
 3. The shaft shall be made of high grade machine steel, or steel forging, of size and design adequate to withstand the load stresses normally encountered in motors of the particular rating. Bearing journals shall be ground and polished.
 4. Rotors shall be made from high grade steel laminations adequately fastened together and to the shaft. Rotor squirrel-cage windings may be cast aluminum or bar type construction with brazed end rings.
 5. Motors shall be equipped with vacuum degassed anti-friction bearings made to AFBMA Standards and be of ample capacity for the motor rating. The bearing housing shall be large enough to hold sufficient lubricant to minimize the need for frequent lubrication, but facilities shall be provided for adding new lubricant and draining out old lubricant without motor disassembly. The bearing housing shall have long, tight running fits, or rotating seals to protect against the entrance of foreign matter into the bearings or leakage of lubricant out of the bearing cavity. Thrust bearings shall be of ample capacity to carry the maximum thrust load of the driven equipment and the total weight of all revolving parts. Bearings of high thrust motors will be locked for

SECTION 16150

ELECTRIC MOTORS

momentary upthrust of 30% downthrust. All bearings shall have a minimum life rating of 5 years in accordance with AFBMA life and thrust values.

- a. For motor speeds 1800 rpm and below, double sealed bearings shall be used. The grease fitting shall be removed and a plug inserted so that the motor does not get inadvertently greased.
 - b. For motor speeds above 1800 rpm, single shielded bearings shall be installed with the shields facing the outboard (grease supply) side and open on the inboard (stator) side. Zert fittings shall be installed at the 12 o'clock position when viewed axially. Grease escape valve or purge plug shall be installed at the 6 o'clock position.
 - c. The entry and exit paths for new and purged grease, respectively, shall enter and leave the bearing cavity on the outboard (shielded) side of the bearing (termed *conventional* grease flow design).
 - d. The motor manufacturer shall provide a procedure for initial greasing and for re-greasing the motor bearings. Specific intervals with a specified quantity of grease per the bearing manufacturer's recommendations are required.
- E. Accessories:
1. Each motor shall be equipped with all necessary accessories as recommended by the manufacturer for the intended service.
 2. Where indicated or required, motors shall be equipped with space heaters. Each motor 25 HP and larger shall be equipped with space heaters. Space heaters shall be low voltage, 120 volt, single phase, with the leads brought out to the motor conduit box.
 3. Where indicated or required, motors shall be equipped with thermal winding protection. All motors smaller than 100 HP shall be equipped with two normally closed automatic reset thermostats imbedded in the stator winding, between phases, and connected in series. The two leads shall be brought to the motor conduit box. All motors 100 HP and larger shall be equipped with thermistors imbedded in the motor winding end turns, one per phase, with the leads connected to a motor mounted, permanently potted, solid state electronic controller.

2.03 DIRECT CURRENT MOTORS

- A. General - Unless indicated otherwise, direct current motors shall be shunt-wound, premium efficiency, with Class F insulation and totally-enclosed, fan-cooled, severe duty construction.
- B. Rating - DC motors shall be rated 1.0 service factor, 90/180 VDC armature, 100/200 VDC field, continuous duty providing full rated torque over a 20:1 speed range.
- C. Accessories - Each direct current motor shall be equipped with an NC motor winding thermostat.

SECTION 16150

ELECTRIC MOTORS

- D. Controllers - Each direct current motor shall be designed for speed control through armature voltage using a rectifier-controller.
 - 1. Rectifier-controllers (SCR drives) for direct current motors shall be solid-state full wave design rated 115/230 VAC input.
 - 2. SCR drives shall provide $\pm 1\%$ armature feedback speed regulation with adjustable acceleration/deceleration (3-25 seconds), adjustable minimum speed (0-30%), adjustable maximum speed (70%-100%), and adjustable current limit (10%-150%).
 - 3. Each SCR drive shall be equipped with AC line protection, fully rated armature loop contactor, speed indicating meter, and speed control potentiometer.
 - 4. SCR drive operator controls and enclosures shall be as required for the intended operation and installation.

PART 3 - EXECUTION

3.01 GENERAL

- A. Electric motors shall be supplied with the driven equipment, unless specified otherwise.
- B. All fittings, bolts, nuts, and screws shall be plated to resist corrosion. Bolts and nuts shall have hex heads. All machined surfaces shall be coated with rust-inhibitor for easy disassembly.
- C. The entire surface of each motor shall be treated with a final coating of chemical-resistant, corrosion- and fungus-protective epoxy enamel, over a red primer.

3.02 INSTALLATION

- A. Motor Connections:
 - 1. All motors shall be connected to the conduit system by means of a short section (18" minimum) of liquid tight flexible metallic conduit.
 - 2. All motor feeders shall include a grounding conductor installed within the motor feeder conductor raceway, continuous from the motor starter to the motor conduit box. The motor feeder grounding conductors shall be properly terminated on each end with approved ground lugs and clamps.
 - 3. Insulated mechanical polaris connectors shall be used for all motor feeder conductor connections to the motor leads. Connectors shall be UV rated, abrasion and chemical resistant, and specifically designed for the conductor material, stranding, etc.

3.03 TESTING

- A. All motors shall be tested prior to shipment in accordance with the standard short commercial test procedures to include the following: no-load current, check-current balance, winding resistance, measure air gap, high potential, and bearing inspections.

SECTION 16150

ELECTRIC MOTORS

- B. Upon completion, the motor operated equipment manufacturer shall provide all necessary instruments and special apparatus to thoroughly test the complete installation and shall conduct all tests that may be required to ensure system is free of all improper grounds and short circuits. All electrical equipment shall be tested to determine proper polarity, phasing, relay settings, and operation.
- C. Prior to energization, the insulation resistance of each motor shall be tested in accordance with the motor manufacturer's recommendations. Upon completion of all corrective measures required, certified acceptance reports, including tabulations of all initial and final resistance measurements, shall be submitted for approval.
- D. Each motor starter overload element, and each motor circuit protector, shall be selected and adjusted to coordinate with the nameplate full-load current and service factor of the actual motors installed. Improper units shall be replaced. Upon completion of all corrective measures required, certified compliance reports, including tabulation of the actual full load current and voltage measurements for each phase of each motor, together with the nameplate current rating, overload element rating, and motor circuit protector setting, shall be submitted for approval.

END OF SECTION 16150

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. In general, the work specified in this section includes the furnishing of all labor, material, and services necessary to provide a complete and operable standby auxiliary electric generating set as shown on the drawings and specified hereinafter, including all fees, charges, and permits necessary.
- B. The auxiliary electric generating set shall have the following minimum ratings:

Rated RPM	1800	RPM
Standby KW with Fan	350	KW
Standby KVA with Fan	438	KVA
Starting KVA with 30% Voltage Dip	880	KVA

- C. Basis of design: Caterpillar C13 with LC6134B oversized PM alternator
- D. Approved generator set manufacturers: Caterpillar, or pre-approved equal.

1.02 SYSTEM RESPONSIBILITY

- A. The auxiliary electric generating set shall be the product of a supplier regularly engaged in the manufacture of this product and shall meet the requirements of the specifications set forth herein. Each auxiliary electric generating set shall be factory assembled and prototype tested. Major exceptions to specifications will be considered sufficient cause for rejection of the item.
- B. To best serve the needs and interests of the Owner, it is the intention of these specifications to secure bids only on a standard auxiliary electric generating set which can be properly maintained and serviced without the necessity of the Owner carrying expensive parts stocks or being subjected to the inconvenience of long periods of interrupted service due to lack of available parts.
- C. The engine supplier must have 24-hour parts service and factory-trained personnel available in the project's locality and must also be able to offer a full maintenance contract to the Owner. Availability of parts and service will be a factor in making the award.
- D. The complete unit shall be sold and serviced from a single source.

1.03 SUBMITTALS

- A. The Generator Manufacturer shall furnish complete shop drawing submittals clearly identifying manufacturer's model numbers, equipment ratings, dimensions, weights, etc. for the entire generator set including all accessory equipment.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

1. The shop drawings shall include detailed drawings identifying all installation points of connection including fuel lines, exhaust piping, starting battery cables, etc.
 2. The shop drawings shall include detailed wiring diagrams and electrical schematic drawings clearing indicating all field connections.
- B. The Generator Manufacturer shall furnish copies of the manufacturer's certified final test records showing the performance of the generating set from no load to maximum load, indicating voltage and frequency regulation of the auxiliary electric generating set, and other information regarding its ability to perform as specified prior to approval.
- C. The Generator Manufacturer shall furnish to the Engineer for the Owner, bound copies of operational instructions and bound copies of the maintenance and overhaul data for the equipment furnished.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Each auxiliary electric generating set shall be a packaged power unit in which all necessary components are mounted on a common base with the exception of the instruments which, if indicated, shall be mounted separately.
- B. The ratings of the electric set shall be based on standby duty operation of the unit, at rated generator RPM, in an ambient temperature of 110°F when equipped with all necessary operating accessories.
- C. All materials and parts comprising the units specified herein shall be new and unused, of current manufacture, of the highest grade, and free from all defects or imperfections affecting performance. Only bids on a new and current model will be accepted.
- D. Workmanship shall be of the highest grade in accordance with modern practice.

2.02 DIESEL ENGINE

- A. Each electric set shall be driven by a water-cooled, 4-cycle, full compression ignition, diesel-fueled engine. Engines for electric sets rated above 50 kw shall be turbocharged. Engines shall not exceed rated speed.
- B. Fuel injection pumps and valves shall be a type not requiring adjustment in service. Fuel injection pumps shall be positive action, constant stroke pumps, actuated by a cam driven by gears from the engine crankshaft. The engine shall be equipped with an individual injection pump and valve for each cylinder. The engine shall be equipped with a built-in gear type, engine-driven fuel transfer pump.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

- C. Each engine shall be capable of rated operation on commercial grade No. 2 diesel fuel.
- D. Each engine shall be equipped with removable wet type cylinder liners of heat-treated, close-grained alloy iron.
- E. Each engine shall be equipped with a gear-type lubricating oil pump. Pistons shall be spray-cooled and a suitable water-cooled, engine-mounted lubricating oil cooler shall be provided.
- F. Each engine shall be capable of operation at idle or light loads for extended periods of time and shall provide for precombustion of fuel or a similar means for the prevention of carbonization.

2.03 GENERATOR

- A. Each generator shall be continuous duty, 0.8 power factor, brush-less type, with electrical characteristics as indicated. Each generator shall be single bearing construction with Class F insulation. Each generator shall incorporate cross current compensation for parallel operation and shall include a resettable thermal protector for exciter/regulator protection against extended low power factor loads.
- B. Each generator shall be equipped with a unit mounted, volts-per-hertz type regulator provided to match the characteristics of the generator and engine. Voltage regulation shall be $\pm 1\%$ from no load to full load. Readily accessible voltage droop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of $\pm 5\%$.
- C. Each generator shall be a permanent magnet type (PMG) capable of producing 300% rated output for ten seconds on a short circuit condition. Bolt-on series boost options are not acceptable.
- D. Each generator shall be equipped with a 120/240 volt, 1 phase space heater.
- E. Each generator shall be equipped with an oversized junction box of sufficient dimensions to facilitate conduit entrance and cable terminations.

2.04 COOLING SYSTEM

- A. Each engine shall be equipped with a cooling system having sufficient capacity for cooling the engine when the electric set is delivering full-rated load in an ambient temperature of 125°F. All cooling system equipment shall be of the type recommended by the engine manufacturer.
- B. Each engine shall be equipped with a high capacity radiator and blower fan.
- C. Each engine shall be equipped with an engine-driven centrifugal type water circulating pump and thermostatic valve to maintain the engine at recommended temperature level.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

- D. Intake louvers shall be sized to provide sufficient intake air for engine combustion and to provide required air flow through the radiator. Intake and discharge louver adequacy shall be verified by the electric set manufacturer prior to installation.

2.05 ACCESSORIES

- A. Each engine and generator shall be close-coupled and mounted on a common welded steel base. The electric set shall be equipped with spring-type vibration isolators for mounting on a concrete foundation.
- B. Each engine shall be equipped with an electric-sensing governor capable of isochronous frequency regulation from no load to full load.
- C. Each engine shall be equipped with an electric starting system of sufficient capacity to crank the engine at a speed which will start the engine under rated operating conditions. The starting system shall provide for 4 crank cycles, 10 seconds on and 10 seconds off, each. The starting pinion shall disengage automatically when the engine starts.
- D. Each electric set shall be furnished with a complete automatic battery/charger system including lead acid battery set, current limiting battery charger, and all necessary cables and clamps, etc. Battery set shall be of voltage and capacity required for complete operation of the standby electric generating facilities including electric starting system and generator controls station power. Battery charger shall automatically recharge and maintain the battery set at full capacity and shall include a DC ammeter, DC voltmeter, DC low level alarm contact, and AC low level alarm contact. Charger shall be unit mounted and shall be suitable for operation at voltage indicated on the drawings.
- E. Each engine shall be provided with anti-freeze and suitable engine-mounted, thermostatically-controlled, jacket water heaters to maintain engine coolant at manufacturer's recommended temperature level. Jacket water heaters shall be suitable for operation at voltage indicated and shall be installed with isolation valves to facilitate maintenance.
- F. Each engine shall be provided with an all-welded type 304L stainless steel exhaust silencer of the critical grade; Maxim Model M51 or approved equal. The silencer shall be sized so that the backpressure at rated capacity of the engine does not exceed one half of the manufacturer's maximum allowable backpressure.
 - 1. Exhaust piping shall be type 304L Schedule 10S stainless steel. The exhaust shall discharge horizontally at the silencer outlet, with a 45-degree bevel cut and stainless expanded metal bird screen.
 - 2. A flexible stainless steel exhaust adapter at least 18" long shall be furnished for the exhaust outlet to the silencer. The flexible exhaust connection shall mount directly on the exhaust manifold and shall be mounted so that no weight is exerted on the manifold at any time.
 - 3. Exhaust piping and silencer shall be properly insulated to prevent heat rejection into the generator set operating atmosphere.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

- G. Each electric set shall be equipped with the following additional accessories:
 - 1. Lubricating oil filters
 - 2. Dry type air filters
 - 3. Replaceable element fuel filters
 - 4. Primary fuel filter/water separators
 - 5. Fuel priming pumps

- H. Each electric set shall be equipped with all additional accessories and circuitry modifications required to provide proper operation when supplying power to inverter loads such as variable frequency drive equipment.

2.06 INSTRUMENTS

- A. Each electric set shall be provided with a unit-mounted instrument panel including the following:
 - 1. Fuel pressure gauge
 - 2. Water temperature gauge
 - 3. Lubricating oil pressure gauge

2.07 CONTROLS

- A. Each electric set shall be provided with a generator-mounted control panel. Control panels shall include the following:
 - 1. AC voltmeter
 - 2. AC ammeter
 - 3. Ammeter-voltmeter phase selector switch
 - 4. Frequency meter
 - 5. Elapsed time meter
 - 6. AUTOMATIC-OFF-MANUAL starting controls
 - 7. Failure and alarm indicator lights
 - 8. Main line circuit breaker

- B. The automatic starting control system shall be completely interlocked to provide automatic operation, at the control panel, from a single pole contact.

- C. Each electric set shall be equipped with a complete engine safety control system which shall provide alarm indication, automatically shut down the engine, and shut trip the main line circuit breaker in the event of any of the following:
 - 1. Low oil pressure
 - 2. High jacket water temperature
 - 3. Overspeed
 - 4. Overcrank

- D. Each electric set shall be equipped with additional engine warning system which shall provide alarm indication in the event of any of the following:
 - 1. Low coolant level
 - 2. Low battery charge
 - 3. Low fuel level
 - 4. Fuel leak detection

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

- E. A generator alarm relay with a minimum of two normally open dry contacts shall be provided at the generator control panel for remote indication of a generator warning, alarm or shutdown condition including "Not in Auto" and "Main Breaker Not Closed". The generator alarm relay shall be normally energized and shall be de-energized when an alarm condition is present.
- F. A generator running relay with a minimum of two normally open dry contacts shall be provided at the generator control panel for remote indication that the generator engine is running. The generator alarm relay shall be normally de-energized and shall be energized when the engine is running.
- G. Each generator control panel shall be equipped with a mini-zone accessory power distribution system providing power to the generator accessory equipment including jacket water heater, battery charger and generator space heater. Input power to the mini-zone accessory power distribution system shall be 480V, single phase, 3 wire service.
- H. Main line circuit breakers shall be inverse time delay, instantaneous trip molded case circuit breakers with adjustable LSI trip settings. Each breaker shall be provided with shunt trip and shall be rated as indicated.

2.08 WEATHERPROOF ENCLOSURE

- A. Each generator set to be installed outdoors shall be equipped with a weatherproof enclosure of 16" wide x 0.080" thick x 2" deep marine grade aluminum modular construction, with stainless steel hardware. Roof construction shall be minimum 0.125 aluminum one-piece peaked design with no through bolt holes on a horizontal surface. A drip edge shall be provided on all four sides.
- B. Each enclosure shall be equipped with gravity discharge louver and fixed intake louvers. All louvers shall be designed to help prevent the entrance of driving rainwater but shall have sufficient free area to allow 120% of the total engine generator cooling air requirements.
- C. The roof of each enclosure shall be reinforced as required to provide the capability of supporting the largest commercially-available exhaust silencer recommended by the manufacturer for the engine. A rain shield and drip collar shall be provided at each roof exhaust penetration.
- D. Enclosure doors shall be strategically located to facilitate ease of maintenance and allow good access to and visibility of instruments, controls, engine gauges, etc. Doors shall be lockable with 3-point latches keyed alike and shall be fitted with bolt-on piano type hinges constructed with stainless steel hinge pins.
- E. Each generator set enclosure shall be equipped with bolt-on entrance steps at each door entrance, and rodent screens over each louvered opening.
- F. Each generator set enclosure shall be equipped with all required accessory equipment mounted inside the enclosure including battery charger.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

- G. A single generator set accessory power supply point of connection shall be provided inside each enclosure. The generator accessory power supply shall be rated 120/240 volts, single phase. The generator accessory power distribution system located inside the enclosure shall be equipped with branch circuit breakers for each generator set accessory including the jacket water heater, battery charger, generator space heater, convenience receptacle, and enclosure interior lighting.
- H. Upon final assembly, enclosures shall be prime painted with a minimum of two (2) coats of rust-inhibiting primer. The final finish painting shall be a minimum of two (2) coats of enamel with polar white finish.

2.09 AUTOMATIC TRANSFER SWITCHES

- A. Automatic transfer switches, with electrical ratings as indicated, shall consist of a power transfer module and a control module, interconnected to provide complete automatic operation. Automatic transfer switches shall be Instantaneous and Short Time rated in accordance with the installation requirements. Each automatic transfer switch shall be mechanically-held and electrically-operated by a simple, over center mechanism energized from the source to which the load is to be transferred. The switch shall be rated for continuous duty, double throw, with mechanically interlocked center off position for load decay. The switch shall provide an adjustable time delay after opening of the closed contacts and before closing of the open contacts for transferring large motor and transformer loads. The automatic transfer switch shall be suitable for use with emergency or auxiliary source provided.
- B. Unless otherwise indicated, automatic transfer switches shall be 4-pole with overlapping switched neutral pole. All transfer switch main contacts shall be segmented silver tungsten alloy contacts with separate arcing contacts, arc quenching grids, enclosed arc chambers and wide contact air gap. Sensing and control relays shall be continuous duty, industrial grade type, with a minimum contact rating of 10 amperes. Transfer switches shall utilize solid-state sensing on normal and emergency, including close differential voltage sensing on all phases of the normal source.
- C. Transfer switch operation shall be adjusted to coordinate with the emergency source provided. Upon failure of the normal source, a voltage drop below the predetermined (75%-98% adjustable) nominal voltage shall initiate a time delay period (0-5 minutes adjustable) prior to closing the engine start signal contact. When the emergency source builds up to the predetermined (85%-100% adjustable) nominal voltage and (90%-100% adjustable) nominal frequency, the transfer switch shall momentarily transfer to the center open position (0-5 minutes adjustable) then complete transfer operation to the emergency source. Upon restoration of the normal source, a time delay (0-30 minutes adjustable) shall delay the transfer back to the normal source. Following the re-transfer time delay, the transfer switch shall momentarily transfer to the center off position (0-5 minutes adjustable) then complete re-transfer operation to the normal source. Re-transfer time delay shall be automatically bypassed if emergency source fails. Following the transfer back to the normal source, a timer (0-30 minutes adjustable) shall provide an unloaded engine cool-down period prior to engine shutdown.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

- D. Each transfer switch shall be provided with the following:
 - 1. Pilot lights to indicate the position of transfer switch.
 - 2. Bypass switch to immediately bypass the time delay in re-transferring to normal.
 - 3. AUTOMATIC-OFF-TEST switch to control operation of emergency source and transfer switch.
 - 4. Engine start contact closes to start emergency electric set.
 - 5. Auxiliary alarm dry contact closes following delay on normal source failure.
 - 6. Auxiliary reversible dry contacts operate when transfer switch is in the normal position. Contacts shall be provided as indicated.
 - 7. Auxiliary reversible dry contacts operate when transfer switch is in the emergency position. Contacts shall be provided as indicated.
 - 8. Auxiliary reversible dry contacts operate when normal source is available. Contacts shall be provided as indicated.
 - 9. Auxiliary reversible dry contacts operate when the emergency source is available. Contacts shall be provided as indicated.
 - 10. Auxiliary time delay relay (0-60 seconds adjustable) with contacts to open each facility motor control circuit prior to operation of the transfer switch in either direction.
 - 11. Generator set exercising timer to automatically operate generator set with load (adjustable 7-day cycle, 15-minute incremental repeat cycle timer).
- E. Unless otherwise indicated or required for the specific installation, transfer switch enclosures shall be NEMA 12 enclosures with gray baked enamel over a rust-inhibiting primer finish. Enclosures for transfer switches located outdoors or in corrosive atmospheres shall be NEMA 4X stainless steel.
- F. Transfer switches mounted within switchboards or motor control centers shall be bus connected to the normal source bus and load bus.
- G. Automatic transfer switches shall be ASCO 7000, or pre-approved equal.

2.10 FUEL SYSTEM

- A. Each electric set shall be provided with a complete, coordinated fuel system including fuel storage tank, fuel system piping, and all additional apparatus as indicated or required. The complete, installed fuel system shall conform to all UL and NFPA requirements.
 - 1. Unless otherwise indicated, each storage tank shall have sufficient capacity to provide a minimum of 72 hours of operation at full rated load.
- B. Each electric set shall be provided with a pad mounted concrete encased double-wall fuel storage tank.
 - 1. Each tank shall be equipped with a drain, fuel level gauge, locking fill cap, and fittings for venting, fuel suction and return. Emergency venting shall be sized for the wetted area of fuel capacity.
 - 2. Each tank shall be equipped with low fuel level and leak detection alarm monitoring systems with auxiliary contacts for remote indication.
 - 3. Each fuel tank shall be equipped with a tandem water separator/filter to pick up any water that may condense inside the tank.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

4. Tanks shall be factory-tested and guaranteed against defects in material or workmanship for a minimum period of two years.
- C. Each fuel storage tank shall be provided with a minimum 10-year warranty and shall be UL- and NFPA-approved for storage of hazardous materials in accordance with the intended service.
1. Each tank shall be equipped with a drain, fuel level gauge, leak detection gauge, locking fill cap, and fittings for venting, fuel suction and return. Emergency venting shall be sized for the wetted area of fuel capacity.
 2. Each tank shall be equipped with low fuel level and leak detection alarm monitoring systems with auxiliary contacts for remote indication.
 3. Each fuel tank shall be equipped with a tandem water separator/filter to pick up any water that may condense inside the tank.
 4. Tanks shall be factory-tested and guaranteed against defects in material or workmanship for a minimum period of two years.
 5. Tank connections, fittings, saddle supports, and accessories shall be provided as indicated.
- D. Each fuel storage tank shall be equipped with a solar powered digital tank monitoring system providing local high level alarm, low level alarm, and leak detection; Greenleaf Solar Gauge Model EFG-8000-I, or pre-approved equal.

PART 3 - EXECUTION

3.01 TESTS

- A. Before acceptance, each unit shall be given an on-site load bank test, at full load for a minimum of 4 hours, under the supervision of a service representative of the manufacturer during which the unit shall demonstrate its ability to deliver the specified capacity under all conditions which may be imposed in operation without overheating or excess vibration.
- B. Proper operation and capability of the automatic transfer switch shall be demonstrated in compliance with the applicable portions of these specifications. Any defects or defective equipment revealed by or noted during the tests shall be corrected or replaced promptly without additional compensation.
- C. Tests shall be repeated, if necessary, until results satisfactory to the Engineer are obtained. Any adjustments or corrections to the equipment shall be made by or under the supervision of the manufacturer's service representative.
- D. Upon satisfactory completion of the tests, the Generator Manufacturer shall furnish, certification from the manufacturer that the equipment has been installed in accordance with the requirements of these specifications and is ready for permanent operation and that nothing in the installation shall render the warranty null and void.

SECTION 16200

ELECTRICAL GENERATION EQUIPMENT (Owner Furnished Equipment)

3.02 TRAINING

- A. Prior to startup, the generator set manufacturer shall conduct a complete training program (minimum 1 day's duration) at the job site for a minimum of 4 Owner-selected operating personnel. The training program shall include operation, tune-up, preventive maintenance, and troubleshooting instructions relative to all aspects of the equipment provided, including associated appurtenances (battery equipment, fuel equipment, etc.).
- B. The training program shall be scheduled a minimum of 14 days in advance. Proposed dates shall be submitted in writing for approval. The Owner may exercise the option to audio- or video-tape the entire training program without restriction.

3.03 SPARE PARTS

- A. Each electric set shall be furnished with a set of spare parts and tools regularly supplied with the engine, including all tools of a special nature required to properly service the engine set.

3.04 GUARANTEE

- A. The Generator Manufacturer shall guarantee the equipment installed to be free from defective materials and workmanship. Any component which proves defective during the guarantee period shall be promptly repaired or replaced without additional compensation. The guarantee shall not apply to items normally consumed in service such as fuel and lubricating oil.

END OF SECTION 16200

SECTION 16400

ELECTRICAL APPARATUS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. In general, the work specified in this section of the Specifications includes the furnishing of all labor, material, and services necessary to install the following material, including all fees, charges, and permits necessary.

1.02 SYSTEM RESPONSIBILITY

- A. All major components of the electrical system shall be the product of one manufacturer. To ensure coordination, compatibility, and the maximum interchangeability of equipment items, the remaining components shall be provided by the major equipment manufacturer.
- B. The manufacturer shall maintain a recognized engineering, servicing, and repair facility in the project locality.

1.03 SUBMITTALS

- A. Complete wiring diagrams including coordination with instrumentation systems, generation systems, auxiliary control systems, etc., shall be approved prior to manufacture. Drawings shall be clear and carefully prepared to facilitate interconnections with other equipment. Standard drawings revised to indicate applicability shall not be acceptable.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All factory wiring shall be permanently numbered every 12-inch.
- B. Typically, the electrical apparatus shall be mounted on top of a 6" high concrete curb wireway. Operator handle extensions shall be provided as required to comply with the NEC two meter rule.
- C. The electrical apparatus shall be manufactured by Eaton, or pre-approved equal.

2.02 MOTOR CONTROL CENTERS

- A. Unless indicated otherwise motor control centers (MCC) shall be NEMA Class II, Type B, provided in NEMA 12 enclosures with open bottom panels and shall be UL-approved for use as service entrance equipment. Units located outdoors shall be NEMA 3R. Each lineup shall consist of vertical sections nominally 90-inch high, 20-inch deep, and 20-inch wide. Each lineup shall be equipped with 120/1/60 space heaters and shall be provided with starter units, feeder units, main breakers, transfer switches, transformers, panelboards, control equipment, etc., as indicated on the drawings. Control equipment shall be provided as specified in the section of these specifications entitled INSTRUMENTATION AND CONTROLS.

SECTION 16400

ELECTRICAL APPARATUS

- B. Each vertical section shall be fabricated of code gauge steel, reinforced and bolted together to form a rigid, free-standing, completely enclosed assembly. Each section shall have a gray baked enamel final coat over a rust-inhibiting prime coat. Enclosure finish shall be suitably touched up, following installation, with a manufacturer's supplied spray. Unless approved otherwise, the final coat shall be ANSI 61 Light Gray.
- C. Each vertical section shall be provided with a separate vertical wire trough door, a 9-inch horizontal wireway at the bottom, and a 9-inch horizontal wireway at the top. Each section shall have flange-formed covers on the rear and flange-formed doors with concealed hinges and quick release quarter-turn latches in the front. Unless approved otherwise, each vertical section shall be front-mounted only, completely front-accessible, and suitable for mounting against the wall. Each lineup shall be provided with continuous lifting angle and floor sills.
- D. Power shall be distributed throughout the lineup by means of a 3-conductor, bolt-connected, edgewise-mounted, tin-plated copper bus bar system. Cable shall not be used on the load side of the main. Each lineup shall be provided with a continuous ground bus and, if indicated, a continuous neutral bus. Each bus shall be braced, and the entire motor control center rated, for the maximum available short-circuit fault current, minimum 42,000 amperes RMS symmetrical. The main horizontal bus shall be enclosed in an isolating compartment at the top of each vertical section. The main bus shall be rated as indicated on the drawings and shall not be rated less than 600 amperes. The vertical bus sections shall be sized for the total connected load and shall not be rated less than 300 amperes. The main horizontal bus, transfer switch bus, cable lugs, etc., and the full height of the vertical bus shall be isolated providing a complete, dead-front installation with glass-reinforced polyester barriers equipped with shutter mechanisms for stab openings. Each ground bus shall be rated for the total capacity of the lineup and shall not be rated less than 300 amperes. When provided, each neutral bus shall have 50% of the full capacity of the main horizontal bus and shall be connected to the ground bus by a removable link.
- E. A separate control power source, independent of any single control circuit, starter unit, etc., shall be provided for all control components (control relays, annunciators, level controllers, etc.), integral to multiple control circuits or system operations, or actuated by remote field devices. Where practical, all control components connected to the separate control power source shall be located in a common compartment. For split bus applications, the separate control power source shall be continuously energized from either bus through an appropriately sized mechanically-held automatic reversing contactor.
- F. Each lineup, or each bus for split bus applications, shall include a separate vertical section fully equipped for the installation of power factor correction equipment, including molded case circuit breaker, switching contactor, capacitor banks, and all required control equipment.
- G. Each unit compartment shall be provided with an individual front door, interlocked mechanically with the unit disconnect device to prevent opening the door with the

SECTION 16400

ELECTRICAL APPARATUS

unit energized, or energizing the unit with the door open. Unit disconnect device handles shall indicate the ON, OFF, TRIPPED, and RESET positions and shall be provided with means for padlocking in the OFF or ON positions. Each unit compartment, including door, shall be individually removable without disturbing adjacent units. Unless approved otherwise, all units shall be of drawout construction with a positive guidance system to insure positive stabbing into the vertical bus. Unit stabs shall be tin-plated copper. Each unit compartment shall be provided with a door-mounted engraved nameplate attached with removable fasteners.

- H. Each motor starter unit shall be the combination type complete with molded case motor circuit protector; magnetic starter; manual resetting, 3-pole, bi-metallic thermal overload relay; individual 120 volt control power transformer; door-mounted pilot control devices, indicators, and instruments; and required accessory control relays, alternators, etc.
1. Each motor starter or contactor coil shall be equipped with a transient suppressor to limit high voltage transients.
 2. Overload element ratings shall be individually selected and adjusted in the field to coordinate with the equipment connected.
 3. Motor starters for submersible motors shall be equipped with ambient-compensated, bi-metallic, quick-trip type overloads.
 4. Control power transformers shall be fused on both primary leads and one secondary lead with the remaining lead grounded and shall be sized for the entire control circuit, including motor space heaters and all additional remote auxiliary devices.
 5. Motor circuit protectors shall be quick-make, quick-break, molded case air circuit breakers with adjustable instantaneous trip. Instantaneous trip settings shall be individually adjusted in the field to coordinate with the equipment connected.
 6. Each unit shall be provided with 2-piece drawout terminal boards, for load and control terminals. The field terminal board component shall be mounted adjacent to the wiring trough.
 7. As indicated on the drawings, starters shall be full voltage, across-the-line type, or reduced voltage autotransformer closed transition type, connected on the 65% tap, unless noted otherwise. Starters shall be reversing or non-reversing as indicated.
 8. Multi-speed starters shall have compelling relays which require starting at lowest speed, and prevent instantaneous transition between speeds.
 9. Starter unit size and ratings shall be coordinated with the equipment supplied. Units of the same size shall be interchangeable.
 10. In addition to contacts required, all starter units shall be provided with 2 spare N.O. and N.C. auxiliary contacts.
- I. Solid-state reduced voltage motor starters shall consist of three sets of two inverse-parallel connected SCR's with a complete microprocessor based electronics package to provide soft start and smooth stepless acceleration to full speed. Unless otherwise indicated, or required by the application, each solid-state reduced voltage starter shall provide individually adjustable acceleration and deceleration control (0 - 120 seconds). Each starter shall be equipped with voltage

SECTION 16400

ELECTRICAL APPARATUS

transient protection (thermostat, MOV, and RC protection of each pole), shorted SCR protection, and single phase protection. Each starter shall be equipped with a 3 phase temperature-compensated solid-state motor overload protection relay. Each starter shall be fan-cooled and shall be rated 115% FLA continuous duty and 300% FLA for a minimum of 30 seconds. Each starter shall be equipped with a fault indication pilot light and auxiliary contact for remote indication of fault condition. Unless indicated otherwise, each solid-state motor starter shall include fully rated isolation contactor and bypass shorting contactor. Each solid-state motor starter shall automatically resume normal operation following a power outage.

- J. Feeder units shall be equipped with molded case air circuit breakers, unless indicated otherwise. Breakers shall be quick-make, quick-break, with trip-free operation, incorporating an internal trip bar and a single external handle. Breakers shall be thermal magnetic type rated not less than 35,000 amperes RMS symmetrical. Breakers rated above 150 amperes shall be provided with interchangeable trips. Breakers shall be provided with control accessories, such as shunt trip, auxiliary contacts, etc., as indicated or required for proper interlocking and operation.
- K. Unless specified otherwise, main breakers shall be as specified for feeder breakers; however, main breakers shall be shall be 100% rated, UL-approved for use as service entrance equipment, and shall be fully rated for the maximum fault current, without the use of current limiters. Each main breaker shall be equipped with a completely self-contained temperature insensitive automatic trip unit with selective tripping characteristics including adjustable long time setting, adjustable long time delay setting, adjustable short time setting, adjustable short time delay setting, adjustable instantaneous setting, and ground fault protection systems. Each main breaker shall be equipped with auxiliary contacts for remote indication of breaker status and overcurrent trip.
- L. Power monitoring units shall be complete microprocessor-based circuit monitors for each incoming line, and selected feeders as indicated. Power circuit monitors shall be equipped with data communications port, communications interface modules, protocol converters, etc. as required for remote monitoring from the OWNER's standard monitoring system. Power circuit monitors shall continuously monitor and display 3 phase current, voltage, power factor, frequency, wathours, varhours, demand current, and demand power, and shall store historical maximum and minimum data for each parameter monitored.

2.04 VARIABLE FREQUENCY DRIVES

- A. To ensure coordination, compatibility, and maximum interchangeability with the OWNER's existing standardized equipment, all variable frequency drive equipment shall be Eaton DG1 with integral DC Choke.
- B. Each variable frequency drive shall control the speed of a standard squirrel-cage induction motor by controlling the frequency applied to the motor and shall be designed to operate from a local manual speed potentiometer or remote automatic speed reference signal. The variable frequency drive shall convert incoming 3

SECTION 16400

ELECTRICAL APPARATUS

phase AC power to a variable potential DC and then to variable frequency AC by use of a full-wave diode bridge converter with line power factor in excess of 0.95 regardless of speed and load, and a 3 phase insulated gate bipolar transistor power module inverter with sine-coded pulse width modulated output.

- C. Variable frequency drives shall have a 110% continuous full nameplate current overload rating, and 150% for 60 seconds. Variable frequency drives shall be oversized where necessary to meet these current overload rating requirements.
- D. Each drive shall be contained within a gasketed, force-ventilated, free-standing motor control center style enclosure. Enclosures shall be equipped with replaceable filters.
- E. Each drive shall be equipped with input circuit breaker, output contactor, 3 phase temperature-compensated solid-state motor overload protection, and fault protection and indication as follows:
 - 1. Softstall
 - 2. Current limit
 - 3. Overcurrent
 - 4. Overvoltage
 - 5. Short-circuit at load
 - 6. Load-side ground fault
 - 7. Undervoltage
 - 8. Momentary power failure
 - 9. Electronic thermal overload protection
 - 10. Overtemperature
 - 11. Overfrequency
- F. Each drive shall be equipped with the following system interfaces:
 - 1. Auxiliary dry contacts for indication of drive operation
 - 2. Auxiliary dry contacts for indication of drive fault
 - 3. Isolated process control speed reference signal
 - 4. Digital diagnostic display for indication of drive diagnostic information
 - 5. Addressable serial communications link to allow drive programming, monitoring, and control
- G. Each drive shall provide independently adjustable acceleration (6-75 seconds), deceleration (6-75 seconds), minimum speed (70%-90%), maximum speed (75%-100%), and current limit (100%-120% FLA). All programmable parameters shall be adjustable from a door-mounted digital operator keypad.
- H. Each drive shall automatically restart and resume normal operation following a power outage.
- I. All VFDs shall be equipped with DV/DT drive output line conditioning as required to protect the connected motors from reflected wave high voltage impulses.
- J. All VFDs while operating at rated load shall limit harmonic current and voltage distortion in accordance with the recommendations of the latest edition of IEEE 519 for general systems during operation from the utility source and for dedicated

SECTION 16400

ELECTRICAL APPARATUS

systems during operation from the standby generator source. The VFD manufacturer shall provide harmonic filtering equipment required to meet this distortion limit and shall submit calculations to demonstrate compliance for drives operating from both sources.

2.04 PANELBOARDS

- A. Lighting and power distribution panelboards shall be dead-front type equipped with main circuit breaker or main lugs only, as indicated on the drawings. Lighting panelboards shall be suitable for 120/208 volt, 3 phase, 4-wire, or 120/240 volt, 1 phase, 3-wire installation as indicated. Power distribution panelboards shall be suitable for 277/480 volt, 3 phase, 4-wire installation.
1. Panelboards shall be constructed with reinforced galvanized steel frames, sequence phasing, copper or tin-plated aluminum bus bars, code-gauge galvanized steel boxes with adequate wiring gutters, and code-gauge steel front panels with gray enamel finish over a rust-inhibitor. All connections shall be anti-turn solderless mechanical type and each panelboard shall be provided with a solid neutral bar. Front panels shall be provided with hinged doors equipped with semi-concealed hinges, directory card holder, and flush type combination catch and lock (all locks keyed alike with a minimum of 3 keys for each panel). Panelboard enclosures located outdoors or in corrosive atmospheres shall be 316 stainless steel or fiberglass NEMA 4X.
 2. Main and branch breakers shall be bolt-on, quick-make, quick-break, thermal magnetic, molded case, trip-free type containing thermal inverse time delay and magnetic instantaneous over-current trip elements. Automatic tripping shall be indicated by the breaker handle assuming a clearly distinct mid-position. Branch breakers shall be interchangeable and shall be removable from the front of the panel without disturbing adjacent units. Multi-pole breakers shall incorporate internal trip bar and a single external handle.
 3. Breakers supplying receptacles located in restrooms, locker rooms, shower rooms, etc., or outdoors, or weatherproof receptacles located indoors, shall be GFCI. Breakers supplying unswitched lighting circuits shall be rated SWD. Breakers supplying heating, air conditioning and refrigeration equipment shall be rated HACR.
 4. Equipment ratings as indicated on the drawings shall be approximate. Panelboard and breaker ratings shall be coordinated with the installed service and the loads supplied. Unless indicated otherwise, breakers shall be rated not less than 10,000 amperes RMS symmetrical for 120/240 volts and 22,000 for 277/480 volts.

2.04 DRY TYPE TRANSFORMERS

- A. Dry type transformers for general power and lighting shall be 2-winding, self-cooled, power transformers with ratings as indicated on the drawings. Unless indicated otherwise, transformers 3 KVA and above shall be provided with 4 fully rated taps, two 2-1/2% above and two 2-1/2% below rated primary voltage. Each unit shall be provided with a 220 degrees C insulation system incorporating a maximum 150 degrees C temperature rise above 40 degrees C ambient and shall be designed for continuous operation at rated KVA.

SECTION 16400

ELECTRICAL APPARATUS

1. Transformer core shall be of high quality, cold-rolled, grain-oriented steel, annealed by the manufacturer for low loss and exciting current. Laminations shall be formed to eliminate burrs and annealed to reduce losses to a minimum. Winding conductors shall be annealed and insulated by the transformer manufacturer. Conductor surfaces shall be free from slivers, burrs, and other irregularities. Core and coil assembly shall be vacuum-impregnated for maximum resistance to moisture.
2. Enclosures shall be drip-proof and rodent-proof; all units installed outdoors shall be 316 stainless steel weatherproof construction.
3. All materials used in the transformers shall be flame-retardant and self-extinguishing and design shall incorporate vibration dampening systems.
4. Overload level, sound level, and BIL ratings shall meet or exceed NEMA and ANSI Standards.
5. Transformer energy efficiency shall meet or exceed the 2016 DOE efficiency standards.

PART 3 - EXECUTION

3.01 SERVICE AND TRAINING

- A. The major equipment manufacturer shall provide support and technical direction of installation, energization, and operation of the electrical equipment. Experienced field service engineering personnel shall be available at the job site, as needed, to provide the following factory service:
 1. Recommended procedures for checks and tests.
 2. Assist in solving erection problems by making critical checks and necessary adjustments.
 3. Supervise necessary operational tests, verify, and document test results.
 4. Perform final inspection of installed equipment.
 5. Participate in initial energization.
 6. Check and test all relays for proper operation. ELECTRICAL CONTRACTOR shall set relays as directed by the ENGINEER and shall submit a list of "as-left" settings.
 7. Provide revised factory drawings on an "as-built" basis.
 8. Conduct complete operation and maintenance training program (minimum 2-1/2 days' duration) at the job site for a minimum of 4 OWNER-selected operating personnel, prior to startup.
- B. Upon completion, final approved as-built wiring diagrams shall be permanently fastened inside the enclosure doors of each SWB section, MCC cubicle, etc. Wiring diagrams shall include all local and remote interconnections, in detail.
- C. Prior to startup, the variable speed drive manufacturer shall conduct a complete training program (minimum 2-1/2 days duration) at the job site for a minimum of 4 OWNER-selected operating personnel. The training program shall include operation, preventive maintenance, and troubleshooting instructions relative to all aspects of each variable speed drive system provided.

SECTION 16400

ELECTRICAL APPARATUS

- D. Each variable speed drive manufacturer shall provide complete drive operation and maintenance manuals.
- E. Each training program shall be scheduled a minimum of 14 days in advance. Proposed dates shall be submitted in writing for approval. The OWNER may exercise the option to audio- or video-tape each entire training program without restriction.
- F. The major equipment manufacturer shall provide a written, comprehensive, annually renewable service contract including all required or recommended maintenance service for a period of one year from the date of substantial completion. The contract shall specifically delineate all services rendered, equipment covered, and the annual renewal date.

END OF SECTION 16400

SECTION 16600

GROUNDING SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. In general, the work specified in this section of the Specifications includes the furnishing of all labor, material, and services necessary to install the following materials, including all fees, charges and permits necessary.

1.02 GENERAL REQUIREMENTS

- A. The project's grounding system shall consist of a grounding electrode system in accordance with NEC specifications, bonded to a main ground bus interconnecting all power distribution equipment. Ground rods shall be located at each service connection, transformer pad, generator pad, outdoor electrical equipment pad, and as indicated or required, and shall be bonded to the main ground bus. Ground rod sections shall be coupled and driven to establish a maximum resistance to ground of 5 ohms throughout the grounding system.

1.03 LIGHTNING PROTECTION

- A. The ELECTRICAL CONTRACTOR shall furnish and install a Master-Labeled lightning protection system in accordance with UL Master Label Code 96A, LPI Code 175, and NFPA Code 780 for each structure as indicated. Upon completion, a UL Master Label shall be furnished for each system.
- B. Streamer retarding air terminals and their associated parts shall be manufactured by Lightning Master Corporation of Clearwater, Florida.

1.04 SURGE PROTECTION

- A. The ELECTRICAL CONTRACTOR shall furnish and install UL 1449 (latest edition) listed surge protection devices (SPD) for the protection of all AC electrical circuits from the effects of lightning-induced currents, substation switching transients, and internally-generated transients from inductive and/or capacitive load switching.
- B. Each SPD unit shall be marked with a short circuit current rating and shall not be installed at a point on the system where the available fault current is in excess of that rating.
- C. Complete UL 1449 performance ratings, including the fault current rating and VPR rating, shall be posted on the UL label of each SPD.
- D. Submit copies of the UL Standard 1449 Listing documentation for each proposed SPD.

SECTION 16600

GROUNDING SYSTEM

PART 2 - PRODUCTS

2.01 GROUNDING

- A. Ground rods shall be minimum 20 feet long, 3/4-inch diameter, copper-clad steel sections.
- B. Main ground bus cable shall be minimum No. 4/0 (19 strand, tinned copper). Bonding jumpers shall be minimum No. 2. Unless noted otherwise, all grounding conductors shall be insulated and shall have green colored insulation.
- C. All grounding hardware such as clamps, connectors, couplings, lugs, bolts, nuts, and washers shall be of silicone bronze.

2.02 LIGHTNING PROTECTION

- A. All material furnished shall be copper or bronze UL-approved and labeled and of the size, weight, and construction to suit the application in accordance with UL and LPI code requirements and manufacturer's recommendations.
- B. Streamer retarding air terminals shall be minimum 5/8-inch diameter copper bars extending a minimum of 18 inches above the object protected. Bases shall be cast bronze with bolt pressure cable connections and shall be securely mounted with stainless steel bolts or screws. Conductors shall be minimum 29 strand 17 gauge copper.

2.03 SURGE PROTECTION

- A. AC power surge protection devices (SPD), formally transient voltage surge suppressors (TVSS), shall utilize heavy duty 'large block' MOVs, each exceeding 30mm diameter, with redundant modules per phase. SPD equipment shall provide suppression elements between all phases and each phase conductor and the system neutral. AC power surge protection equipment shall be APT, or equal.
- B. SPD shall be UL labeled as Type 1, intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- C. SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.
- D. SPD shall be UL labeled with 20kA Inominal (I-n) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.

SECTION 16600

GROUNDING SYSTEM

E. Minimum surge current capability (single pulse rated) per phase shall be:

Service Entrance Equipment:	300kA
Power Distribution Equipment:	200kA
Panelboards & Control Panels:	100kA

F. SPD shall provide surge current paths for all modes of protection: L-N, L-G, and N-G for Wye systems; L-L, L-G in Delta and impedance grounded Wye systems.

G. UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
208Y/120	700V	700V	1200V	700V
480Y/277	1200V	1200V	1800V	1200V

Numerically lower is allowed/preferred; old-style Suppressed Voltage Ratings (SVRs) shall not be submitted, nor evaluated due to outdated less-strenuous testing)

H. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV):

<u>System Voltage</u>	<u>Allowable Voltage Fluctuation (%)</u>	<u>MCOV</u>
208Y/120	25%	150V
480Y/277	15%	320V

I. SPD shall have UL 1283 EMI/RFI filtering with minimum attenuation of -50dB at 100kHz.

J. SPD shall include visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED. SPD shall include an audible alarm with on/off silence function and diagnostic test function (excluding branch).

K. Warranty – Each SPD shall have a warranty period of not less than 10 years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period.

PART 3 - EXECUTION

3.01 GROUNDING

A. The concrete-encased steel reinforcement within the foundation of each structure shall be grounded, with a minimum of one 20-foot ground rod, at each corner column and at intermediate columns at distances not to exceed 60 feet. The main ground bus shall be interconnected to each ground rod throughout the structural grounding system with a continuous tinned copper cable loop, minimum No. 4/0 (19 strand), buried 30 inches below grade and 24 inches outside the structural footing.

SECTION 16600

GROUNDING SYSTEM

- B. A minimum of one 20-foot ground rod shall be located within each manhole and handhole. The main ground bus shall be interconnected to each ground rod throughout the underground ductbank system with a continuous tinned copper cable, minimum No. 4/0 (19 strand), encased within the ductbank concrete envelope.
- C. All grounding connections shall be made in the same manner as current carrying connections are made with bolted clamps and solderless connectors. All underground grounding system connections, cable-to-cable, cable-to-ground rod, etc., shall be made with exothermic-fused connections. Contact surfaces shall be equal in area to those of current carrying connectors. All contact surfaces shall be thoroughly cleaned before connections are made.
- D. All ground connections shall be made with connectors or lugs approved for the specific type of connection.
- E. Insulated-type grounding bushings shall be used for all metallic conduit terminations.
- F. Permanent and effective ground connections shall be provided for transformer secondary neutrals.
- G. The metallic frame of each motor, generator, transformer, panelboard, lighting fixture, outlet box, control equipment enclosure, etc. shall be grounded to the ground bus of the power distribution equipment with an insulated grounding conductor included in the feeder or branch circuit conduit.
- H. The base of each street or area lighting standard shall be grounded to a ground rod driven into the ground near the base of the standard and to a separate ground wire run with the feeder. Ground rods shall be driven so that the top is 6 inches below finished ground grade. When the foundation is placed, a suitable ground wire shall be embedded in the concrete to facilitate connection to the base on the inside.
- I. Installed ground cables shall be protected from subsequent mechanical damage. Sleeves shall be provided in foundation walls and in floors to facilitate installation of ground cables. Where ground cables enter buildings through sleeves, the sleeves shall be sealed with jute packing and approved sealing compound.

3.02 LIGHTNING PROTECTION

- A. Streamer retarding air terminals, conductor cables, and downlead cables shall be located and spaced in accordance with UL and LPI requirements. Streamer retarding air terminals shall be located on every corner and along structure perimeters at distances not to exceed 20 feet, nor more than 24 inches from roof edge or ridge end. Streamer retarding air terminals that exceed 24 inches in length shall not exceed 25 feet spacing center to center. On a flat or gently sloping roof,

SECTION 16600

GROUNDING SYSTEM

additional streamer retarding air terminals are to be located at intervals not to exceed 50 feet on center.

- B. Downlead cables shall be installed at every corner column and at intermediate columns at distances not to exceed 100 feet. Minimum 3/4-inch Schedule 40 PVC conduits shall be embedded in each column as required for installation of downlead cables. Conductor cable fasteners shall be electrolytically compatible with the conductor and mounting surface and shall be installed not more than 3 feet apart on all conductors.
- C. Metal bodies of conductance or inductance, including HVAC units, antennae, roof drains, plumbing vents, etc., shall be bonded to the lightning protection system.
- D. The complete lightning protection system shall be bonded to the project's grounding system at each downlead cable. A minimum of three ground rods spaced 10 feet apart shall be bonded to the project's grounding system at each downlead cable connection.
- E. Each area high mast lighting standard shall be equipped with a top-mounted streamer retarding lightning rod, downlead cable inside the pole, and base-mounted circuit surge protector.
- F. Each low voltage panelboard shall be equipped with full service rated lightning arrestors ahead of the main.
- G. Each installed lightning protection system air terminal that represents a potential impalement hazard shall be equipped with a flathead retro-fit slip-on impalement protector.

3.03 SURGE PROTECTION

- A. Service Entrance - Each SPD installed on service entrance equipment shall be replaceable modular construction. A UL approved disconnect switch shall be provided as a means of servicing disconnect if a 60A breaker is not available.
- B. Power Distribution - Each SPD installed on switchboards or motor control centers shall be replaceable modular construction. Each SPD shall have an independent means of servicing disconnect such that the protected power distribution equipment remains energized. A 30A breaker (or larger) may serve this function.
- C. Sub Panels - Each SPD installed on power distribution panelboards, lighting panelboards, control panels, unit equipment, etc. shall be encapsulated construction.
- D. SPD equipment shall be installed per manufacturer's installation instructions with lead lengths as short (less than 24") and straight as possible. Gently twist conductors together.

SECTION 16600

GROUNDING SYSTEM

- E. Installer may reasonably rearrange breaker locations to ensure short & straightest possible leads to SPDs.
- F. SPD shall be installed on the load side of the main service disconnect.
- G. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.
- H. Status indication pilot lights for each SPD shall be remote mounted and shall be visible from the front of the protected equipment enclosure.

END OF SECTION 16600

SECTION 16900

INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. In general, the work specified in this section of the specifications includes the furnishing of all labor, material, and services necessary to install the instrumentation, control and monitoring systems, including all fees, charges, and permits necessary.
- B. The ELECTRICAL CONTRACTOR shall make all interconnections required between transmitters, receivers, recorders, indicating instruments, control panels, and miscellaneous devices, and shall provide for electrical supply to metering and signal systems.
- C. All conduit and wiring between electrical and instrumentation panels, all field-mounted devices, and power sources shall be furnished and installed as required for a complete operable system.
- D. The instrumentation equipment locations and conduit drawings are diagrammatic to show the general scope and route of instrumentation system conduit. The ELECTRICAL CONTRACTOR shall provide all conduit and wiring necessary for the complete instrumentation and control system requirements, in accordance with these specifications, and without additional cost to the OWNER.
- E. Unless otherwise indicated, all electrical equipment and installation shall be in accordance with Division 16 of these specifications.

1.02 SYSTEM RESPONSIBILITY

- A. To ensure coordinated control systems, to properly achieve the indicated functions, and to provide a maximum interchangeability of equipment items and parts, the complete instrument and control system shall be furnished by a single Instrumentation System Supplier who shall be responsible for the satisfactory operation of the system.
- B. The Instrumentation System Supplier shall be an OWNER approved SCADA system integrator: GCS or pre-approved equal.
- C. The Instrumentation System Supplier shall maintain permanent in-house system engineering and fabrication facilities including a quality assurance organization with the capability to perform complete system checkout and simulation in the shop prior to shipment.
- D. The Instrumentation System Supplier shall maintain a permanent field service ENGINEER for maintenance service.
- E. The Instrumentation System Supplier shall perform all system engineering, prepare all necessary internal and external wiring and piping drawings, and assume full responsibility with the performance requirements of these specifications, and as required for a complete and operable facility.

SECTION 16900

INSTRUMENTATION AND CONTROLS

- F. The Instrumentation System Supplier shall be responsible for providing all applications programming and configuration services to accomplish the control and monitoring functions described in the Specifications and Contract Drawings.
- G. The Instrumentation System Supplier shall provide all programming functions including, but not limited to, any control strategies and communications.
- H. The Instrumentation System Supplier shall also provide all application programming and configuration services necessary to produce the HMI graphic displays, reports, trends, historical archive, etc. as described in the Specifications and Contract Drawings.
- I. The Instrumentation System Supplier shall coordinate the control systems for proper operation with related equipment and materials furnished by other suppliers under other sections of these specifications and with related existing equipment.
- J. Auxiliary and accessory programming structures necessary for system operation or performance shall be included whether or not they are specified or shown on the contract drawings.
- K. All equipment shall be controlled in full conformity with the specifications, drawings, engineering data, instructions, and recommendations of the equipment manufacturer.
- L. To facilitate the OWNER's future operation and maintenance requirements, all programming and operator interface development shall match the form and function of the existing SJCUD standards.
 - 1. The existing programming and operator interface development for the SJCUD Bannon Lakes Reclaimed Water SCADA System shall serve as the initial model to be duplicated with site specific adaptations and additions as required for the CR-208 GST & Booster PS facilities
- M. The Instrumentation System Supplier and the Electrical Contractor shall coordinate and schedule all testing procedures with the Engineer, Owner and all affected Contractors.

1.03 SUBMITTALS

- A. The Electrical Contractor's attention is directed to the requirements of the general contract conditions with regard to submissions for approval.
- B. In order to facilitate review and approval of the proposed system, shop drawing submittals shall be made in three steps. The first submittal shall include all field instruments. The second submittal shall include all instrumentation system hardware including all instrumentation and control panels submittals. The third submittal shall include all instrumentation system software and programming information.
- C. Shop drawing submittals shall be in accordance with the General Conditions and shall include the following:
 - 1. Field Instrument Submittal

SECTION 16900

INSTRUMENTATION AND CONTROLS

- a. Instrument data sheets indicating all pertinent data including complete model number, and description of each option and accessory.
- b. Each instrument shall be identified by tag number and nomenclature as indicated on the drawings and in these specifications.
2. System Hardware Submittal
 - a. Complete front panel view with component locations, subpanel view with component locations, and electrical schematics.
 - b. Functional description of the entire system including individual loop diagram descriptions.
 - c. Detail loop diagrams showing both piping and wiring requirements for each analog instrument loop in the system.
 - d. Component drawing for each component showing dimensions, mounting, and external connection details.
 - e. Detail layout, dimensions, fabrication, piping, and wiring schematic, connection, and interconnection drawings for each instrumentation panel, graphic display, termination cabinet, etc.
 - f. Component manufacturing data sheet for each component indicating pertinent data and identifying each component by item number and nomenclature as indicated on the drawings and in these specifications.
3. System Software Submittal
 - a. Preliminary Graphics Submittal
 - b. Process Control Strategy, Graphic Screen and Reports Submittal
- D. Preliminary Graphics Submittal: The preliminary graphics submittal shall be reviewed at first coordination meeting and shall include the following:
 1. Standard symbols
 2. Standard color conventions to be used for pumps, valves, filters, pipe colors, equipment on and off, alarm status colors, etc.
 3. Sample HMI graphic displays
 4. Sample equipment interface popup displays
 5. Alarm display descriptions
 6. Alarm acknowledgement descriptions
- E. Process Control Strategy, Graphic Screens and Reports:
 1. The Instrumentation System Supplier shall hold all necessary meetings at the SJCUD office building, or conduct a Teams meeting, to solicit the Owner and Engineer's input prior to submitting the process control strategies and operator interface submittals. These meetings shall also be used to establish standards for developing the database, trends, graphics, reports, and control strategies.
 2. The process control strategies shall be developed in a functional block (logic) diagram presentation based on information from the specifications and drawings. Included with each diagram shall be:
 - a. A short narrative of the control strategy
 - b. Any assumptions made in developing the program
 - c. I/O database list showing all field inputs and output signals, or data points associated with the control strategy
 - d. Cross-reference list of all I/O showing to which I/O modules or software modules they are linked
 - e. List of all operator inputs or outputs to and from the control strategy
 - f. Specific OIT and HMI graphic displays and reports related to the strategy

SECTION 16900

INSTRUMENTATION AND CONTROLS

- shall be illustrated, defined and formatted
- g. A narrative of the operation of any panels shall be described as it relates to the strategy
 - h. A narrative of failure contingencies shall be described in detail
3. This submittal shall cover any associated program (function block diagrams, script language, etc.) developed under this contract required to implement the control strategy specified.
 4. The annotated program shall be submitted in 8-1/2 inch by 11-inch format and electronic media for all logic developed. Annotation shall be 3 lines of 6 characters each for every logic contact. In addition, each network or rung shall be annotated so that a non-technical person can read and easily comprehend what control function the rung or network is performing.
 5. This submittal shall also include PLC I/O configuration tables, I/O reference usage table, complete cross-reference to specific rung used of all inputs, outputs, internal coils, data registers and special purpose coils. In addition, any special switch settings or hardware configuration requirements such as communications port configurations shall be described in detail and submitted.
 6. This submittal shall cover the specific control strategies as well as the semifinal details of the reports and process graphic displays. This submittal shall also include what appears on each display and what appears on each display and what calculations are required to support them.
 7. Each system point shall have the capability of being stored historically for an indefinite period of time and shall be capable of being changed. Each system point's raw value shall be available for trending.
 8. A complete list of all signals to be collected for long-term historical information shall be provided. This listing shall include frequency of data sampling and duration for which the data shall immediately accessible.
- F. Shop drawings shall include detailed Bill of Materials for each component.
- G. Operation and maintenance manuals, in accordance with the provisions of the general contract conditions, shall also be supplied. Operating instructions shall incorporate an updated functional description of the entire system including the system schematics that reflect as-built modifications. Special maintenance requirements particular to the system shall be clearly defined along with special calibration and test procedures.
1. A complete set of "as-built" wiring, fabrication, and interconnection drawings shall be included with the manuals.
 - a. Provide separate sets of 11x17 printed panel drawings in pressboard binders for installation within each respective panel.
 2. Provide copies of all PLC program files, OIT program files, HMI program files and VTScada program files, etc. in native format.
 3. Electronic copies of the O&M manuals with as-built drawings shall be provided on flash drive in Adobe PDF format.
 4. Electronic copies of the as-built drawings shall also be provided on flash drive in AutoCAD 2020 format.
 5. Electronic copies of all programming files shall be provided on flash drive.

SECTION 16900

INSTRUMENTATION AND CONTROLS

1.05 TESTING SUBMITTALS

- A. Testing Plan
 - 1. The testing plan shall demonstrate that the Instrumentation System Supplier has designed and configured a system that meets the design specifications. This submittal shall include written description and test forms, structured so that the Owner understands what the inputs are, what the predicted outputs should be, and what the actual outputs are when tested. Each page of the test plan should have sign-off and date block for the Instrumentation System Supplier, the Engineer, and the Owner.
 - 2. Refer to paragraph 3.06 TESTING AND STARTUP for a description of the tests to be performed, and specific test form requirements. The same test form template may be used for both the Operational Readiness Test (ORT) and the Functional Demonstration Test (FDT).
 - 3. This submittal must be approved before testing may commence.
- B. Test Documentation: Submit a copy of the completed and signed off test form, upon completion of each required test.
- C. Certification of Installation. Refer to paragraph 3.10 SITE ACCEPTANCE TEST (SAT).

PART 2 - PRODUCTS

2.01 GENERAL CRITERIA

- A. All of the equipment shall be the manufacturer's latest and proven design. Specifications and drawings call attention to certain features but do not purport to cover all details entering into the design of the instrumentation system. The completed system shall be compatible with the functions required and the equipment furnished by the ELECTRICAL CONTRACTOR and shall include all necessary control relays, contacts, and additional devices required for a complete, coordinated, operable facility.
- B. All electrical components of the system shall operate on 120/1/60 power, except as noted otherwise in the specifications.
- C. All controls for remote electrically-operated or motor-driven equipment shall be complete, including all necessary auxiliary relays so as to require only wiring and connections to the equipment control circuit. All contacts for control of remote motor-operated or electrically-operated equipment shall be rated not less than 10 amperes on 120 volts unless specified otherwise herein.
- D. All remote motor-operated or electrically-operated equipment shall have a separate 120 volt control circuit, except as indicated otherwise.
- E. All necessary fuses or switches required by the instrumentation manufacturer for his equipment shall be provided with the equipment. All instruments requiring an internal power supply shall have an internal ON-OFF switch.

SECTION 16900

INSTRUMENTATION AND CONTROLS

- F. The drawings and specifications indicate the energy sources that will be provided. Any other devices (isolation transformers, power supplies, lightning arresters, etc.) necessary to obtain proper operation and protection of the instrumentation system shall be furnished with the instrumentation system.
- G. Signal isolators shall be provided for all analog signals to auxiliary equipment remote from instrumentation panels.
- H. All printed circuit boards throughout the instrumentation system shall have a protective coating to prevent corrosion.
- I. All components shall be tagged with the item number and nomenclature given in the specifications and component tabulation lists.
- J. Field Mounted Instrumentation Weather Protection Enclosures: Each field mounted transmitter shall be installed within a NEMA 12/3R marine grade aluminum enclosure for weather protection. Enclosures shall exceed the dimensions of the enclosed transmitter by a minimum of six inches on all sides and shall permit full unobstructed access to the enclosed transmitter. Field instrumentation weather protection enclosures shall be equipped with the following features:
 - 1. Continuous hinged access door with 3-point latching handle.
 - 2. Ventilation louvers at top and bottom of both sides to promote convection cooling.
 - 3. Power and signal line surge protection in a wall mounted enclosure.
 - 4. Single gang switch ahead of the power line surge protection.
 - 5. Multi-conductor cable with cord connectors for all connections to the transmitter, surge protection, and switch.

2.02 CONTROL DEVICES

- A. Control Stations - Control stations shall be 30 mm, heavy-duty, corrosion resistant, water-tight and oil-tight, complete with NEMA 13 cast aluminum enclosures; Eaton Type E34, Square-D Type SK, or equal.
 - 1. Lockout stations shall be equipped with 316 stainless steel padlock devices for padlocking in the de-energized position; Eaton 10250A63, Square-D Type K5, or equal.
 - 2. Unless specified otherwise, control stations installed outdoors, or in corrosive atmospheres, shall have watertight, NEMA 4X cast aluminum enclosures.
 - 3. Control stations within hazardous locations shall be explosion-proof and shall have galvanized cast iron enclosures; Crouse-Hinds Type EFS, Appleton, or equal.
- B. Float Switches - Where required for control system operation, float switches consisting of a SPDT mechanical micro switch, rated 15 amps at 120 VAC, in a chemical-resistant casing, complete with chemical-resistant flexible cord, shall be provided; Flygt PSM or equal.
- C. Electrode Level Controls - Where required for control system operation, industrial-type, conductance actuated, 120 volt primary, single or differential liquid level controls shall be provided; Warrick Controls Series 1, 2, or 17 (as required) or equal. Unless indicated otherwise or required for the specific application, each electrode

SECTION 16900

INSTRUMENTATION AND CONTROLS

control system shall consist of PVC-coated 316 stainless steel electrodes with a NEMA 4X cast aluminum holder with 316 stainless steel body and a 3-pole transformer/relay combination with a NEMA 4X cast aluminum enclosure.

- D. Pressure Switches - Where required for control system operation, adjustable deadband, industrial pressure switches shall be provided; ASCO Tri-Point, Square D 9012-G, or equal. Pressure switches shall be watertight (or explosion-proof as required), die-cast copper-free aluminum construction, with 316 stainless steel wetted parts. Contacts shall be DPDT rated 5 amps at 120 VAC. Each pressure switch shall be equipped with a 316 stainless steel, adjustable, self-cleaning pulsation dampener and a 316 stainless steel diaphragm isolation sleeve, Red Valve Series 42 or equal.
- E. Temperature Switches - Where required for control system operation, adjustable deadband, industrial temperature switches shall be provided; ASCO Tri-Point or equal. Temperature switches shall be watertight (or explosion-proof as required), die-cast copper-free aluminum construction with 316 stainless steel sensing probe. Contacts shall be DPDT rated at 5 amps at 120 VAC.
- F. Limit Switches (Leverless) - Where required for control system operation, magnetic target sensing, leverless limit switches shall be provided; GO Switch Model 81. Limit switches shall be NEMA 4X, hermetically sealed, 316 stainless steel construction. Limit switches shall be equipped with 72 inch potted leads. Unless otherwise required by the application and installation, limit switch outlet shall be located at the bottom of the enclosure. Limit switches shall not require input power for operation. Limit switch contacts shall be DPDT rated 10 amps at 120 VAC. Limit switches located in hazardous locations shall be explosion proof and intrinsically safe
- G. Alarm Horns - Alarm horns shall be piezoelectric audible signal devices; Mallory Sonalert, or equal. Each alarm horn shall be equipped with an enable/disable control switch. Unless indicated otherwise, alarm horns shall be installed within the associated control equipment enclosure. Exterior alarm horns shall be weatherproof semi-flush mounted.

2.03 CONTROL COMPONENTS

- A. General - Where indicated on the drawings, or required by the functions specified, control components shall be furnished and installed with-in control panels, motor control center, or other approved locations. Suitable nameplates shall be provided for all panel door or surface-mounted control devices. All component terminals, including auxiliary contacts, shall be wired to master terminal boards.
- B. Instruments - Instruments shall be of standard size not less than 5-1/2" in width and they shall present a uniform appearance when mounted upon the panels. Instruments shall have scales 5" in length and shall be accurate within 1% of full scale. Instrument scales shall be selected with full-load readings at 75% of the scale range, unless specified otherwise or approved.
- C. Pilot Devices - Selector switches, pushbuttons, indicating pilot lights, and additional pilot devices as required, shall be 600 volt rated heavy-duty, oil-tight, 30mm pilot devices as manufactured by General Electric, Cutler-Hammer, or equal.

SECTION 16900

INSTRUMENTATION AND CONTROLS

1. Pushbuttons shall be standard type with anodized aluminum rings and colored buttons.
 2. Selector switches shall be standard handle type with anodized aluminum rings and handles.
 3. Pilot lights shall be full brightness LED type.
 4. All pilot devices shall have appropriate nameplates and locking means for locking in the de-energized mode, and shall be color coded (red - start, on, open, up; green - stop, off, close, down; black - test, silence, miscellaneous).
- D. Running Time Meters - Hour meters shall be non-reset type with register to indicate hours and tenths of hours up to 99,999.9 hours. Each meter shall be a 2-1/2" round panel mounting type, suitable for operation on 120 volt control circuits; Engler Model 10NG1 or equal.
- E. Counters - Operation counters shall be non-reset electromechanical totalizing type with register to indicate total pulses (contact closures) to 999,999 in one-count steps. Each counter shall be minimum 2" square panel-mounting type, suitable for operation on 120 volt control circuits; Hecon EM 800 or equal.
- F. Timers - Where required for control system operation, multifunction programmable timing modules shall be provided. Timers shall have timing modes and cycle times as indicated, shall be provided for operation at voltage indicated, and shall have DPDT contacts; Potter & Brumfield CNS-35-96, or equal.
- G. Automatic Alternators - Where required for control system operation, duplex DPDT plug-in automatic alternators shall be provided; Diversified Electric Model ARA-120-ADA or equal. Alternators shall be installed with hold-down springs, and a lead selector switch (1-AUTO-2) to permit manual and automatic selection of the lead sequence. For triplex systems, 3 input 3 output triplex alternators shall be provided. Triplex alternators shall be installed with plug-in base, hold down springs, and a lead selector switch (AUTO-1-2-3).
- H. Control Relays - Where required for control system operation, control relays shall be 3P3T, 11 pin octal type, with 10 amp contacts, internal LED, test button, and large ice cube style case; Cutler-Hammer D3PF3AA, D3PF3AT1, or equal.
1. Time delay relays shall be potentiometer adjustable time setting, 1.0% repeatability, 2PDT plug-in type time delay relays with, 10 amp contacts, 8-pin square sockets and hold-down springs. Delay on de-energize mode shall not require input power during the timing; Potter & Brumfield CK Series, or equal.
- I. Shock Relays - Where required for control system operation, electronic sensor shock relays that detect overloads and unexpected shock loads shall be provided; Tsubaki TSB-SS Shock Relay.
- J. Power Monitors - Where required for control system operation, 3 phase power monitors shall be provided. Power monitors shall be surface-mounted type consisting of a phase angle sensing circuit driving a DPDT electromechanical relay. Power monitors shall sense loss of any phase, low volt-age on any or all phases, and phase sequence reversal. Power monitors shall be field-adjustable, provided with fault indication, and adjustable time delay (0-20 seconds); Diversified Electronics Series SLD or equal.

SECTION 16900

INSTRUMENTATION AND CONTROLS

2.04 PROGRAMMABLE LOGIC CONTROLLERS

- A. General: Each programmable logic controller (PLC) shall be designed to provide monitoring and control in the form of relays, counters, timers, sequencers, etc., and shall consist of a processor unit, local and remote input/output units, power supplies, appropriate programming device, and all required peripherals, accessories, etc.; Motorola ACE3600, or ENGINEER pre-approved equal.
1. The entire controller shall be suitable for installation and operation within harsh industrial environments, including 5-95% non-condensing humidity, 0-60°C temperature, vibration, shock, surges, etc., with-out fans, air conditioning, or electrical filtering.
 2. Each controller shall be programmed in simple "ladder diagram" language and shall be easily programmed with a portable programming panel as system requirements change.
 3. Unless indicated otherwise, each PLC shall be factory-loaded and edited in the field and shall include hardcopy final programming and ladder diagram printouts with complete system operating descriptions.
- B. Each PLC shall be fully equipped to monitor all equipment status, alarm, and instrumentation system analog signals; control selected equipment operations; and seamlessly connect to the communications network. Unless otherwise indicated, PLC configuration shall be based upon the following standardized components:
- | | | |
|----|------------|-----------------------------|
| 1. | F7509/V448 | CPU3680 |
| 2. | VA00360AA | Security Enable |
| 3. | V212 | Ethernet Plug-in Port |
| 4. | V261 | Power Supply |
| 5. | V114 | Battery Backup |
| 6. | V379 | 32 DI Modules |
| 7. | V616 | 16 DO Modules |
| 8. | V463 | 16 AI Modules |
| 8. | V118 | 4 AO Modules |
| 9. | V260 | 24V Floating Power Supplies |
- C. Operator Interface Terminals: PLC panels shall be equipped with an operator interface terminal (OIT) custom configured with menu driven dynamic color graphic display screens to provide local monitoring and control.
1. OIT screens shall include, but shall not be limited to, the following:
 - a. PLC I/O Module Status Screens.
 - b. Analog Signal Trend Screens
 - c. Alarm Status Report Screen
 - d. IP Camera Video Display Screens
 2. All PLC operator "adjustable" or "selectable" settings shall be accessible locally from the OIT and remotely from the SCADA System HMI.
 3. Operator interface terminals shall be minimum 12.1 inch, 1024 x 768 high-resolution TFT, 32-bit RISC Cortex-AB 1Gz CPU, and Ethernet communications: Maple Systems HMI5121XL, or pre-approved equal.
- D. Electronic and hard copies of all final approved PLC and OIT programming shall be furnished to the Owner with the O&M manuals.

SECTION 16900

INSTRUMENTATION AND CONTROLS

2.05 FIELD INSTRUMENTS

A. Magnetic Flow Meters:

1. Magnetic flow meters shall be of the pulsed DC short-form design utilizing electromagnetic induction to produce a 4-20 mA analog output signal and a scaled pulse output signal directly proportional to flow.
2. Metering tubes shall be constructed of Type 304 stainless steel with a 158°F rated ebonite hard rubber liner and ANSI 150# carbon steel flange end connections. Electrodes shall be Hastelloy.
3. Magnetic flow meters shall be NEMA 6P suitable for Class I, Group D, locations. Meter housings shall be provided with a corrosion-resistant epoxy coating. Meters shall be capable of submergence up to 30'.
4. Each meter shall be equipped with two non-corrosive Type 316 stainless steel grounding rings.
5. Flow meters shall be hydraulically calibrated and computer printouts of the actual calibration data shall be furnished with each meter.
6. Magnetic flow transmitters shall be of the feedback type utilizing solid-state printed circuit construction and shall be provided with low flow cutoff circuitry for positive return to zero during no flow conditions.
7. Each transmitter shall be remote mounted. Flow transmitter housings shall be NEMA 4X cast aluminum. Remote mounted transmitters shall be equipped with a full-scale indicating meter and observation window. Flow meter sensor cable length shall be as required to be installed within the conduit system and reach the remote transmitter without splices.
8. Magnetic flow meter accuracy shall be $\pm 0.4\%$ full scale for the range indicated. Magnetic flow meters shall be Siemens Mag 5100W with Mag 6000 transmitters.

B. Pressure Transmitters:

1. Pressure transmitters shall be variable capacitance or bonded strain gauge type for use with installation and process indicated. Transmitters shall incorporate temperature-compensated, solid-state electronic construction, and shall produce an analog signal linear with respect to pressure.
2. Transmitter electronics shall be mounted in a NEMA 4X plastic PBT housing and shall include an integral output meter. Transmitters shall be equipped with externally adjustable span and zero adjustments. The case shall be rotatable by 330 degrees, and the LC display shall be capable of being mounted in different positions, displaceable in 90 degree steps.
3. Transmitters shall be equipped with a 1 inch 316 stainless steel flush diaphragm process connection.
4. Transmitters shall be provided with a 316 stainless steel 2-valve isolation/vent manifold.
5. Pressure transmitter accuracy shall be $\pm 0.15\%$ of full scale for the required ranges. Pressure transmitters shall be Vega Vegabar 82 Model B82.IXDS DAGGSZXAIJKX, or pre-approved equal.

2.06 PANEL INSTRUMENTS

A. Digital Indicating Meters:

1. Digital indicating meters shall be self-contained, 4-1/2 digit indicators with minimum 0.5" high LED display, auto-zero, adjustable scaling, offset, and

SECTION 16900

INSTRUMENTATION AND CONTROLS

- decimal point location.
2. Digital indicating meters shall be housed in a dust-tight, high-impact plastic enclosure suitable for panel mounting.
 3. Digital indicating meters shall be calibrated to coordinate with the associated process input signal operating range with an overall accuracy of $\pm 0.01\%$ of reading.
- B. Signal Converters:
1. Where required for system operation, appropriate signal converters, integrators, square root extractors, summators, etc., signal modifying devices shall be provided.
 2. Each unit shall utilize plug-in assembly and shall be capable of performing the intended operation as an independent unit. Each unit shall be enclosed in a NEMA 1 enclosure.
 3. All necessary and appropriate adjustments shall be provided including deadband and time delay. Ten turn precision calibrated dials shall be provided for setting adjustments.
 4. Signal conditioning and processing modules shall be as manufactured by AGM or equal.

2.07 INSTRUMENTATION AND CONTROL PANELS

- A. General - The general arrangement of each panel is shown on the drawings. No attempt has been made to detail the complete mechanical and electrical construction of the panels. The instrument schematic and electrical drawings indicate the overall system requirements.
- B. Each panel shall be a gasketed NEMA 12 type enclosure, fabricated from minimum 11 gauge H.P.R. steel and adequately braced for rigidity and structural integrity. Panels shall incorporate front or rear access as indicated. Doors shall have hidden hinges, 3-point latches, and neoprene gaskets. All exterior welds shall be ground and sanded to a smooth finish. Steel shall be finished by bonderizing and painting with 2 coats of air-dry enamel. The inside of each panel shall be finished in white enamel with adequate lighting to permit proper servicing of components.
- C. Each instrumentation panel shall be entirely pre-wired to master terminal blocks, so located as to allow easy access for termination of field wiring, and to allow removal of each component without disrupting operation of the remaining components.
1. Pre-wired control cables with multi-pin cable connectors shall be provided for all interconnections between individually assembled panel sections.
 2. All necessary contacts for interlocking with the motor control center shall be dry-isolated contacts wired to the master terminal board.
 3. Terminal blocks for analog signal conductors shall be equipped with knife switch disconnects to facilitate signal testing and calibration.
- D. All instruments, display lamps, etc., shall be mounted on the panel fronts and wired to terminal blocks with identifying numbers. All wiring shall be neatly bundled with wire ties or in wireways and all wiring shall be identified by wire numbering. All external electrical connections shall be made to pressure type terminals at the bottom of each panel section.

SECTION 16900

INSTRUMENTATION AND CONTROLS

- E. Each instrumentation panel shall be equipped with a main circuit breaker, incoming service transient voltage surge suppressor, and all required power protection equipment, including noise isolation control power transformer, for operation and protection of each integral component, from a single power supply, as indicated. Noise isolation transformers shall incorporate noise and spike/surge suppression in addition to an electrostatic shield to provide 60 dB/120 dB transverse/common-mode noise attenuation.
- F. Each instrumentation panel shall be equipped with an uninterruptible power supply for complete power conditioning, isolation, and standby power.
- G. A control circuit breaker of adequate size for the equipment within the panel shall be provided inside each panel section for disconnecting 115 volt control power. Fuses shall be provided in individual circuits as required for proper protection. Nameplates shall be provided for all instruments located on the panel front.
- H. Inner panel wiring for instrumentation and control panels shall be single conductor, 600 volt, 125 °C rated UL Type AWM stranded tinned copper conductors with cross-linked polyethylene insulation, Belden 356 series, sized per National Electrical Code for load requirements. Wiring shall be run in wire duct. Wire identification in-side the panel shall be by machine printed heat shrink wire numbering.
- I. Detail fabrication and wiring diagrams for all panels shall be submitted for approval by the ENGINEER prior to fabrication.

2.08 SCADA SYSTEM

- A. The existing St. Johns County Utility Department NW WTP SCADA System, and the countywide Master SCADA System, shall be modified and expanded as required to completely incorporate the new facilities. The SCADA system expansions and modifications shall be provided by the instrumentation system supplier who shall be responsible for the satisfactory operation of the entire system.
- B. The supervisory control and data acquisition (SCADA) system shall be a complete integrated system furnished and configured by the Instrumentation System Supplier who shall provide all the equipment and appurtenances and shall be responsible for the satisfactory operation of the entire system. The SCADA system shall include all hardware and software components required for complete system operation.
- C. In accordance with SJCUD standards, the basis of design for the SCADA system HMI software shall VTScada HMI SCADA Software by Trihedral, Inc.
- D. Programmable logic controllers (PLC) shall provide the primary interface between the field devices and the SCADA system HMI.
 - 1. To ensure coordination, compatibility, and maximum interchangeability with existing SJCUD systems, the basis of design for the SCADA system PLCs shall be Motorola ACE3600 programmable logic controllers.
- E. Operator Interface Terminals: Each PLC shall be equipped with an operator interface terminal (OIT) custom configured with menu driven dynamic color graphic display screens to provide local monitoring and control.
 - 1. OIT screens shall include, but shall not be limited to, the following:

SECTION 16900

INSTRUMENTATION AND CONTROLS

- a. Primary Overview Screen
 - b. Detailed GST Screen
 - c. Detailed Pump Screens
 - d. Setpoint Screen
 - e. PLC I/O Module Status Screens
 - f. Analog Signal Trend Screens
 - g. Alarm Status Report Screens
 2. All PLC operator “adjustable” or “selectable” settings shall be accessible locally from the OIT and remotely from the SCADA System HMI.
 3. To ensure coordination, compatibility, and maximum interchangeability with existing SJCUD systems, the basis of design for SCADA system OITs shall be Maple Systems HMI5121XL.
- F. The SCADA system shall be fully equipped to provide seamless network communications between PLCs, SCADA system HMIs, SJCUD NW WTP SCADA system, and the SJCUD countywide master SCADA system.
- G. The SCADA system shall be fully equipped to monitor all equipment status, alarm, and instrumentation system analog signals, and control selected equipment operations.
- H. The SCADA system shall be configured to provide all output signals required for control system operation including digital output signals for remote alarm monitoring, digital output signals for remote control interlocking, and analog output signals for remote indication and equipment control.
- I. The Instrumentation System Supplier shall provide complete system configuration submittal data, including detailed I/O signal listings, proposed ladder logic, etc. for coordination and approval prior to implementation.
- J. The Instrumentation System Supplier shall provide all SCADA system PLC and HMI programming and shall configure all network communications.
- K. The preliminary SCADA system installation, including HMI development, communications system configuration, and PLC operation shall be loaded, and tested at the Instrumentation System Supplier manufacturing facility, and shall be witnessed and approved by SJCUD and the ENGINEER. The performance demonstration shall utilize the actual components to be installed.
- L. System startup and testing shall be provided by the Instrumentation System Supplier and shall be witnessed and approved by SJCUD and the ENGINEER.

PART 3 - EXECUTION

3.01 SYSTEM DESCRIPTIONS

A. GENERAL

1. The general arrangement of the analog instrument and control system is shown on the drawings. No attempt has been made to detail on the drawings all accessories and devices required for the complete system.
2. The Instrumentation System Supplier shall be responsible for the preparation of all detail installation drawings showing wiring, piping, mounting, etc. The

SECTION 16900

INSTRUMENTATION AND CONTROLS

- Instrumentation System Supplier shall be responsible for furnishing all devices required for a complete functioning system.
3. The term "SCADA System" shall be used to collectively describe all major components of the instrumentation and control system including PLC hardware, software, programming, and operator interface panel screen development; VTScada hardware, software, programming, and HMI screen development; and network communications systems.
 4. Plant monitoring, operation and control system programming shall be resident within the PLCs to the maximum extent possible.
 5. All operator "adjustable" or "selectable" settings shall be accessible from the PLC operator interface panels and the SCADA system HMI screens. Each setpoint shall include adjustable deadband and adjustable time delay.
 6. PLC operator interface panels, and SCADA system HMI screens, shall include Manual-Automatic selector switch, Start and Stop pushbuttons, and Remote mode status indication for each equipment item monitored or controlled. Additionally, manual and automatic pacing signal controls shall be provided for all variable speed equipment.
 7. The instantaneous flow rate and the running flow total for each flow signal shall be displayed in SCADA via the HMI. The average daily flow rate shall also be displayed in SCADA via the Historical Data Viewer.
 8. For each flow pacing signal, a 30 minute rolling average shall be calculated in the input PLC. The rolling average shall be initialized to the current flow rate when the PLC is powered up, and shall be updated once a minute, thereby utilizing 30 total samples for the calculation. The formula for the rolling average shall be as follows: $\text{New Rolling Average} = [\text{Current Instantaneous Flow} + (29 * \text{Current Rolling Average})] / 30$.
 9. The default 30 minute rolling average shall be operator adjustable for each individual flow pacing signal. For example, if "X" minutes is selected, the formula for the rolling average shall be: $\text{New Rolling Average} = [\text{Current Instantaneous Flow} + ((X-1)*\text{Current Rolling Average})]/X$.
 10. All processes that are proportional to the flow, or use flow signals for pacing, shall utilize the rolling average flow signal for the control logic.
 11. Flow signals shall be forced to zero anytime the associated pumping equipment is not in operation. Additionally, flow signals below an operator adjustable minimum flow set point shall be forced to zero.
 12. Speed signals, feed rate signals, etc. shall be forced to zero anytime the associated equipment is not in operation. Additionally, analog signals below an operator adjustable minimum flow set point shall be forced to zero.
 13. Automatic alternation controls shall alternate following each lead cycle, following an operator adjustable number of hours of operation, and at an operator selectable time of day. For each automatic alternation system, enable or disable shall be individually selectable for each alternation trigger. Only equipment that is ready to run when called shall be available to the automatic alternation sequence. If only one unit is ready it shall be the dedicated lead.
 14. The "ready" status of each equipment item monitored shall be displayed on the PLC operator interface panels, and SCADA system HMI screens. Ready status control logic shall confirm that the equipment to be controlled is in Remote and/or Automatic mode, does not have any active fault conditions, and does not have any inhibiting or disabling interlock conditions. If the control logic cannot determine any reason why the equipment item would not start when called to run, then the equipment item shall be deemed "ready".
 15. Manual reset for each fault shutdown or lockout condition shall be provided at

SECTION 16900

INSTRUMENTATION AND CONTROLS

the PLC operator interface terminals and SCADA system HMI screens. Additionally, automatic or non-automatic reset shall be operator selectable. Automatic reset shall include reset logic that is appropriate and safe for the operating conditions. Reset logic, such as an operator adjustable time delay following return to normal, or control logic conditions such as reaching an operator adjustable analog signal setpoint, shall be individually determined for each situation.

16. Equipment status monitoring shall include elapsed run time accumulation and control mode monitoring. Each control switch for each equipment item controlled shall provide an "AUTO" position status contact input signal.
17. Before operating any field device, the SCADA system program shall check to see that the device has been switched to the AUTO mode of operation. If the device is not in AUTO, the SCADA system shall set an error bit and suspend control of the device until it is switched to AUTO. The control system shall use the error bit to log a "Not in AUTO" status.
18. If at any time a field device fails to respond to an output command from the control system, the SCADA system shall set an error bit. The control system shall use the error bit to log a "No Response" alarm.
19. For each analog signal, high and low alarm setpoints, high and low alarm reset setpoints, high and low alarm time delays and high and low alarm reset time delays shall be operator adjustable at the SCADA system HMI.
20. Instrument signal values shall display "Invalid" when the signal value is out of range or non-responsive.
21. A timing countdown shall be displayed at the SCADA system HMI for each time control setpoint or time delay setting, to clearly indicate the instantaneous status of each timing period.
22. All equipment that is automatically controlled by the SCADA system, and that is in operation prior to a power outage, shall be systematically restarted upon restoration of power. The sequential restart control system shall be designed to minimize the starting load on the standby generator.

B. BOOSTER PUMP STATION

1. The Booster Station shall have two modes of operation: Storage Tank Fill Cycle Mode and Booster Pump Operation Mode. The pump station mode of operation selection shall be controlled by the system pressures and tank level. Both modes of operation may occur simultaneously.
2. Tank Fill Cycle Mode: During the storage tank fill cycle, the pressure sustaining fill valve pilot solenoid shall be energized to allow the valve to modulate open and fill the storage tank to an operator selectable high level.
3. Booster Pump Mode: During the booster pump operation mode, the booster pumps shall operate at variable speed to maintain an operator selectable booster pump pressure setpoint. Provide quadruplex lead/lag variable speed booster pump control system to maintain an operator adjustable booster pump pressure set point.
4. Standby Mode: During the standby mode the booster pumps shall remain off, and the fill valve shall remain closed.

3.02 WIRING:

- A. Identification: All single conductor wiring shall be color-coded as follows:
 1. 120 VAC Phase Red

SECTION 16900

INSTRUMENTATION AND CONTROLS

2. 120 VAC Neutral White
 3. Ground Green
 4. 24 VDC+ Blue
 5. 24 VDC- White with Blue Strip
- B. Analog signal twisted shield pair wiring shall be color-coded as follows:
1. 24 VDC + Red or White
 2. 24 VDC - Black
- C. Wiring for all instrumentation and control panels shall be 600 volt, 125 °C rated UL Type AWM stranded tinned copper conductors with cross-linked polyethylene insulation, sized per National Electrical Code for load requirements; Belden 356 series.
- D. All wire conductors and cabling shall be identified with permanent machine-printed wire markers. They shall be of the shrink-tube type and affixed to each end of each conductor, with numeric or alpha-numeric characters matching the as-built wiring diagrams for the control panels. Wrap-on hand-written markers will not be accepted.
- E. Wire Duct: All wiring shall be routed through a wiring duct system to provide wire protection and an organized appearance. Wire duct shall be permanently attached using screws into the back panel.
- F. Terminals: Terminal blocks for control and instrumentation conductors shall be 600 volt, rail mounted push-in cage clamp type terminal blocks with plastic pre-printed terminal numbering markers: Wago Top Job S series, or equal.
1. Minimum size shall be 4 mm.
 2. Terminal blocks for general control connections shall be feed-through terminal blocks.
 3. Terminal blocks for instrumentation signal circuits shall be knife type test/disconnect terminal blocks
 4. Terminal blocks for cable shield termination and grounding shall be ground blocks.

3.03 NAMEPLATES:

- A. Nameplates shall be a laminated two-part system using white letters on a black background providing protection against fading, peeling or warping. The labeling system shall be computer controlled to provide logos, post-script type or custom designs. The uses of embossed plastic type tags are not acceptable.
- B. As a minimum, the following components shall be labeled using a laser-screened Mylar nameplate:
1. Relays
 2. Fuses
 3. Circuit breakers
 4. Surge protectors
 5. Signal Isolators

SECTION 16900

INSTRUMENTATION AND CONTROLS

3.04 MOUNTING HARDWARE:

- A. All components shall be mounted using stainless steel machine screws. All holes shall be drilled and tapped. The use of self-tapping screws is unacceptable.

3.05 ELECTRICAL TRANSIENT AND SURGE PROTECTION:

- A. All components of the instrumentation system shall be equipped with suitable surge arresting devices to protect the equipment from damage due to electrical transients, including lightning induced electrical power surges.
- B. All power and signal circuits of each field instrument shall be protected with surge and transient protectors. Unless otherwise indicated surge and transient protectors shall be installed at both the source and destination ends of each circuit. Combination power and signal line surge and transient protectors shall be EDCO model SLAC-12036.
 - 1. Protectors for 120 volt power circuits shall be Citel DS40-120.
 - 2. Protectors for signal circuits shall be Citel DLAW-24D3.
- C. Surge and transient protectors shall be connected to the electrical system ground. Supplemental grounding shall be provided in accordance with the protection equipment manufacturer's recommendations.

3.06 TESTING AND STARTUP

- A. The startup and testing shall be in accordance with Section 01465 and shall include the following additional requirements.
- B. Testing shall include the following:
 - 1. Factory Testing
 - 2. Operational Readiness Test (ORT).
 - 3. Functional Demonstration Test (FDT).
 - 4. Site Acceptance Test (SAT).
- C. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system producing the correct result (effect), the specific test requirement will have been satisfied.
- D. All tests shall be conducted in accordance with prior Engineer-approved procedures, forms, and checklist. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.
- E. Copies of these sign off test procedures, forms, and checklists will constitute the required test documentation.
- F. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data, provide suitable means of simulation. Define these simulations techniques in the test procedures.

SECTION 16900

INSTRUMENTATION AND CONTROLS

- G. The Instrumentation System Supplier and the ELECTRICAL CONTRACTOR shall coordinate all testing with the ENGINEER, OWNER and all affected Contractors.
- H. The Engineer reserves the right to test or retest all specified functions whether or not explicitly stated in the prior approved test procedures.
- I. The Engineer's decision shall be final regarding the acceptability and completeness of all testing.
- J. The Instrumentation System Supplier shall furnish the services of servicemen, all special calibration and test equipment and labor to perform the field tests.

3.07 FACTORY TESTING

- A. The purpose of the factory testing is for the Instrumentation System Supplier to check and confirm the system functionality, performance, and stability of the hardware and software system prior to shipping the equipment to the project site. This type of testing should be part of any quality firm's internal QA/QC procedures.
- B. Temporary network connections will be required to confirm the network configuration. Temporary wiring of primary elements, final control elements, and field-mounted transmitters is not required.
- C. Tests to be performed shall include, but not be limited to, the following. Each of these tests shall be specifically addressed in the Test Procedure submittal.
 - 1. All panels and enclosures being provided shall undergo a thorough inspection to verify the integrity of the cabinet enclosures, frame structures, paint work and finish, etc. Review the panel drawings to ensure they accurately reflect the panel layout and wiring.
 - 2. Perform a system audit to verify all components have been staged for the test and have been documented properly with correct model numbers, serial numbers, etc. The following documentation of the audit shall be submitted with the test results and included as part of the O&M Manual:
 - a. For each workstation and server, list of all software installed (including the operating system), with software revision number, software improvement modules or patches installed, license number and owner registration information, warranty period, vendor and local distributor names and contacts.
 - b. For each microprocessor-based component connected to the control communication backbone in the system (PLCs, managed switches, protocol converters, communication cards on final field devices, radios, etc.), list the firmware revision, vendor and local distributor information, and system, warranty information, configuration parameters (e.g., communication settings, fail position settings, etc.)
 - 3. Panel wire pull tests shall be performed to ensure all wiring has been properly connected with the appropriate torque to prevent wires from coming loose.
 - 4. UPS shall be tested for correct sizing of backup battery, and to verify the UPS switch power correctly.
 - 5. A 100 percent I/O point checkout shall be performed to verify proper operation of the input/output points from the panel terminations to HMI nodes. At a minimum, the I/O checkout shall consist of four steps.
 - a. Discrete input signals shall be simulated with temporary wire jumper at

SECTION 16900

INSTRUMENTATION AND CONTROLS

- the field terminal blocks in the control panels to verify proper status in the HMI nodes.
- b. Analog input signals shall be connected to a signal generator at the field terminal blocks in the control panels to verify proper status in the HMI nodes and signals shall be verified at zero percent, 50 percent, and 100 percent of full scale.
 - c. Discrete output signals shall be tested by switching the equipment to manual control at the HMI nodes and turning the output on or other means to turn the output on. Then verify the output is on by connecting a digital multimeter to measure the continuity at the terminations, thus verifying the command from the PLC has properly executed the contact closure.
 - d. Analog output signals shall be tested by switching the equipment to manual control at the HMI nodes and turning the output on or other means to turn the output on. Then verify the output by utilizing a digital multimeter to measure the current or voltage generated at the termination points.
6. For each hardware enclosure, inspection shall include, but not be limited to, cabinet enclosures, frame structure, paint work and finish, dimensions, and hardware operability (i.e., fans, door hinges, key locks, etc.).
 7. For each subpanel, inspection shall include, but not be limited to, I/O subsystem physical layout, power supply sizing and mounting, cable routing, wire runs across hinges properly installed, fans and blowers unobstructed and mounted to maximize air flow, power conditioning correctly installed, and overall layout and installation of components meets manufacturer's recommendations and standard industry accepted practices.
 8. All other control panel circuitry.
 9. The following systems tests shall be performed:
 - a. Demonstrate the ability to share data between operator workstations and servers.
 - b. Demonstrate the ability of each workstation to print reports on all designated report printers.
 - c. Demonstrate the ability for each workstation to read and write designated files from servers and other workstations on the network.
 - d. Demonstrate the operability of all back-up and mass storage equipment.
 - e. Demonstrate communication failure and recovering self-healing ring testing.
 - f. Demonstrate total power failure and recovery of each control panel and PC. The UPS shall be removed for this test.
 - g. Demonstrate the capabilities of the historical server.
 - h. Demonstrate the failover capabilities of the redundant HMI servers.
- D. Upon successful completion of the factory testing, the Instrumentation System Supplier shall submit a record copy of the test results.

SECTION 16900

INSTRUMENTATION AND CONTROLS

3.08 OPERATIONAL READINESS TEST (ORT)

- A. Following installation of the process control system components and prior to startup and the Functional Demonstration Test (FDT), the Instrumentation System Supplier shall notify the ELECTRICAL CONTRACTOR that the system is ready for the ORT as defined below.
- B. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated, and adjusted on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and these Specifications.
- C. The Instrumentation System Supplier shall thoroughly test all I/O from the field device to the PLC terminals, and verify the PLC is powered up and the PLC is communicating to the facility HMI system. The Instrumentation System Supplier shall assist the Owner in testing I/O from the HMI to the field device.
- D. The Loop/Component Inspections and Tests shall be implemented using Engineer-approved forms and checklists, as follows.
 - 1. Each loop shall have a Loop Status Report to organize and track its inspection, adjustment, and calibration. These reports shall include the following information and check-off items with spaces for sign-off by the system supplier:
 - a. Project Name, Test Date, Instrumentation System Supplier Name, and Lead Instrumentation System Supplier Technician Name.
 - b. Loop Number.
 - c. Tag Number for each component.
 - d. Check-offs/sign-offs for each component: Tag/identification; installation; termination (wiring and tubing); scale, range, and setpoint as applicable; and calibration/adjustment (four-point for analog, set point for switches) rising and falling.
 - e. Check-offs/sign-offs for the loop: Panel interface terminations; I/O interface terminations; I/O signal operation; inputs/outputs operational (received/sent, processed, adjusted); total loop operation; process controller scaling and adjustment; and space for comments.
 - 2. Each active Analog Subsystem element and each I/O module shall have a Component Calibration Sheet. These sheets shall have the following information, spaces for data entry, and a space for sign-off by the Instrumentation System Supplier.
 - a. Project Name.
 - b. Loop Number.
 - c. Component Tag Number of I/O Module Number.
 - d. Component Code Number Analog System.
 - e. Manufacturer (for Analog system element).
 - f. Model Number/Serial Number (for Analog system).
 - g. Summary of functional requirements shall include, but not be limited to, scale and chart ranges of indicators, recorders, and transmitters/converters; functions of computing elements; and parameters of controllers (i.e., proportional, integral, derivative, reverse/forward acting, etc.). Calibrations shall include testing of analog input and output signals at zero, 10, 50, and 100 percent of span. Where appropriate, discrete input signals shall include details regarding actual trip points and reset points.

SECTION 16900

INSTRUMENTATION AND CONTROLS

- h. Space for comments.
 - i. Space for sign-off by the Instrumentation System Supplier and the Owner/Engineer witnesses.
 - 3. The Instrumentation System Supplier shall maintain the completed test reports at the job site and make them available to the Engineer/Owner at any time.
- E. These inspections, calibrations, and tests do not require witnessing. Any deficiencies found shall be corrected by the Instrumentation System Supplier before this test shall be considered complete.
- F. Upon successful completion of the ORT, the Instrumentation System Supplier shall submit a record copy of the test results to the Owner and Engineer and request the scheduling of the FDT as noted in the following section.

3.09 FUNCTIONAL DEMONSTRATION TEST (FDT)

- A. After successful completion of the ORT, and prior to startup and the 30-day Site Acceptance Test (SAT), the Instrumentation System Supplier shall notify the ELECTRICAL CONTRACTOR that the system is ready for the FDT as defined below.
- B. Loop-specific and non-loop-specific tests shall be the same as specified under the ORT, except that the tests shall be witnessed by representatives of the Engineer and/or the Owner.
- C. The Instrumentation System Supplier shall provide a copy of all as-built documentation, including panel drawings and programming logic, for reference by the witnesses during the tests.
- D. During the FDT, a demonstration of communication failure and recovery shall be accomplished. This test shall be scheduled and coordinated with Owner's personnel to minimize the impact on plant operations.
- E. In the event of rejection of any piece of equipment furnished by the Instrumentation System Supplier, or the failure of any test procedure, if the problem cannot be corrected immediately, the Instrumentation System Supplier shall perform repairs, replacement, and/or retest within 10 days.
- F. Upon successful completion of the FDT, the Instrumentation System Supplier shall submit a record copy of the test results to the Owner and Engineer and request the scheduling of the SAT as noted in the following section.

3.10 SITE ACCEPTANCE TEST (SAT)

- A. After completion of the Operational Readiness and Functional Demonstration Tests, the system shall undergo a 30-day Site Acceptance Test (SAT), under conditions of full plant process operation, without a single non-field-repairable malfunction.
- B. During this test, plant operations and Instrumentation System Supplier personnel shall be present as required to address any potential issues that would impact the overall system operation. The Instrumentation System Supplier is expected to provide personnel for this test who have an intimate knowledge of the hardware and

SECTION 16900

INSTRUMENTATION AND CONTROLS

software of the system. When Instrumentation System Supplier personnel are not on-site, provide cell phone/pager numbers that Owner personnel can use to ensure that support staff are available by phone and/or on-site within four hours of a request by operations staff.

- C. While this test is proceeding, the Engineer and Owner's Agent shall have full use of the system. Only plant operating personnel shall be allowed to operate equipment associated with live plant processes. Plant operations shall remain the responsibility of Owner and the decision of plant operators regarding plant operations shall be final.
- D. Any malfunction during the tests shall be analyzed and corrections made by the Instrumentation System Supplier. The Engineer and/or Owner will determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.
- E. Any malfunction during this 30 consecutive day test period which cannot be corrected by the Instrumentation System Supplier's personnel within 24 hours of occurrence, or more than two similar failures of any duration, will be considered as a non-field-repairable malfunction. Upon completion of repairs by the Instrumentation System Supplier, the SAT will be re-started from the date which the Instrumentation System Supplier successfully corrected the malfunction(s) and the Owner and Engineer have accepted and signed off on the repairs.
- F. In the event of rejection of any part or function, the Instrumentation System Supplier shall perform repairs or replacement within 10 days.
- G. All data base, process controller logic, and graphical interface system errors must be functioning as required per the specifications prior to the start of each test period. The 30-day test will not be considered successful until all data base points and logic functions are tested and verified to be correct.
- H. The total availability of the system shall be greater than 99.5 percent during this test period. Availability shall be defined as:

$$\text{Availability \%} = 100 * (\text{Total Testing Time} - \text{Down Time}) / \text{Total Testing Time}$$

Down times due to power outages or other factors beyond the Instrumentation System Supplier's control shall not contribute to the availability test times above.
- I. Throughout the duration of the SAT, no software or hardware modifications shall be made to the system without prior approval from the Owner and Engineer.
- J. Upon successful completion of the 30-day operation test and subsequent review and approval of complete system final documentation, the system shall be considered substantially complete, and the warranty period shall commence.
- K. Certification of Installation: Following successful completion of the 30-day test, the Instrumentation System Supplier shall issue a Certification of Installation. Certification shall be on Instrumentation System Supplier corporate letterhead and signed by an officer of the firm. Certification shall state that the process control system has been completed in conformance with plans and specifications. Certification shall be submitted to the Engineer as specified herein.

SECTION 16900

INSTRUMENTATION AND CONTROLS

3.11 TRAINING

- A. Following acceptance of the complete instrumentation and control system startup, each instrumentation and control system supplier shall conduct a complete training program (minimum 1 day duration) at the job site for a minimum of 4 Owner-selected operating personnel. The training program shall include operation, preventive maintenance, and troubleshooting instructions relative to all components of the system provided and shall include calibration demonstrations for each type of instrument provided.
- B. Each training program shall be scheduled a minimum of 14 days in advance. Proposed dates shall be submitted in writing for approval. The Owner may exercise the option to audio- or video-tape the entire training program without restriction.

3.12 SPARE PARTS:

- A. The Instrumentation System Supplier shall furnish, upon completion of the project, one year's supply of all consumable parts utilized within the instrumentation system.
- B. Spare parts shall include pilot lights (minimum 12 of each part number), fuses (minimum 12 of each part number).
- C. Spare parts shall include one PLC CPU, one PLC power supply, and one of each individual I/O module part number throughout the system.
- D. Spare parts shall include a minimum of 6 of each of the following control panel components: Digital Input Relays, Digital Output Relays, Analog Surge Protectors.
- E. Following startup and final acceptance the Instrumentation System Supplier shall replace all UPS batteries and RTU/PLC backup batteries with new fresh batteries.

END OF SECTION 16900

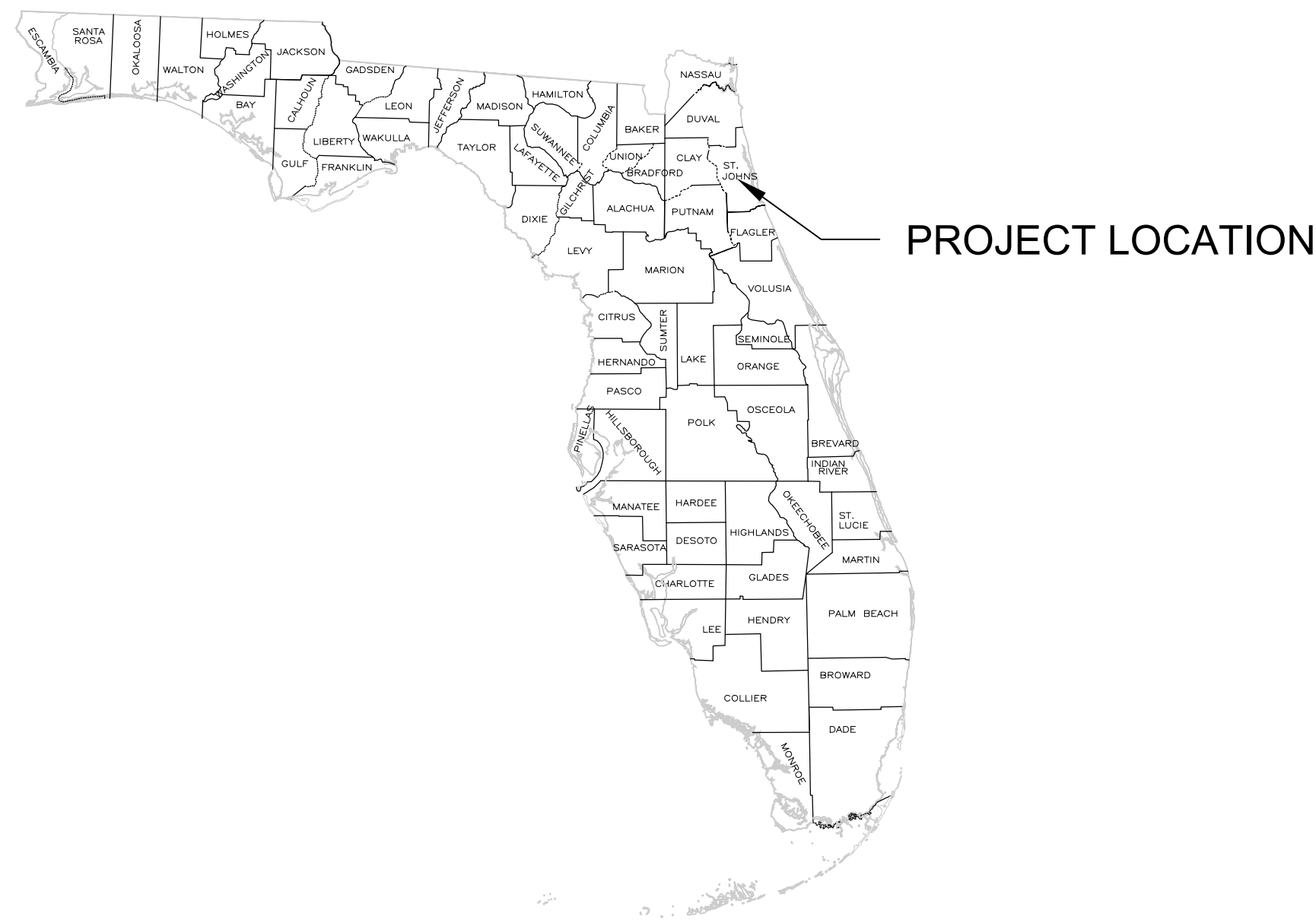
CONSTRUCTION DRAWINGS
FOR
CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION
ST. AUGUSTINE, FLORIDA

PREPARED FOR:

ST. JOHNS COUNTY UTILITY DEPARTMENT

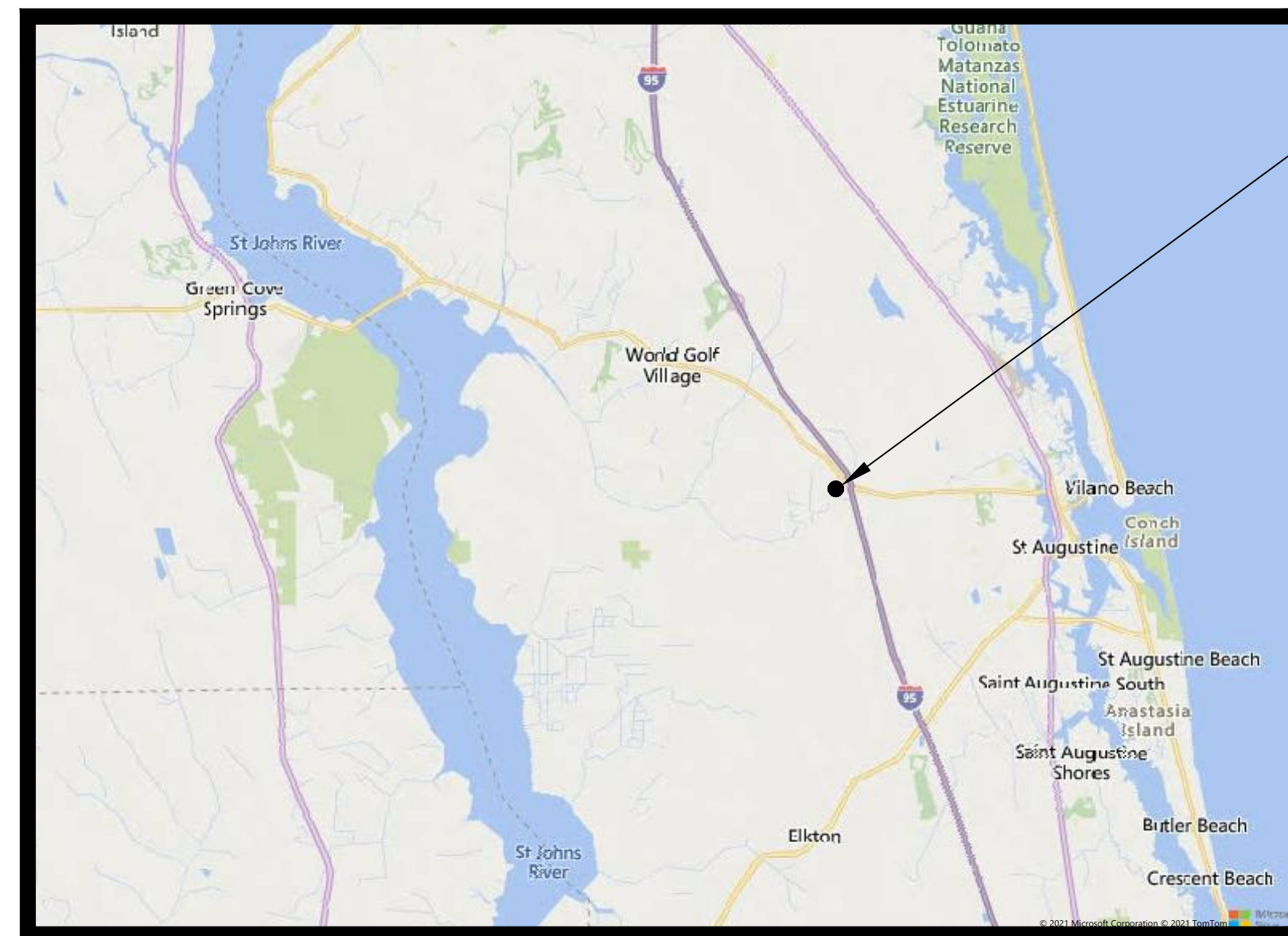
PROJECT NO. 4488-56302-6264-56302

OCTOBER 2022 – ELECTRICAL CONTRACTOR BID PACKAGE



VICINITY MAP

M.M. PROJECT
NO. 502100379-007



LOCATION MAP
SCALE: NTS

PROJECT LOCATION:
3575 AGRICULTURAL CENTER DRIVE
ST AUGUSTINE, FL 32092

M
M
MOTT
MACDONALD
Mott MacDonald Florida, LLC

Architects Engineers Surveyors
AA - C0000035 EB - 0000155 LB - 0006783
10245 Centurion Pkwy. N., Suite 320
Jacksonville, Florida 32256
Telephone: (904) 203-1090

GENERAL NOTES:

- DISTURBANCE SHALL BE LIMITED TO SJUCUD PROPERTY, RIGHT OF WAYS, AND UTILITY EASEMENT.
- THE CONTRACTOR IS RESPONSIBLE FOR PROCURING ALL MOBILIZATION, STORAGE, AND STAGING AREAS AS WELL AS ACCESS TO THE CONSTRUCTION SITES WITHIN THE RIGHT OF WAYS. EROSION CONTROL DEVICES AND BEST MANAGEMENT PRACTICES SHALL BE INSTALLED AND MAINTAINED AT ALL WORK SITES AND STAGING AREAS. THE CONTRACTOR SHALL FOLLOW ALL LOCAL GUIDELINES AND REGULATIONS REGARDING THE WORK, INCLUDING KEEPING MUD AND DIRT OFF PUBLIC ROADS AND PRIVATE ENTRANCES.
- ANY PUBLIC LAND CORNER, PROPERTY MONUMENTATION, OR BENCH MARK WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PROTECTED. IF A MONUMENT IS IN DANGER OF BEING DESTROYED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY. ANY CORNER MONUMENT OR LANDMARKS DISTURBED OR DESTROYED SHALL BE RESET BY A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF FLORIDA AT NO ADDITIONAL COST TO THE OWNER.
- FOR ALL TIE-IN PIPING, CROSSINGS, OR VALVES THE CONTRACTOR SHALL VERIFY ALL EXISTING PIPELINE ELEVATIONS, LOCATIONS, DIAMETERS, AND MATERIALS PRIOR TO SHOP DRAWING SUBMITTALS, NOTIFYING THE ENGINEER OF ANY CONFLICTS.
- SUBMITTAL OF AS-BUILT SITE SURVEY, INCLUDING BENCHMARKS, IS REQUIRED PRIOR TO SCHEDULING FINAL INSPECTION. AS-BUILT SURVEY SHALL BE SIGNED AND SEALED BY A REGISTERED LAND SURVEYOR IN THE STATE OF FLORIDA AND SHALL INCLUDE COORDINATES OF ALL NEW STRUCTURES, ALL PIPE FITTINGS AND VALVES 2-INCH AND LARGER AND ELEVATIONS OF ALL NEW STRUCTURES AND PADS AND PIPES, VALVES AND FITTINGS 2-INCH AND LARGER.
- ELEVATIONS SHOWN HEREON ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 AND ARE BASED ON BENCHMARKS AS SHOWN ON THE SURVEY.
- LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY AND AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THEIR FAILURE TO EXACTLY LOCATE FEATURES AFFECTING THEIR WORK.
- PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL PHYSICALLY VERIFY LOCATION OF ALL UTILITIES, ABOVE AND BELOW GROUND AND NOTIFY SJUCUD 72 HOURS PRIOR TO DIGGING IN ANY PORTION OF THE SITE.
- THE CONTRACTOR SHALL CONTACT THE ENGINEER'S OFFICE IMMEDIATELY UPON FINDING AND CONFLICTS DURING CONSTRUCTION ON ANY IMPROVEMENTS SHOWN ON THE DRAWINGS.
- THE CONTRACTOR SHALL NOTE ALL EXISTING UTILITIES ENCOUNTERED DURING EXCAVATION AND INCLUDE ON AS-BUILT DRAWINGS.
- THE CONTRACTOR SHALL, BY REPAIR OR REPLACEMENT, RETURN TO EQUAL OR BETTER CONDITION ALL PAVEMENT, SIDEWALK, LAWNS, UTILITIES AND OTHER ITEMS DAMAGED BY THE CONSTRUCTION ACTIVITY.
- ALL BRUSH, STRIPPING OR UNSUITABLE MATERIAL SHALL BE DISPOSED OF OFF-SITE AT THE CONTRACTOR'S EXPENSE.
- NO REPRESENTATION IS MADE REGARDING BALANCED EARTHWORK. ANY EXCESS MATERIAL, OR MATERIAL NOT SUITABLE FOR USE AS BACKFILL, SHALL BE HAULED AWAY TO AN APPROVED DISPOSAL AT THE CONTRACTOR'S EXPENSE, AND WHERE NECESSARY, SUITABLE FILL AND BACKFILL SHALL BE PROVIDED AND NO ADDITIONAL COMPENSATION SHALL BE ALLOWED.
- CONTRACTOR SHALL PERFORM IN THE PRESENCE OF SJUCUD AND THE ENGINEER A PRE-CONSTRUCTION VIDEO DOCUMENTING EXISTING CONDITIONS.
- ALL BURIED PIPING SHALL BE OF THE RESTRAINED JOINT TYPE.

UTILITY CONTACTS:

A. AT&T - GENERAL NUMBER	-----904-519-2529
B. AT&T - ADAM DUGAN - NORTH DISTRICT	-----904-781-0741
C. AT&T - BILL LAKE - SOUTH DISTRICT	-----904-303-8754
D. FLORIDA DEPT. OF TRANSPORTATION	-----904-360-5200
E. ST. JOHNS COUNTY - RIGHT-OF-WAY PERMITTING - RICK MAULDIN	-----904-209-0134
F. ST. JOHNS COUNTY - TRAFFIC SIGNALS - HANK MEIN	-----904-209-0173
G. COMCAST - EMERGENCY HOTLINE	-----904-380-6274
H. TECO/PEOPLES GAS - BEN MOBLEY	-----904-545-8958
I. SUNSHINE ONE CALL	-----811
J. FLORIDA POWER AND LIGHT - MIKE DEHAVEN	-----386-329-5102

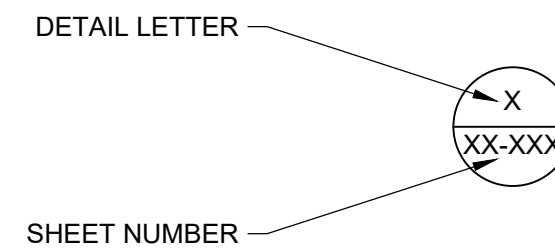
ABBREVIATIONS:

AC ASBESTOS CEMENT	H.C. HIGH CURB
A.G. ALLEY GRATE	INT. INTERSECTION
B. BASE LINE	INV. INVERT
B.M. BENCH MARK	I.P. IRON PIPE
BC BOTTOM OF CURVE	LT. LEFT
C.B. CATCH BASIN	MB MAIL BOX
C.I. CAST IRON	MES MITERED END SECTION
C CENTER LINE	MFR MANUFACTURER
C.E.P. CITY ELECTRIC POLE	M.H. MANHOLE
CONC. CONCRETE	N.T.S. NOT TO SCALE
CONST. CONSTRUCTION	O.E. OVERHEAD ELECTRIC
C.M.P. CORRUGATED METAL PIPE	O.T. OVERHEAD TELEPHONE
C.M.P.A. CORRUGATED METAL PIPE ARCH	P.R.M. PERMANENT REFERENCE
CPP CONCRETE POWER POLE	P.V.C. POLYVINYL CHLORIDE
CULV. CULVERT	R.C.P. REINFORCED CONCRETE PIPE
C&G CURB & GUTTER	RT RIGHT
C CUT	RWM RECLAIMED WATER MAIN
D.B.I. DITCH BOTTOM INVERT	R/W RIGHT OF WAY
D.W. OR DR DRIVEWAY	R.D. ROOF DRAIN
D.I. DUCTILE IRON	S.W. SIDE WALK
E.O.P. EDGE OF PAVEMENT	STA STATION
ELEV. ELEVATION	TCP TERRA COTTA PIPE
ERCP ELLIPTICAL REINFORCED CONC. PIPE	T.O.P. TOP OF PIPE
EXP. JT. EXPANSION JOINT	U.G.E. UNDERGROUND ELECTRIC
F. FILL	U.G.T. UNDERGROUND TELEPHONE
F.H. FIRE HYDRANT	U.S.C. & G.S. UNITED STATES COASTAL & GEODETIC SURVEY
FL FLOW LINE	V.C. VITRIFIED CLAY
FM FORCE MAIN	WM WATER MAIN
GALV./GLV GALVANIZED	W.V. WATER VALVE
G GAS LINE	WLP WOOD LIGHT POLE
G.V. GAS VALVE	WPP WOOD POWER POLE
HDPE HIGH DENSITY POLYETHYLENE PIPE	WTP WOOD TELEPHONE POLE
H.W. HEAD WALL	

GENERAL LEGEND AND SYMBOLS

	EXISTING	PROPOSED
ASPHALT		
BENCH MARK		
BALL VALVE		
CHECK VALVE		
CONCRETE		
EDGE OF PAVEMENT		
ELECTRIC OVERHEAD		
ELECTRIC UNDERGROUND		
FENCE		
FIBER OPTIC		
FORCE MAIN		
GAS MAIN		
GATE VALVE		
GRAVEL		
MAIL BOX		
MANHOLE		
OVERHEAD POWER POLE		
RIGHT OF WAY		
SANITARY SEWER		
SILT FENCE		
TREE LINE		
TELEPHONE		
UNKNOWN UTILITY		
WASH HOSE STATION		
WATER MAIN		
WATER METER		
WOOD WALK		
SOIL BORING		
TEST HOLE		

DETAIL CALL OUT



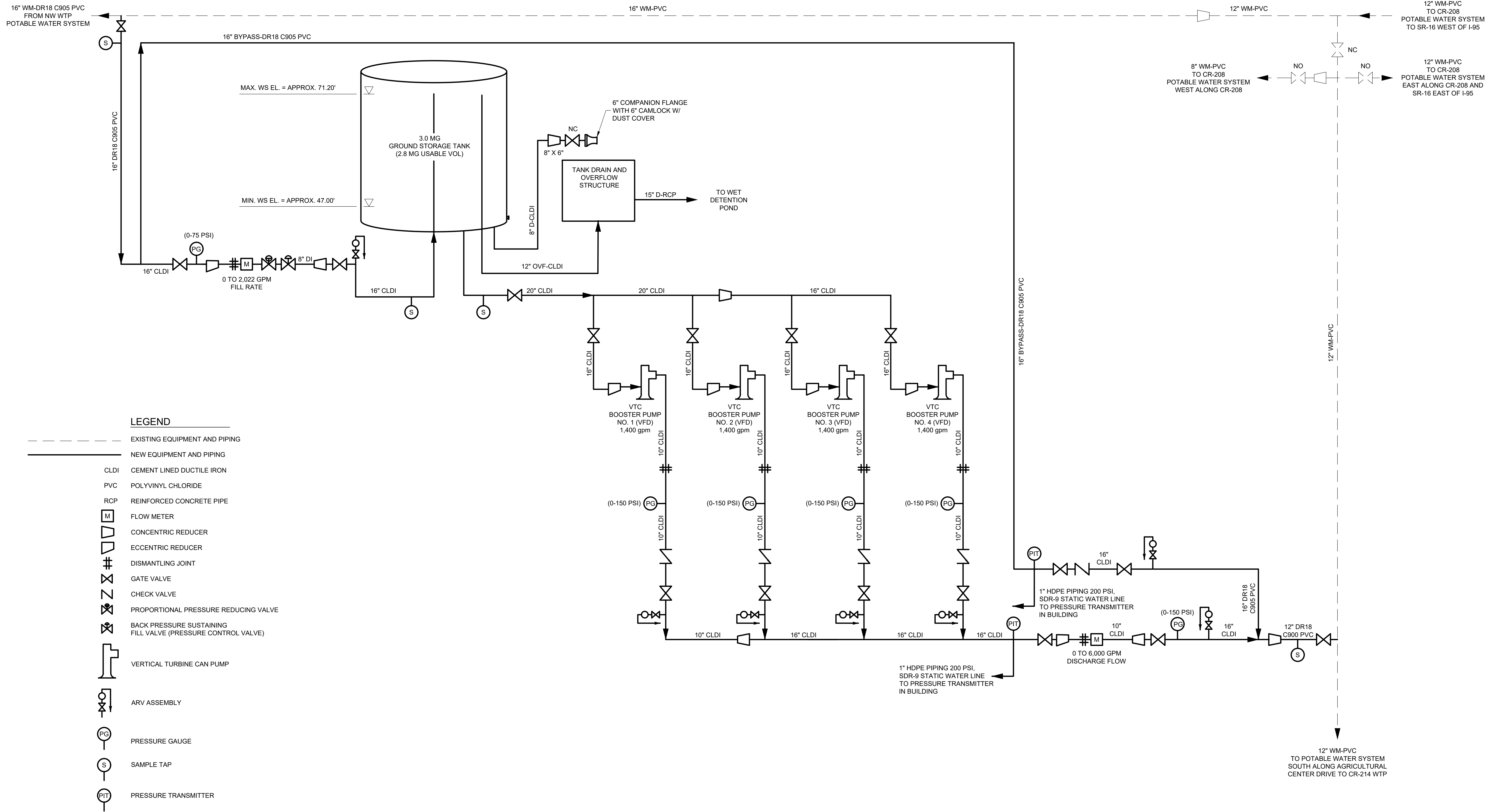
INDEX OF DRAWINGS

SHEET NO.	DWG NO.	TITLE
-	-	COVER
1	G-1	GENERAL NOTES, ABBREVIATIONS, LEGEND, SYMBOLS AND INDEX OF DRAWINGS
2	G-2	PROCESS FLOW DIAGRAM
3	C-1	EXISTING SITE, DEMOLITION & EROSION CONTROL PLAN
4	C-2	PROPOSED SITE LAYOUT PLAN
5	C-3	GRADING & DRAINAGE PLAN
6	C-4	YARD PIPING PLAN
7	C-5	WATER MAIN AND RECLAIMED WATER MAIN PLAN AND PROFILE
8	C-6	WATER MAIN AND RECLAIMED WATER MAIN PLAN AND PROFILE
9	C-7	WATER MAIN AND RECLAIMED WATER MAIN PLAN AND PROFILE
10	CD-1	EROSION CONTROL DETAILS
11	CD-2	CIVIL DETAILS
12	CD-3	CIVIL DETAILS
13	CD-4	CIVIL DETAILS
14	L-1	GENERAL LANDSCAPE NOTES
15	L-2	LANDSCAPE PLAN
16	L-3	LANDSCAPE SPECIFICATIONS
17	L-4	GENERAL IRRIGATION NOTES
18	L-5	IRRIGATION PLAN
19	A-0	CODE SUMMARY AND LIFE SAFETY PLAN
20	A-1	ARCHITECTURAL LEGENDS AND ABBREVIATIONS
21	A-2	FLOOR PLAN
22	A-3	EXTERIOR ELEVATIONS
23	A-4	BUILDING SECTIONS
24	A-5	ROOF PLAN
25	A-6	REFLECTED CEILING PLAN
26	A-7	WALL SECTIONS
27	A-8	DOOR AND WINDOW SCHEDULE AND DETAILS
28	A-9	ARCHITECTURAL MISC. DETAILS
29	S-1	STRUCTURAL GENERAL NOTES
30	S-2	STRUCTURAL GENERAL NOTES
31	S-3	BOOSTER PUMP STATION BUILDING PLANS
32	S-4	BOOSTER PUMP STATION BUILDING SECTIONS & DETAILS
33	S-5	SLAB AND FOUNDATION DETAILS
34	S-6	MASONRY DETAILS
35	S-7	GUARDRAIL DETAILS
36	M-1	BOOSTER PUMP ROOM PLAN
37	M-2	BOOSTER PUMP ROOM SECTIONS
38	M-3	GROUND STORAGE TANK SLAB PLAN
39	M-4	GROUND STORAGE TANK ROOF PLAN
40	M-5	GROUND STORAGE TANK SECTIONS
41	M-6	GROUND STORAGE TANK DETAILS
42	M-7	GROUND STORAGE TANK DETAILS
43	M-8	FILL VALVE, DISCHARGE FLOW METER, AND BYPASS PLANS AND SECTIONS
44	M-9	GROUND STORAGE TANK DRAIN AND OVERFLOW STRUCTURE PLAN AND SECTIONS
45	MD-1	MISCELLANEOUS MECHANICAL DETAILS
46	H-1	HVAC LEGEND, SYMBOLS, AND ABBREVIATIONS
47	H-2	BOOSTER PUMP STATION HVAC PLAN
48	H-3	HVAC CONTROL DIAGRAMS
49	H-4	HVAC DETAILS
50	H-5	HVAC SCHEDULES
51	E-1	ELECTRICAL LEGEND AND SCHEDULES
52	E-2	SINGLE LINE DIAGRAM
53	E-3	CONTROL WIRING DIAGRAMS
54	E-4	INSTRUMENTATION SCHEMATIC DIAGRAM
55	E-5	INSTRUMENTATION CONTROL PANEL DETAILS
56	E-6	INSTRUMENTATION RTU DETAILS
57	E-7	ELECTRICAL SITE PLAN
58	E-8	ELECTRICAL PLAN BOOSTER PUMP STATION
59	E-9	ELECTRICAL PLAN GROUND STORAGE TANK
60	ED-1	CONDUIT AND CABLE SCHEDULE
61	ED-2	ELECTRICAL DETAILS
62	ED-3	ELECTRICAL DETAILS

Xrefs Attached= S:\CUD_22X34_BOR [L:\d0555394\water_wastewater\lee79433\d0555385\G-1.dwg Current Layout Tab = Layout1 Fri Oct 21, 2022 - 13:37

NO.	BY	DATE	SYMBOL	REVISIONS
1	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

MOTT MACDONALD Mott MacDonald Florida, LLC	Architects Engineers Surveyors AA - C0000035 EB - 0000155 LB - 0006783 10245 Centurion Pkwy. N., Suite 320 Jacksonville, Florida 32256 Telephone: (904) 203-1090	DESIGNER: L. TRACEY DRAWN BY: B. LEE DATE: OCT 2022	DESIGN ENGINEER LESLIE S. SAMEL, P.E. FLORIDA REGISTRATION NO. 68763	St. Johns County Utility Department 1205 STATE ROAD 16 ST. AUGUSTINE, FL 32084 PHONE: (904) 209-2626 FAX: (904) 209-2627	CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION	GENERAL NOTES, ABBREVIATIONS, LEGENDS, SYMBOLS AND INDEX OF DRAWINGS	SHEET NO. 1 DWG NO. G-1 ELECTRICAL BID PACKAGE
		MOTT MACDONALD Florida, LLC			DESIGNER: L. TRACEY DRAWN BY: B. LEE DATE: OCT 2022	DESIGN ENGINEER LESLIE S. SAMEL, P.E. FLORIDA REGISTRATION NO. 68763	St. Johns County Utility Department 1205 STATE ROAD 16 ST. AUGUSTINE, FL 32084 PHONE: (904) 209-2626 FAX: (904) 209-2627



LEGEND

- EXISTING EQUIPMENT AND PIPING
- NEW EQUIPMENT AND PIPING
- CLDI CEMENT LINED DUCTILE IRON
- PVC POLYVINYL CHLORIDE
- RCP REINFORCED CONCRETE PIPE
- [M] FLOW METER
- [C] CONCENTRIC REDUCER
- [E] ECCENTRIC REDUCER
- [#] DISMANTLING JOINT
- [V] GATE VALVE
- [Z] CHECK VALVE
- [P] PROPORTIONAL PRESSURE REDUCING VALVE
- [B] BACK PRESSURE SUSTAINING FILL VALVE (PRESSURE CONTROL VALVE)
- [T] VERTICAL TURBINE CAN PUMP
- [A] ARV ASSEMBLY
- [PG] PRESSURE GAUGE
- [S] SAMPLE TAP
- [PIT] PRESSURE TRANSMITTER

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NO.	BY	DATE	SYMBOL	REVISIONS
1	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M M
MOTT MACDONALD
 Mott MacDonald Florida, LLC

Architects Engineers Surveyors
 AA - C0000035 EB - 0000155 LB - 0006783
 10245 Centurion Pkwy, N., Suite 320
 Jacksonville, Florida 32256
 Telephone: (904) 203-1090

DESIGNER: L. TRACEY
 DRAWN BY: B. LEE
 DATE: OCT 2022
 CHECKED BY: L. SAMEL
 DATE: OCT 2022

DESIGN ENGINEER
LESLIE S. SAMEL, P.E.
 FLORIDA REGISTRATION NO.
 68763



St. Johns County
 Utility Department
 1205 STATE ROAD 16
 ST. AUGUSTINE, FL 32084
 PHONE: (904) 209-2626 FAX: (904) 209-2627

CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

PROCESS FLOW DIAGRAM

SHEET NO. 2
 DWG NO. G-2
 ELECTRICAL BID PACKAGE

GENERAL NOTES:

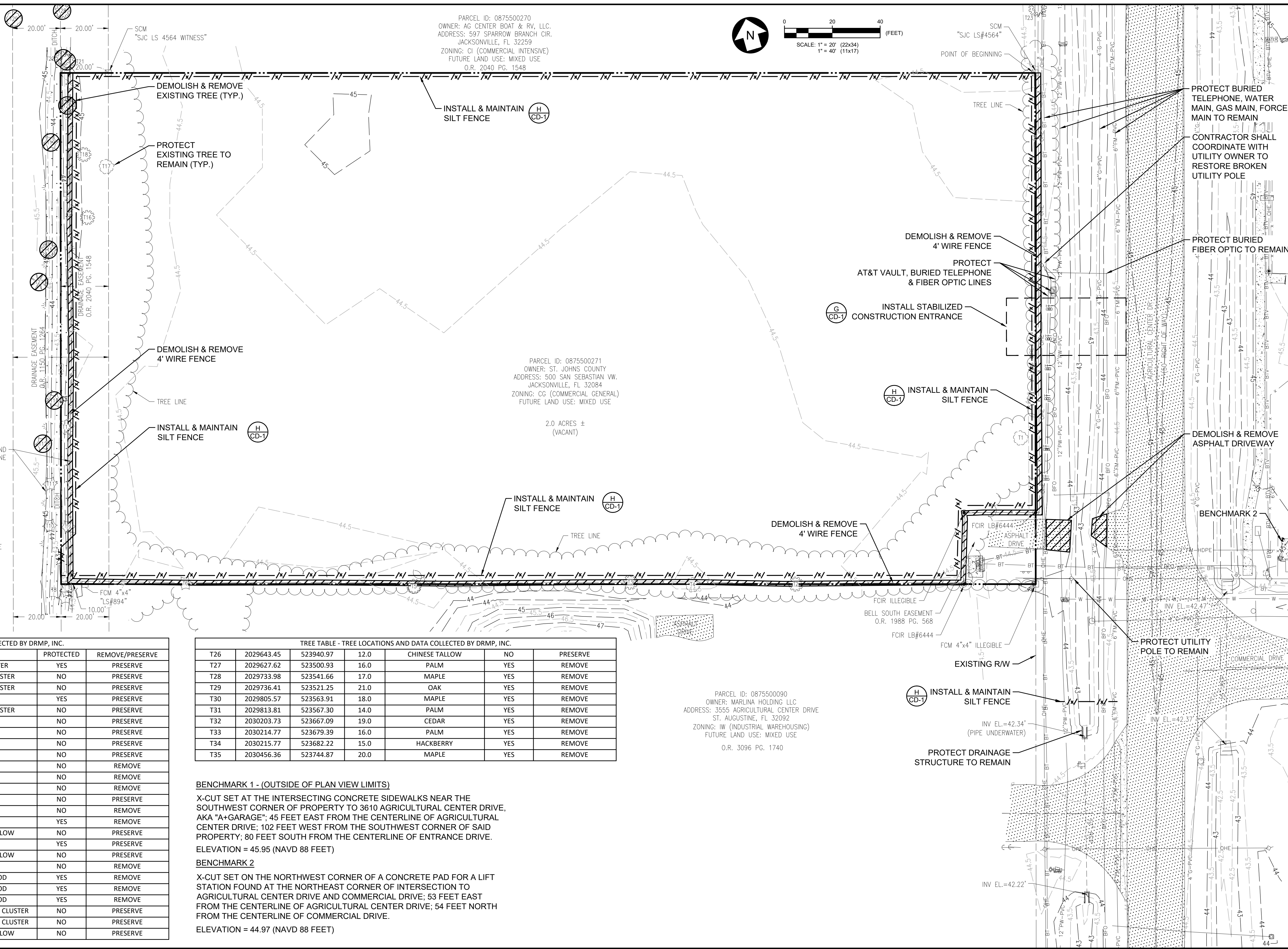
- ALL ASPHALT AND CONCRETE SHALL BE SAW CUT IN SMOOTH NEAT LINES AT EDGES TO REMAIN.
- ALL DEMOLITION DEBRIS SHALL BE REMOVED FROM SITE AND DISPOSED OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
- INLET PROTECTION SHALL BE INSTALLED AROUND ALL PROPOSED INLETS UNTIL FINAL STABILIZATION.
- SITE CLEARING AND GRUBBING SHALL OCCUR ACROSS THE ENTIRE SITE WITHIN THE PROPERTY BOUNDARIES AND WITHIN AREAS OF THE EASEMENT. TREES CALLED FOR AS PROTECTED OR TO REMAIN SHALL BE PROTECTED AND NOT REMOVED.

EROSION CONTROL NOTES:

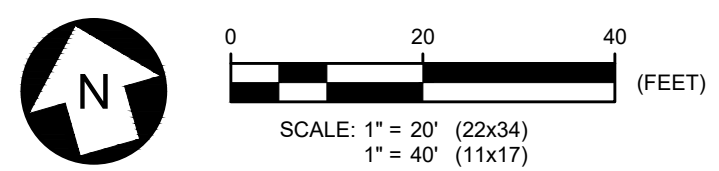
- THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONTROL OF EROSION AND MAINTAINING SEDIMENT ON SITE. FAILURE TO ADEQUATELY CONTROL EROSION AND MAINTAIN SEDIMENT ON SITE MAY RESULT IN ENFORCEMENT ACTIONS AND/OR FINES. THE CONTRACTOR SHALL BEAR THE COSTS OF ANY ENFORCEMENT ACTIONS OR FINES.
- EROSION CONTROL MEASURES SHOWN HEREIN SHALL BE CONSIDERED THE MINIMUM INSTALLATION REQUIREMENTS. CONTRACTOR SHALL PROVIDE ANY MATERIAL ITEM OR WORK EFFORT NECESSARY TO PREVENT EROSION AND MAINTAIN SEDIMENT ON SITE THROUGHOUT CONSTRUCTION AND UNTIL FINAL STABILIZATION HAS BEEN ACHIEVED.

SURVEYORS NOTES:

- BEARING DATUM BASED ON STATE PLANE COORDINATES, FLORIDA EAST ZONE, IN UNITS OF US SURVEY FEET, REFERENCE TO THE NAD 83/2011. ST. JOHNS COUNTY GEODETIC NETWORK CONTROL POINTS 1309 AND 1310, S 49°51'59" E.
- ELEVATIONS BASED ON NAVD 88, FEET, IF ANY.
- BENCHMARK BASIS: NGS BENCHMARK ELLZEY ELEVATION = 45.35.



PARCEL ID: 0875500270
 OWNER: AG CENTER BOAT & RV, LLC.
 ADDRESS: 597 SPARROW BRANCH CIR.
 JACKSONVILLE, FL 32259
 ZONING: CI (COMMERCIAL INTENSIVE)
 FUTURE LAND USE: MIXED USE
 O.R. 2040 PG. 1548



PARCEL ID: 0875500271
 OWNER: ST. JOHNS COUNTY
 ADDRESS: 500 SAN SEBASTIAN VW.
 JACKSONVILLE, FL 32084
 ZONING: CG (COMMERCIAL GENERAL)
 FUTURE LAND USE: MIXED USE
 2.0 ACRES ±
 (VACANT)

PARCEL ID: 0875500000
 OWNER: USINA CHARLES R LIVING TRUST, USINA GABYE LEE
 ADDRESS: C/O WELLS FARGO BANK
 P.O. BOX 135
 ARLINGTON, TX 76094
 ZONING: OR (OPEN RURAL)
 FUTURE LAND USE: MIXED USE
 O.R. 2966 PG. 1088

PARCEL ID: 0875500090
 OWNER: MARLINA HOLDING LLC
 ADDRESS: 3555 AGRICULTURAL CENTER DRIVE
 ST. AUGUSTINE, FL 32092
 ZONING: IW (INDUSTRIAL WAREHOUSING)
 FUTURE LAND USE: MIXED USE
 O.R. 3096 PG. 1740

TREE NO.	NORTHING	EASTING	DIA. (IN.)	SPECIES	PROTECTED	REMOVE/PRESERVE
T1	2029451.35	523877.13	UNK	OAK CLUSTER	YES	PRESERVE
T2	2029418.61	523769.88	UNK	TALLOW CLUSTER	NO	PRESERVE
T3	2029438.50	523703.67	UNK	TALLOW CLUSTER	NO	PRESERVE
T4	2029430.35	523728.43	14.0	OAK	YES	PRESERVE
T5	2029461.94	523616.28	UNK	TALLOW CLUSTER	NO	PRESERVE
T6	2029489.70	523524.76	8.0	PINE	NO	PRESERVE
T7	2029497.97	523474.91	9.0	PINE	NO	PRESERVE
T8	2029500.51	523476.30	15.0	PINE	NO	PRESERVE
T9	2029525.83	523484.34	9.0	PINE	NO	PRESERVE
T10	2029528.43	523477.04	17.0	PINE	NO	REMOVE
T11	2029545.30	523482.05	14.0	PINE	NO	REMOVE
T12	2029562.22	523483.71	16.0	PINE	NO	REMOVE
T13	2029566.24	523495.17	10.0	OAK	NO	PRESERVE
T14	2029578.24	523493.31	15.0	PINE	NO	REMOVE
T15	2029639.52	523508.50	14.0	MAPLE	YES	REMOVE
T16	2029648.00	523527.84	9.0	CHINESE TALLOW	NO	PRESERVE
T17	2029666.34	523541.35	13.0	OAK	YES	PRESERVE
T18	2029673.72	523533.67	8.0	CHINESE TALLOW	NO	PRESERVE
T19	2029682.32	523521.87	18.0	PINE	NO	REMOVE
T20	2029695.24	523532.81	8.0	HARDWOOD	YES	REMOVE
T21	2029713.09	523537.72	9.0	HARDWOOD	YES	REMOVE
T22	2029714.71	523536.61	9.0	HARDWOOD	YES	REMOVE
T23	2029621.93	523933.06	11.0	CHINESE TALLOW CLUSTER	NO	PRESERVE
T24	2029622.09	523934.64	9.0	CHINESE TALLOW CLUSTER	NO	PRESERVE
T25	2029633.80	523939.00	8.0	CHINESE TALLOW	NO	PRESERVE

TREE NO.	NORTHING	EASTING	DIA. (IN.)	SPECIES	PROTECTED	REMOVE/PRESERVE
T26	2029643.45	523940.97	12.0	CHINESE TALLOW	NO	PRESERVE
T27	2029627.62	523500.93	16.0	PALM	YES	REMOVE
T28	2029733.98	523541.66	17.0	MAPLE	YES	REMOVE
T29	2029736.41	523521.25	21.0	OAK	YES	REMOVE
T30	2029805.57	523563.91	18.0	MAPLE	YES	REMOVE
T31	2029813.81	523567.30	14.0	PALM	YES	REMOVE
T32	2030203.73	523667.09	19.0	CEDAR	YES	REMOVE
T33	2030214.77	523679.39	16.0	PALM	YES	REMOVE
T34	2030215.77	523682.22	15.0	HACKBERRY	YES	REMOVE
T35	2030456.36	523744.87	20.0	MAPLE	YES	REMOVE

BENCHMARK 1 - (OUTSIDE OF PLAN VIEW LIMITS)
 X-CUT SET AT THE INTERSECTING CONCRETE SIDEWALKS NEAR THE SOUTHWEST CORNER OF PROPERTY TO 3610 AGRICULTURAL CENTER DRIVE, AKA "A+GARAGE"; 45 FEET EAST FROM THE CENTERLINE OF AGRICULTURAL CENTER DRIVE; 102 FEET WEST FROM THE SOUTHWEST CORNER OF SAID PROPERTY; 80 FEET SOUTH FROM THE CENTERLINE OF ENTRANCE DRIVE. ELEVATION = 45.95 (NAVD 88 FEET)

BENCHMARK 2
 X-CUT SET ON THE NORTHWEST CORNER OF A CONCRETE PAD FOR A LIFT STATION FOUND AT THE NORTHEAST CORNER OF INTERSECTION TO AGRICULTURAL CENTER DRIVE AND COMMERCIAL DRIVE; 53 FEET EAST FROM THE CENTERLINE OF AGRICULTURAL CENTER DRIVE; 54 FEET NORTH FROM THE CENTERLINE OF COMMERCIAL DRIVE. ELEVATION = 44.97 (NAVD 88 FEET)

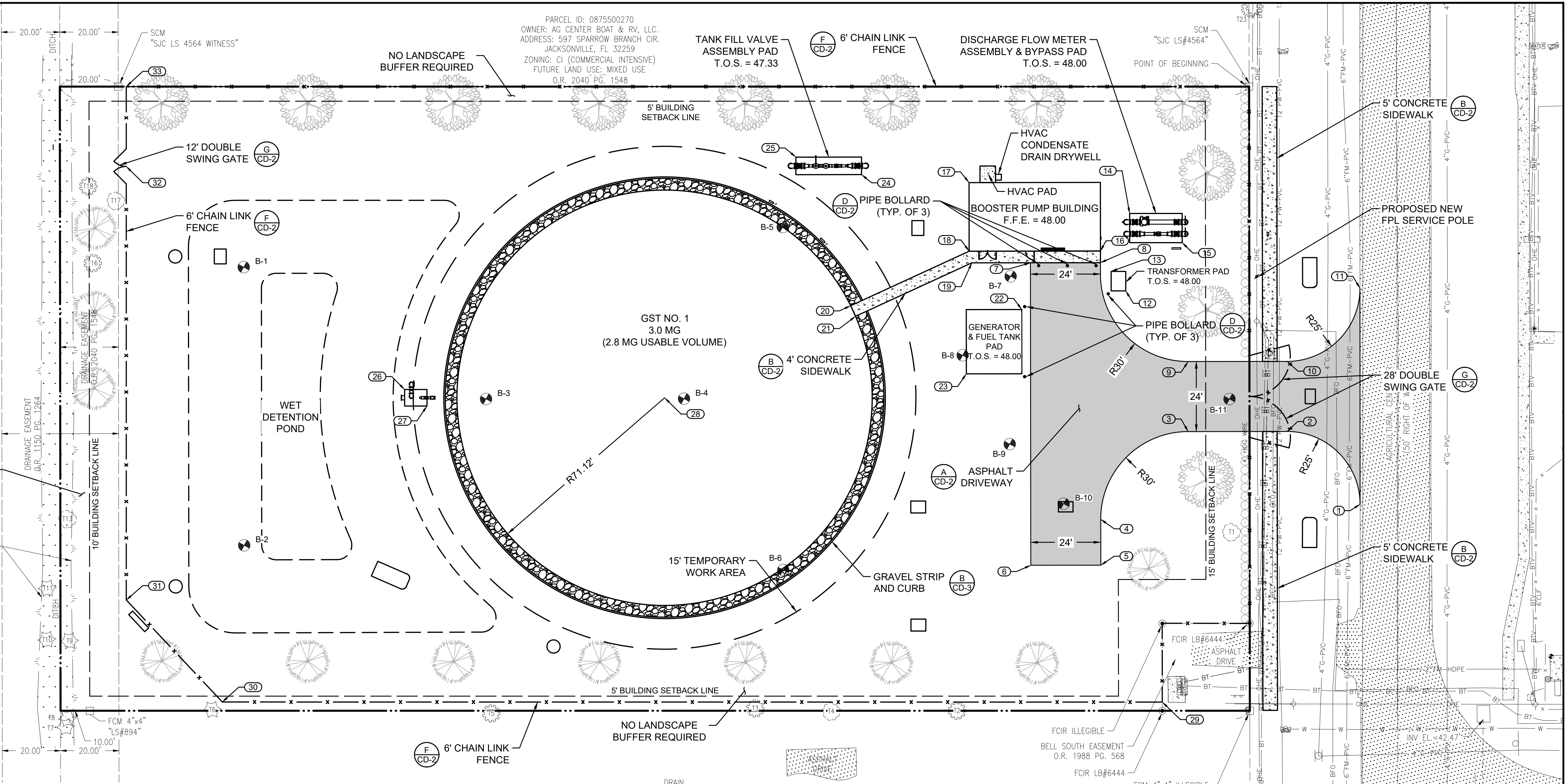
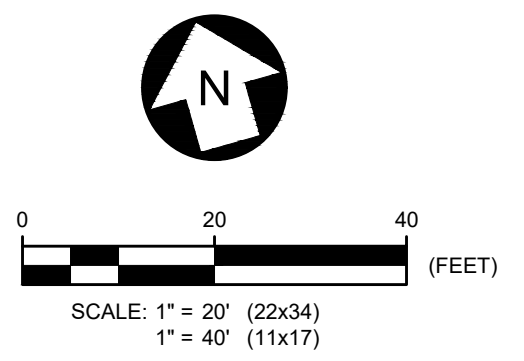
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1	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

<p>MOTT MACDONALD</p>	Mott MacDonald 10245 Centurion Pkwy, N., Suite 320 Jacksonville, Florida 32256 Telephone: (904) 203-1090 Architects Engineers Surveyors AA - C000035 EB - 0000155 LB - 0006783	DESIGNER: S. WHITE DRAWN BY: C. RILEY DATE: OCTOBER 2022 CHECKED BY: S. WHITE DATE: OCTOBER 2022	DESIGN ENGINEER STEVEN D. WHITE FLORIDA REGISTRATION NO. 58809	<p>St. Johns County Utility Department 1205 STATE ROAD 16 ST. AUGUSTINE, FL 32084 PHONE: (904) 209-2626 FAX: (904) 209-2627</p>	CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION	EXISTING SITE, DEMOLITION & EROSION CONTROL PLAN	SHEET NO. 3 DWG NO. C-1 ELECTRICAL BID PACKAGE
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 Drawing Name: Proposed Site Layout Plan.dwg
 Drawing Path: C:\pwworking\mwater_wastewater\136256\proposed\136256.dwg
 Xrefs Attached: 502100379-007_V-Survey-Xref.dwg
 502100379-007_C-Layout-Xref.dwg
 502100379-007_SJC-DWG.dwg
 502100379-007_C-Submittals-Xref.dwg

POINT TABLE		
NO.	NORTHING	EASTING
1	N: 2029448.17	E: 523922.22
2	N: 2029479.07	E: 523905.08
3	N: 2029488.42	E: 523872.54
4	N: 2029467.87	E: 523835.42
5	N: 2029452.77	E: 523831.08
6	N: 2029459.39	E: 523808.01
7	N: 2029558.96	E: 523836.61
8	N: 2029552.33	E: 523859.68
9	N: 2029511.49	E: 523879.16
10	N: 2029502.13	E: 523911.75
11	N: 2029519.26	E: 523942.68
12	N: 2029540.67	E: 523865.34
13	N: 2029548.46	E: 523862.38
14	N: 2029565.78	E: 523873.96
15	N: 2029551.18	E: 523888.48
16	N: 2029556.18	E: 523860.78
17	N: 2029591.19	E: 523824.02
18	N: 2029568.60	E: 523817.53
19	N: 2029564.52	E: 523817.31
20	N: 2029561.92	E: 523773.35
21	N: 2029557.96	E: 523773.95
22	N: 2029544.41	E: 523829.31
23	N: 2029528.51	E: 523804.98
24	N: 2029604.03	E: 523789.39
25	N: 2029616.01	E: 523769.42
26	N: 2029576.72	E: 523618.55
27	N: 2029569.15	E: 523624.35
28	N: 2029549.30	E: 523703.36
29	N: 2029401.87	E: 523838.32
30	N: 2029491.19	E: 523528.87
31	N: 2029533.88	E: 523506.92
32	N: 2029676.58	E: 523548.10
33	N: 2029702.84	E: 523555.67



PARCEL ID: 0875500000
 OWNER: USINA CHARLES R LIVING TRUST, USINA GABYE LEE
 ADDRESS: C/O WELLS FARGO BANK
 P.O. BOX 135
 ARLINGTON, TX 76094
 ZONING: OR (OPEN RURAL)
 FUTURE LAND USE: MIXED USE
 O.R. 2966 PG. 1088

PARCEL ID: 0875500090
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 ADDRESS: 3555 AGRICULTURAL CENTER DRIVE
 ST. AUGUSTINE, FL 32092
 ZONING: IW (INDUSTRIAL WAREHOUSING)
 FUTURE LAND USE: MIXED USE
 O.R. 3096 PG. 1740

SITE CHARACTERISTICS				
COVERAGE TYPE	EXISTING (FT2)	DEMOLISHED (FT2)	PROPOSED (FT2)	POST DEVELOPMENT TOTALS (FT2)
PROJECT PARCEL				
BUILDINGS	0	0	1,058	1,058
TANK	0	0	15,893	15,893
CONCRETE	52	0	1,121	1,173
ASPHALT	233	0	4,097	4,330
GRAVEL	0	0	1,822	1,822
TOTAL IMPERVIOUS AREA	285	0	23,990	24,275
OPEN AREA	86,835	0	0	86,835
TOTAL AREA	87,120	0	0	87,120
PROPOSED DEVELOPMENT AREA	0	0	87,120	87,120
WETLANDS	0	0	0	0
TOTAL AREA EXCLUDING WETLANDS	87,120	0	0	87,120
% IMPERVIOUS COVERAGE	0.33%			27.86%
% IMPERVIOUS COVERAGE EXCLUDING WETLANDS	0.33%			27.86%
SITE DEVELOPMENT REGULATIONS				
PARCEL NUMBER	875500271			
FUTURE LAND USE DESIGNATION	MIXED USE DISTRICT			
ZONING DISTRICT	CG (COMMERCIAL GENERAL)			
PUD/ORDINANCE #	1987-01			
REQUIRED SETBACKS	15' FRONT, 5' SIDE, 10' REAR			
PROPOSED SETBACKS	51.01' FRONT, 32.85' SIDE, 135.97' REAR			
MAXIMUM BUILDING HEIGHT	40'			
PROPOSED BUILDING HEIGHT	39.47'			
MAXIMUM FAR	50%			
PROPOSED FAR	1.21%			
MAXIMUM IMPERVIOUS SURFACE RATIO	70%			
PROPOSED IMPERVIOUS SURFACE RATIO	27.86%			

NO.	BY	DATE	SYMBOL	REVISIONS
1	MM	10/20/22		ELECTRICAL CONTRACTOR BID PACKAGE

M M
MOTT MACDONALD

Mott MacDonald
 10245 Centurion Pkwy, N., Suite 320
 Jacksonville, Florida 32256
 Telephone: (904) 203-1090
 Architects Engineers Surveyors
 AA - C000035 EB - 0000155 LB - 0006783

DESIGNER: S. WHITE
 DRAWN BY: C. RILEY
 DATE: OCTOBER 2022
 CHECKED BY: S. WHITE
 DATE: OCTOBER 2022

DESIGN ENGINEER
STEVEN D. WHITE
 FLORIDA REGISTRATION NO.
 58809



St. Johns County
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 1205 STATE ROAD 16
 ST. AUGUSTINE, FL 32084
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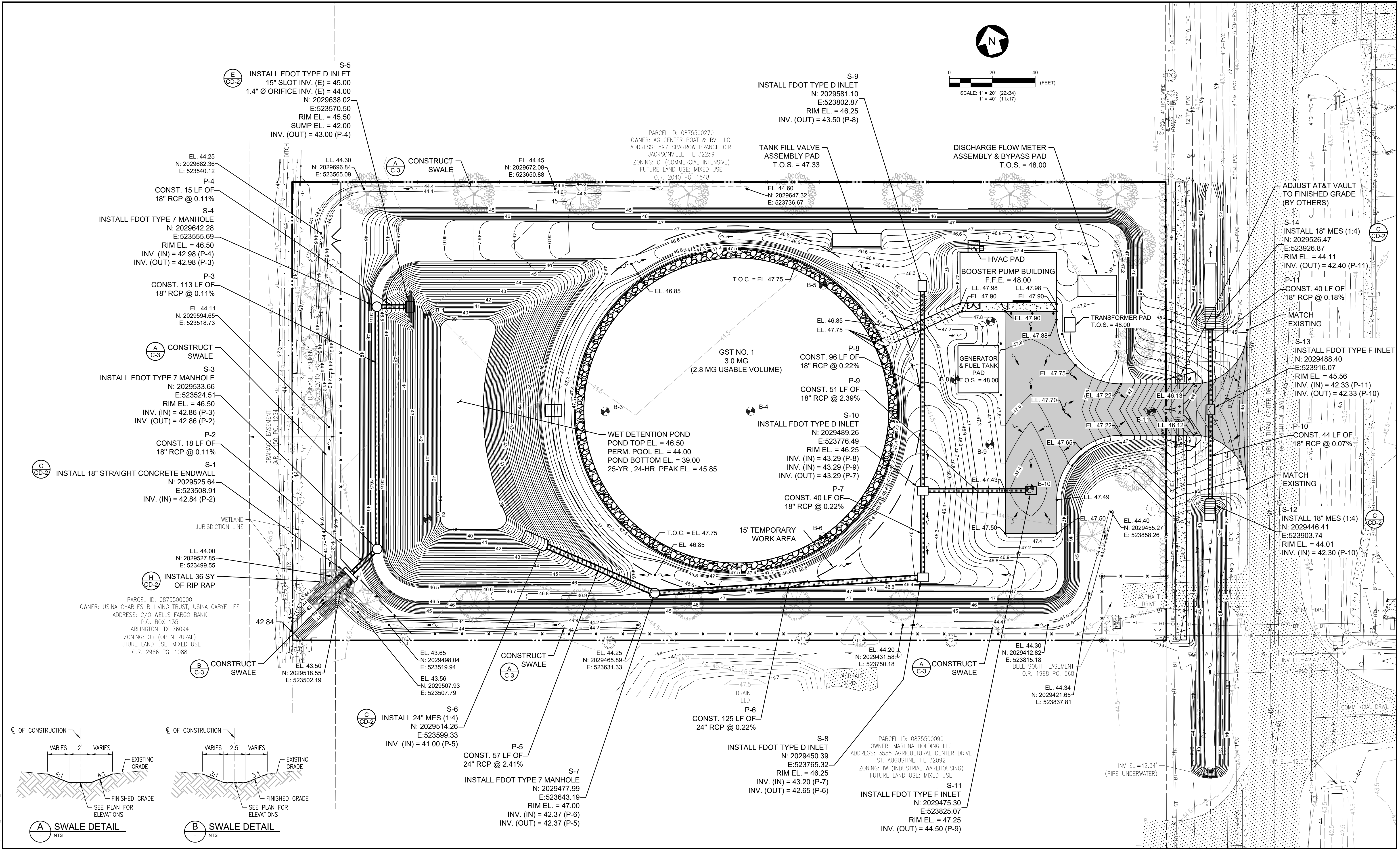
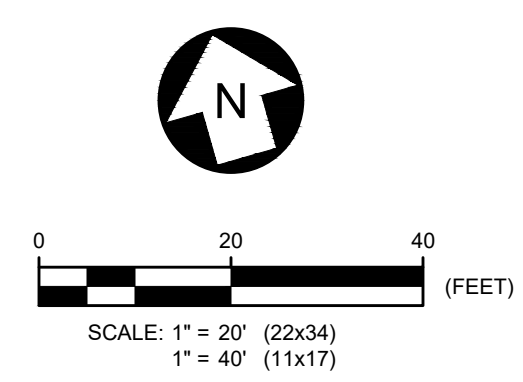
GR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

PROPOSED SITE LAYOUT PLAN

SHEET NO. 4
 DWG NO. C-2
 ELECTRICAL BID PACKAGE

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Xrefs Attached: 502100379-007_V-Survey-Xref.dwg
 502100379-007_C-Layout-Xref.dwg
 502100379-007_S-CD.dwg
 502100379-007_C-Calendar-Xref.dwg



S-5
 INSTALL FDOT TYPE D INLET
 15" SLOT INV. (E) = 45.00
 1.4" Ø ORIFICE INV. (E) = 44.00
 N: 2029638.02
 E: 523570.50
 RIM EL. = 45.50
 SUMP EL. = 42.00
 INV. (OUT) = 43.00 (P-4)

S-9
 INSTALL FDOT TYPE D INLET
 N: 2029581.10
 E: 523802.87
 RIM EL. = 46.25
 INV. (OUT) = 43.50 (P-8)

P-4
 CONST. 15 LF OF
 18" RCP @ 0.11%

TANK FILL VALVE
 ASSEMBLY PAD
 T.O.S. = 47.33

DISCHARGE FLOW METER
 ASSEMBLY & BYPASS PAD
 T.O.S. = 48.00

S-4
 INSTALL FDOT TYPE 7 MANHOLE
 N: 2029642.28
 E: 523555.69
 RIM EL. = 46.50
 INV. (IN) = 42.98 (P-4)
 INV. (OUT) = 42.98 (P-3)

P-3
 CONST. 113 LF OF
 18" RCP @ 0.11%

S-3
 INSTALL FDOT TYPE 7 MANHOLE
 N: 2029533.66
 E: 523524.51
 RIM EL. = 46.50
 INV. (IN) = 42.86 (P-3)
 INV. (OUT) = 42.86 (P-2)

P-2
 CONST. 18 LF OF
 18" RCP @ 0.11%

S-1
 INSTALL 18" STRAIGHT CONCRETE ENDWALL
 N: 2029525.64
 E: 523508.91
 INV. (IN) = 42.84 (P-2)

P-1
 CONST. 113 LF OF
 18" RCP @ 0.11%

H
 CD-2
 INSTALL 36 SY
 OF RIP RAP

B
 C-3
 CONSTRUCT SWALE

EL. 44.00
 N: 2029527.85
 E: 523499.55

EL. 43.65
 N: 2029498.04
 E: 523519.94

EL. 43.56
 N: 2029507.93
 E: 523507.79

S-6
 INSTALL 24" MES (1:4)
 N: 2029514.26
 E: 523599.33
 INV. (IN) = 41.00 (P-5)

A
 C-3
 CONSTRUCT SWALE

EL. 44.45
 N: 2029672.08
 E: 523650.88

EL. 44.30
 N: 2029696.84
 E: 523565.09

EL. 44.11
 N: 2029594.65
 E: 523518.73

A
 C-3
 CONSTRUCT SWALE

EL. 44.00
 N: 2029527.85
 E: 523499.55

EL. 43.65
 N: 2029498.04
 E: 523519.94

EL. 43.56
 N: 2029507.93
 E: 523507.79

EL. 44.25
 N: 2029465.89
 E: 523631.33

EL. 44.20
 N: 2029431.58
 E: 523750.18

EL. 44.30
 N: 2029412.82
 E: 523815.18

EL. 44.34
 N: 2029421.65
 E: 523837.81

S-7
 INSTALL FDOT TYPE 7 MANHOLE
 N: 2029477.99
 E: 523643.19
 RIM EL. = 47.00
 INV. (IN) = 42.37 (P-6)
 INV. (OUT) = 42.37 (P-5)

PARCEL ID: 0875500270
 OWNER: AG CENTER BOAT & RV, LLC.
 ADDRESS: 597 SPARROW BRANCH CIR.
 JACKSONVILLE, FL 32259
 ZONING: CI (COMMERCIAL INTENSIVE)
 FUTURE LAND USE: MIXED USE
 O.R. 2040 PG. 1548

GST NO. 1
 3.0 MG
 (2.8 MG USABLE VOLUME)

WET DETENTION POND
 POND TOP EL. = 46.50
 PERM. POOL EL. = 44.00
 POND BOTTOM EL. = 39.00
 25-YR., 24-HR. PEAK EL. = 45.85

15' TEMPORARY
 WORK AREA

PARCEL ID: 0875500090
 OWNER: MARLINA HOLDING LLC
 ADDRESS: 3555 AGRICULTURAL CENTER DRIVE
 ST. AUGUSTINE, FL 32092
 ZONING: IW (INDUSTRIAL WAREHOUSING)
 FUTURE LAND USE: MIXED USE

P-8
 CONST. 96 LF OF
 18" RCP @ 0.22%

P-9
 CONST. 51 LF OF
 18" RCP @ 2.39%

S-10
 INSTALL FDOT TYPE D INLET
 N: 2029489.26
 E: 523776.49
 RIM EL. = 46.25
 INV. (IN) = 43.29 (P-8)
 INV. (IN) = 43.29 (P-9)
 INV. (OUT) = 43.29 (P-7)

P-7
 CONST. 40 LF OF
 18" RCP @ 0.22%

P-6
 CONST. 125 LF OF
 24" RCP @ 0.22%

S-8
 INSTALL FDOT TYPE D INLET
 N: 2029450.39
 E: 523765.32
 RIM EL. = 46.25
 INV. (IN) = 43.20 (P-7)
 INV. (OUT) = 42.65 (P-6)

S-11
 INSTALL FDOT TYPE F INLET
 N: 2029475.30
 E: 523825.07
 RIM EL. = 47.25
 INV. (OUT) = 44.50 (P-9)

ADJUST AT&T VAULT
 TO FINISHED GRADE
 (BY OTHERS)

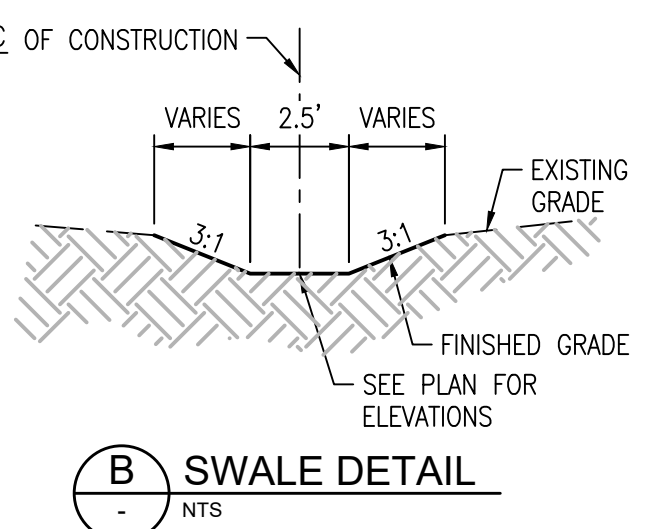
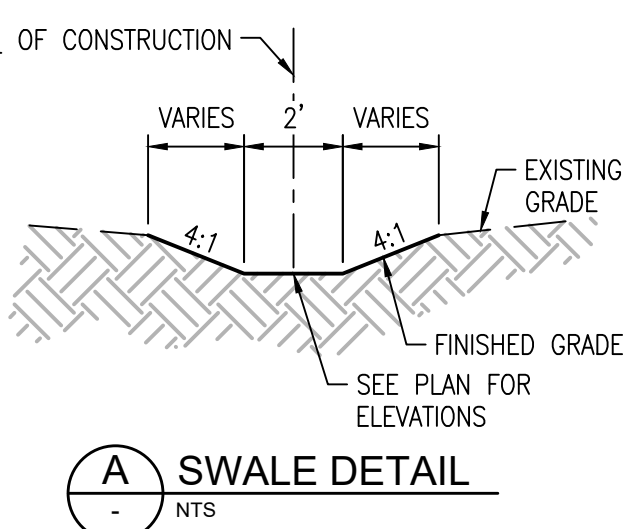
S-14
 INSTALL 18" MES (1:4)
 N: 2029526.47
 E: 523926.87
 RIM EL. = 44.11
 INV. (OUT) = 42.40 (P-11)

P-11
 CONST. 40 LF OF
 18" RCP @ 0.18%

S-13
 INSTALL FDOT TYPE F INLET
 N: 2029488.40
 E: 523916.07
 RIM EL. = 45.56
 INV. (IN) = 42.33 (P-11)
 INV. (OUT) = 42.33 (P-10)

P-10
 CONST. 44 LF OF
 18" RCP @ 0.07%

S-12
 INSTALL 18" MES (1:4)
 N: 2029446.41
 E: 523903.74
 RIM EL. = 44.01
 INV. (IN) = 42.30 (P-10)



NO.	BY	DATE	SYMBOL	REVISIONS
1	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

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 DRAWN BY: C. RILEY
 DATE: OCTOBER 2022
 CHECKED BY: S. WHITE
 DATE: OCTOBER 2022

DESIGN ENGINEER
STEVEN D. WHITE
 FLORIDA REGISTRATION NO.
 58809

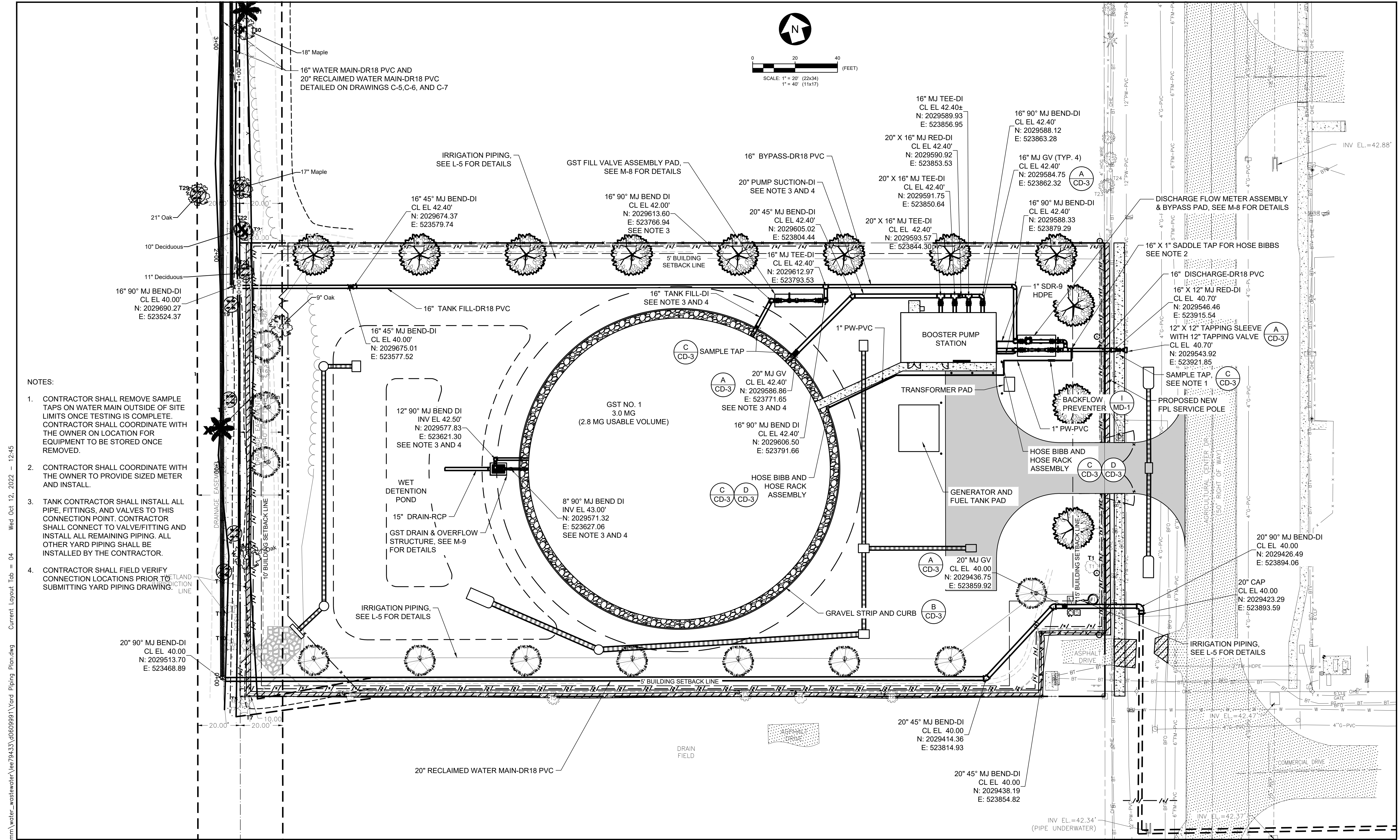
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 1205 STATE ROAD 16
 ST. AUGUSTINE, FL 32084
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GR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

GRADING & DRAINAGE PLAN

SHEET NO. 5
 DWG NO. C-3
 ELECTRICAL BID PACKAGE

This document is issued for the party which commissioned it and for specific purposes connected with the captioned project only. It should not be relied upon by any other party or used for any other purpose. We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.



- NOTES:**
- CONTRACTOR SHALL REMOVE SAMPLE TAPS ON WATER MAIN OUTSIDE OF SITE LIMITS ONCE TESTING IS COMPLETE. CONTRACTOR SHALL COORDINATE WITH THE OWNER ON LOCATION FOR EQUIPMENT TO BE STORED ONCE REMOVED.
 - CONTRACTOR SHALL COORDINATE WITH THE OWNER TO PROVIDE SIZED METER AND INSTALL.
 - TANK CONTRACTOR SHALL INSTALL ALL PIPE, FITTINGS, AND VALVES TO THIS CONNECTION POINT. CONTRACTOR SHALL CONNECT TO VALVE/FITTING AND INSTALL ALL REMAINING PIPING. ALL OTHER YARD PIPING SHALL BE INSTALLED BY THE CONTRACTOR.
 - CONTRACTOR SHALL FIELD VERIFY CONNECTION LOCATIONS PRIOR TO SUBMITTING YARD PIPING DRAWING.

C:\pwworking\hmm\water_wastewater\lee79433\d0609991\Yard Piping Plan.dwg Current Layout Tab = 04 Wed Oct 12, 2022 - 12:45

NO.	BY	DATE	SYMBOL	REVISIONS
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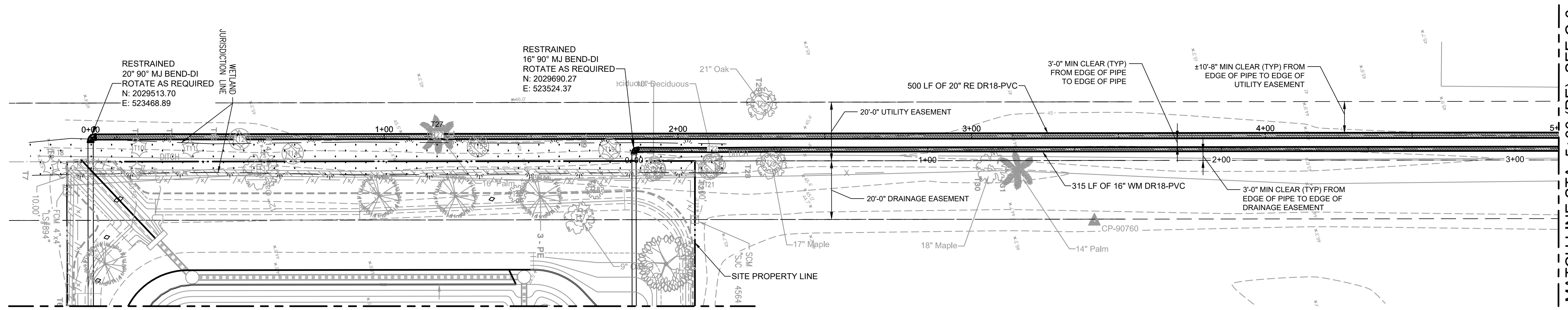
CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

YARD PIPING PLAN

SHEET NO. 6
 DWG NO. C-4
 ELECTRICAL BID PACKAGE

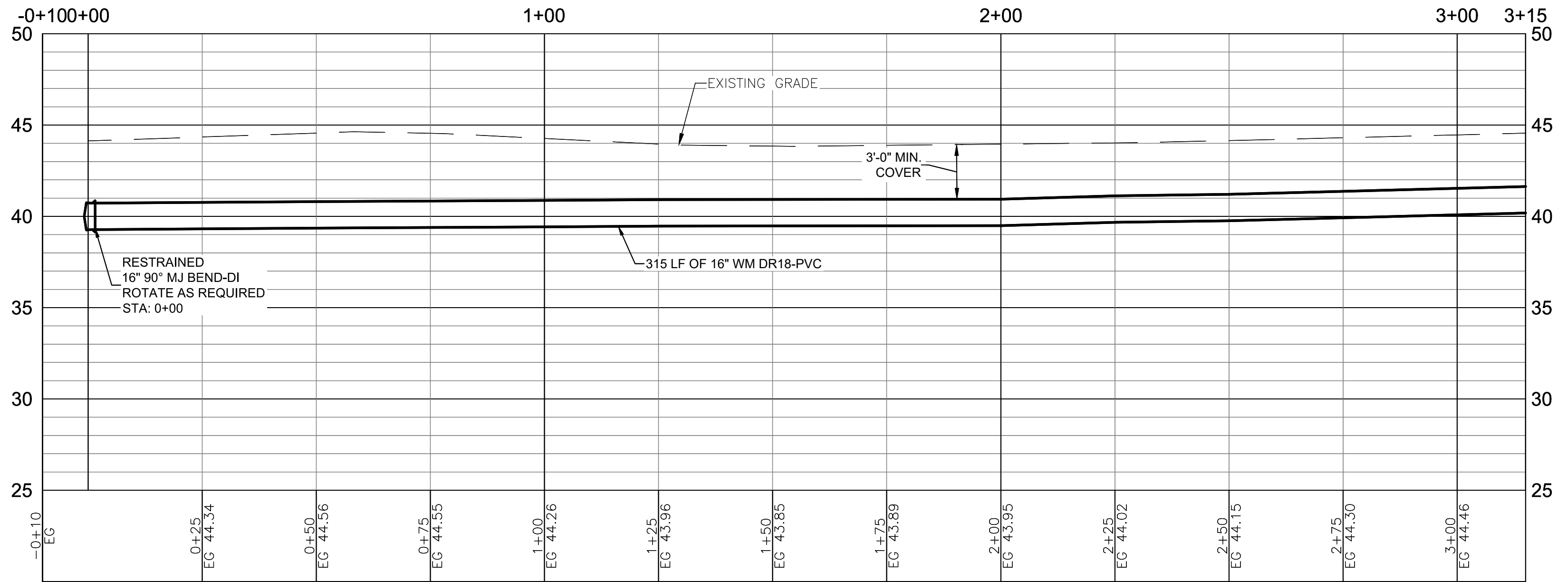
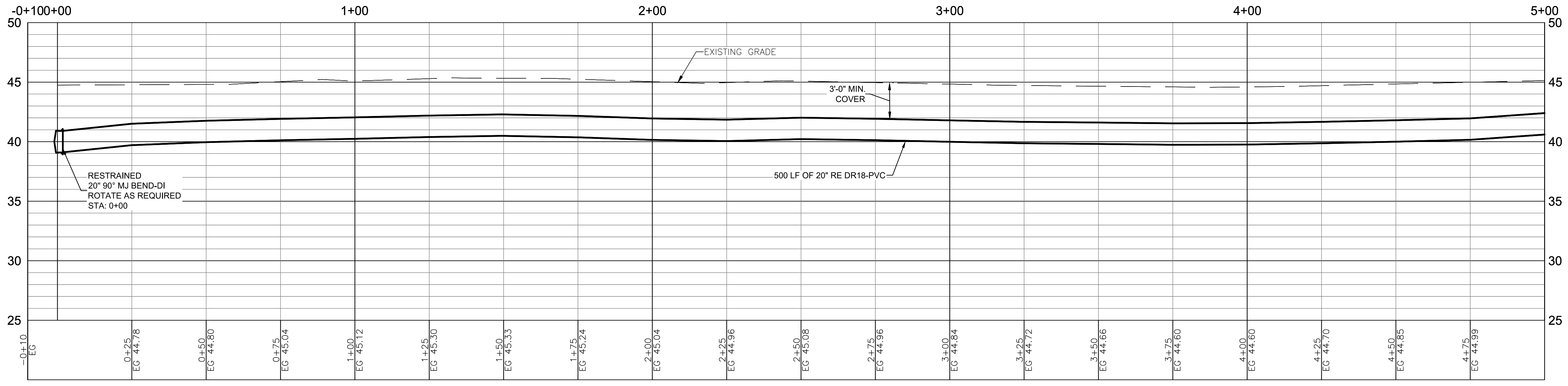


HORZ SCALE: 1" = 20 FT. (22x34)
 1" = 40 FT. (11x17)
 VERT SCALE: 1" = 5 FT. (22x34)
 1" = 10 FT. (11x17)



MATCH LINE STA. 5+00 (RE), SEE C-6

SEE C-4 FOR CONTINUATION



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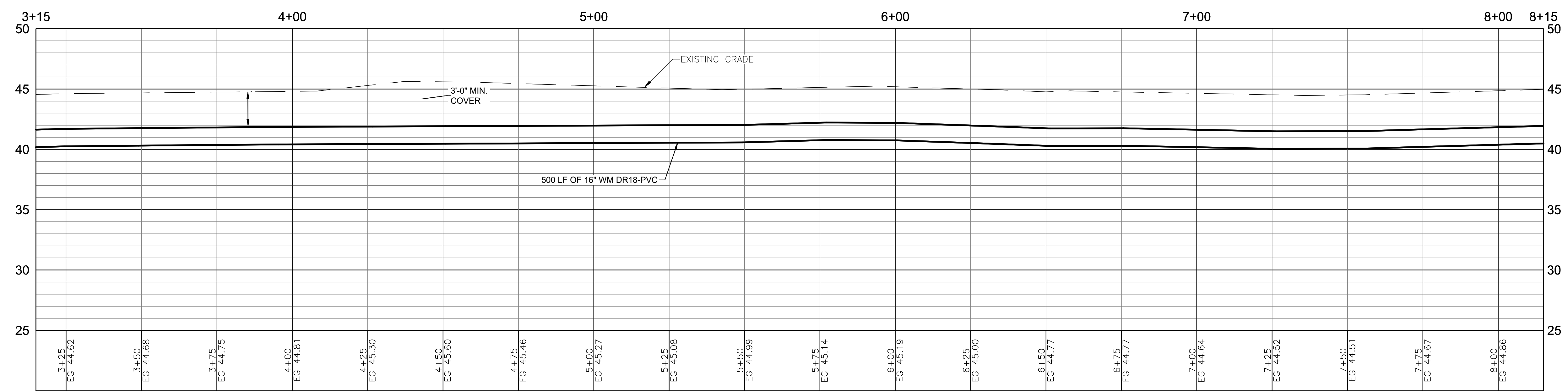
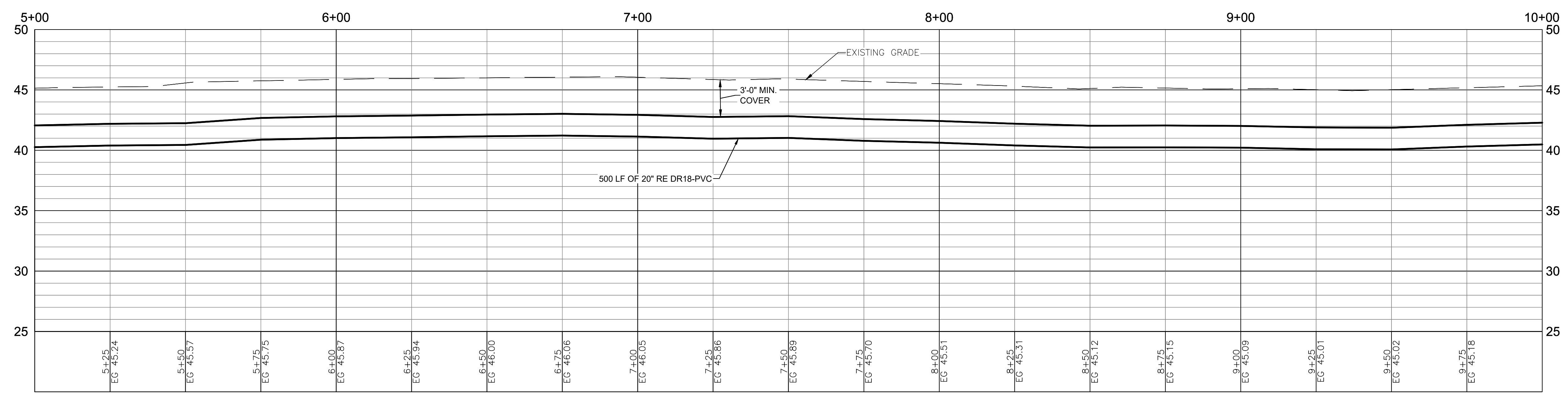
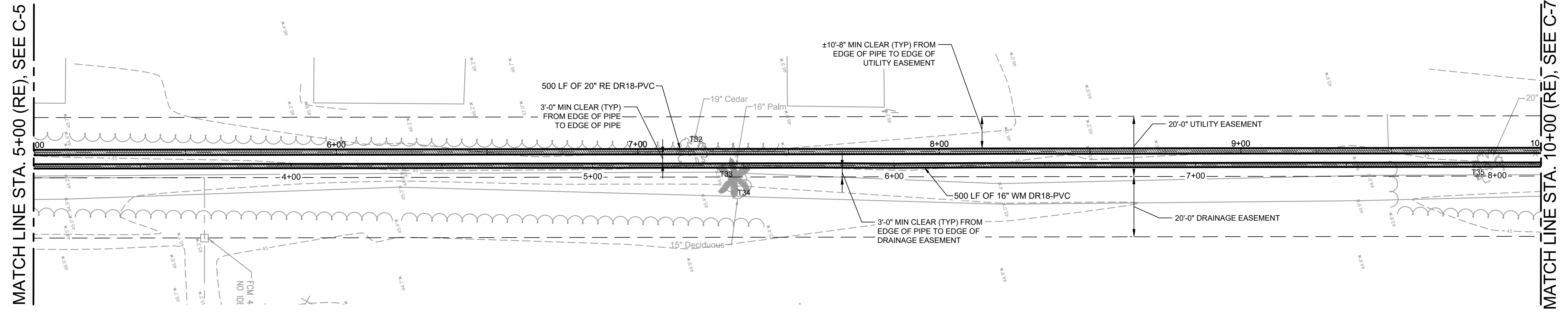
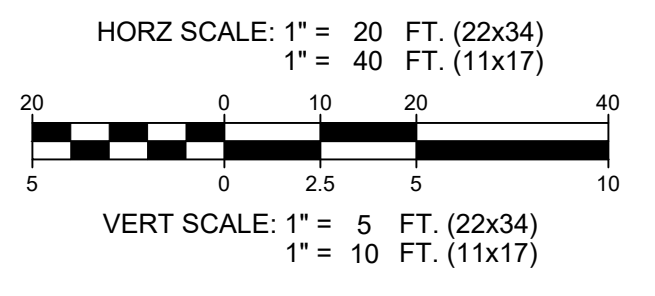
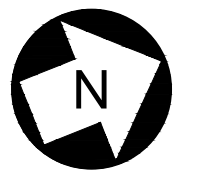


St. Johns County
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CR-208 GROUND STORAGE TANK
 AND BOOSTER PUMP STATION

WATER MAIN AND
 RECLAIMED WATER MAIN
 PLAN AND PROFILE

SHEET NO.
 7
 DWG NO.
 C-5
 ELECTRICAL
 BID PACKAGE



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 CHECKED BY: L. SAMEL
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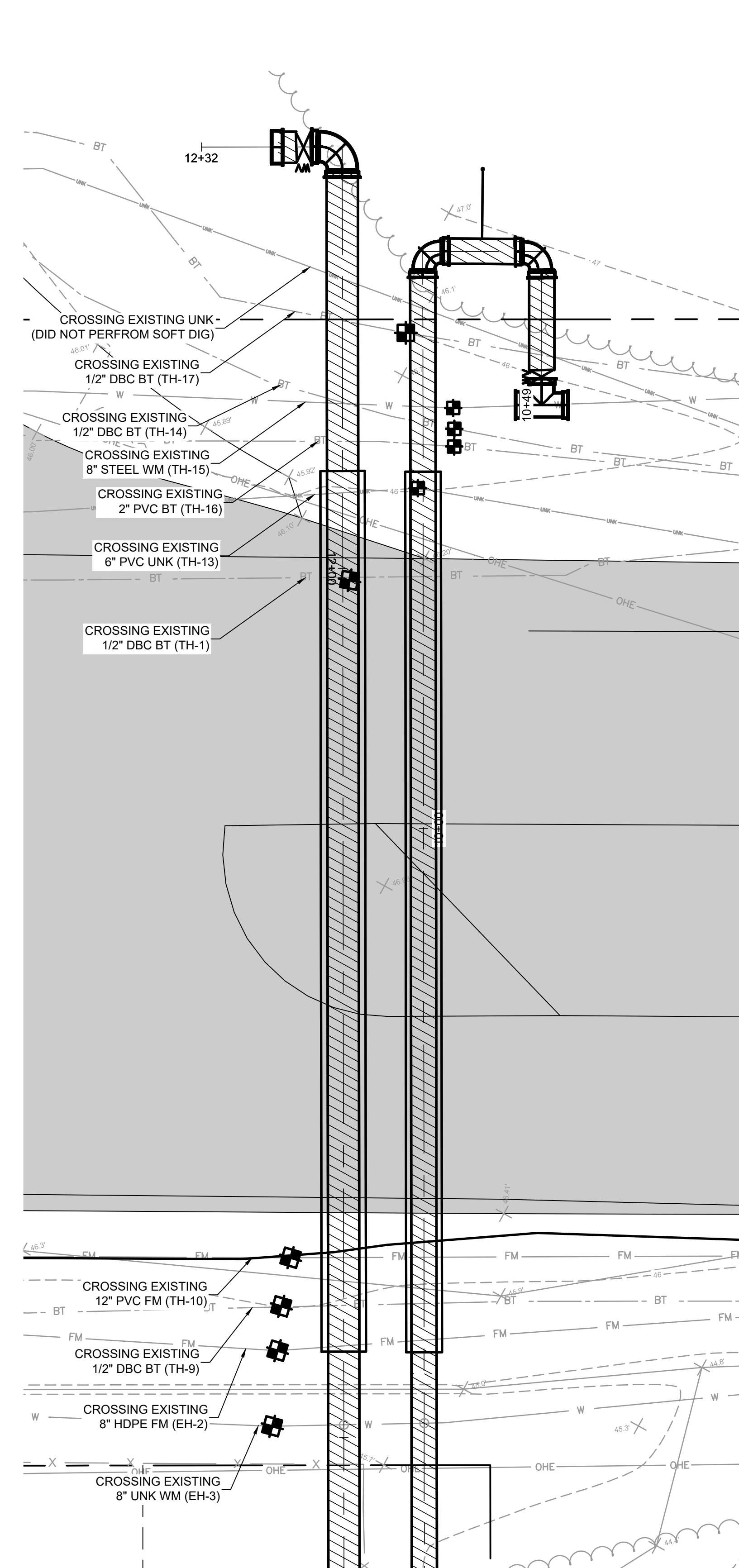
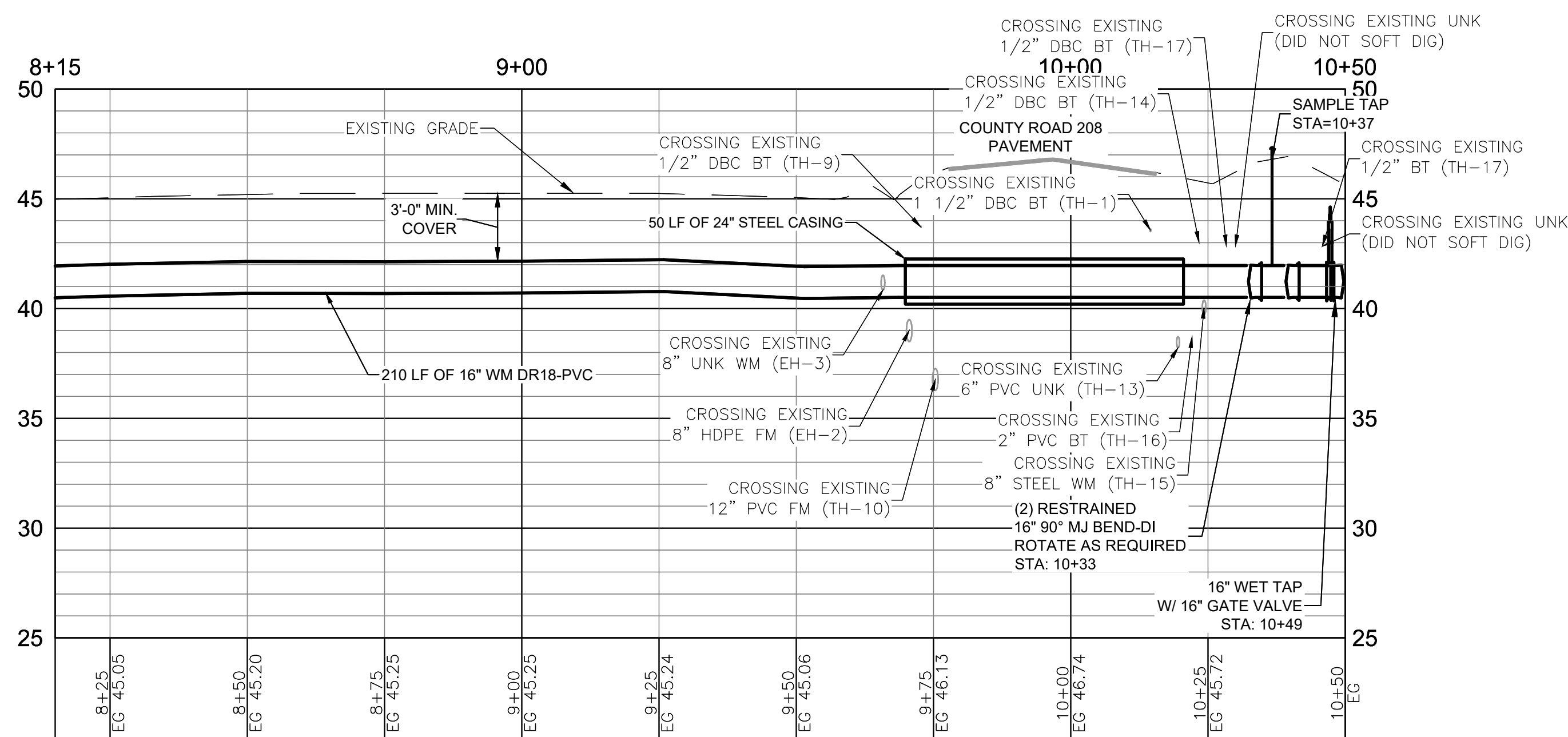
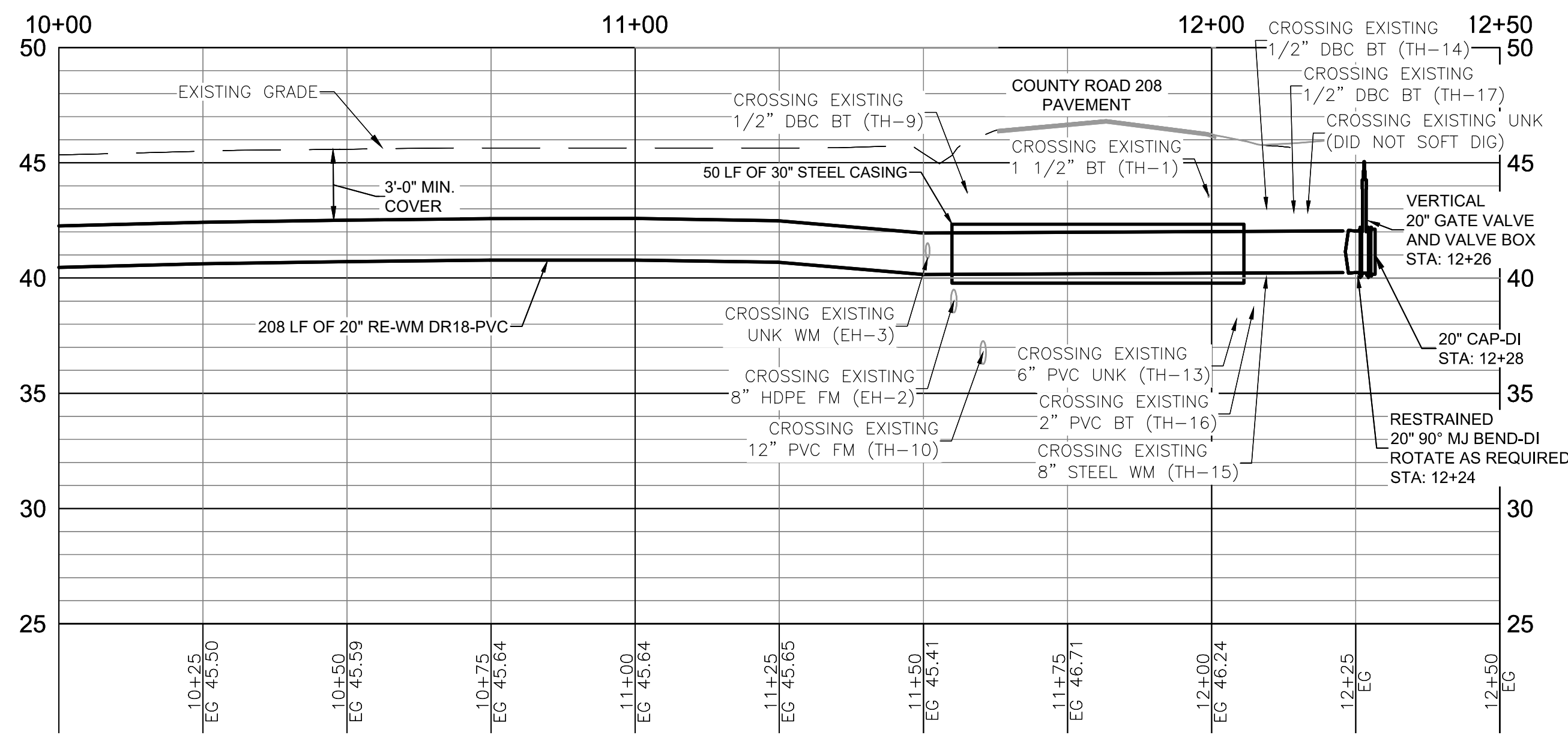
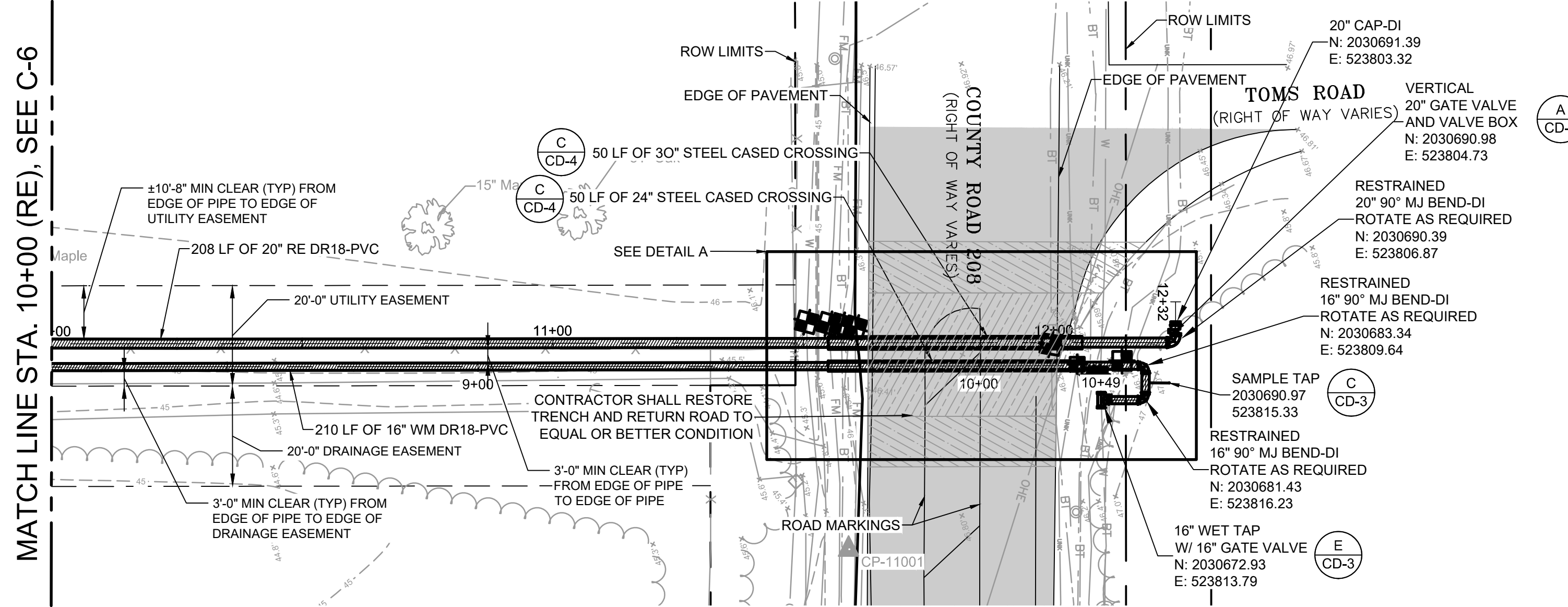
St. Johns County
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CR-208 GROUND STORAGE TANK
 AND BOOSTER PUMP STATION

WATER MAIN AND
 RECLAIMED WATER MAIN
 PLAN AND PROFILE

SHEET NO.
 8
 DWG NO.
 C-8
 ELECTRICAL
 BID PACKAGE

MATCH LINE STA. 10+00 (RE), SEE C-6



A CR-208 CROSSING
SCALE: 1" = 5'

TEST HOLE LOCATIONS					
ID	Northing	Easting	Grade EL	T/Pipe EL	Comments
TH-1	2030666.31	523800.36	46.30	43.65	1 1/2" DBC BT
TH-2	2029366.45	523895.67	44.89	41.35	6" FM-PVC
TH-3	2029371.14	523890.90	44.52	41.95	1/2" DBC BFO
TH-4	2029378.22	523887.80	43.66	41.61	4" GAS MAIN-PE
TH-5	2029385.72	523875.98	44.28	40.76	12" WM-PVC
TH-6	2029430.79	523885.15	44.57	41.94	1/2" DBC BFO
TH-7	2029431.18	523882.65	44.61	42.20	1" DBC BT
TH-8	2030627.25	523785.00	46.02	43.18	1" DBC BT
TH-9	2030627.31	523784.92	45.95	43.77	1/2" DBC BT
TH-10	2030629.70	523786.18	46.31	37.32	4" FM-PVC
TH-11	2029399.17	523873.14	44.78	42.25	1" DBC BT
TH-12	2029544.68	523921.41	44.82	41.48	12" WM-PVC
TH-13	2030670.31	523805.60	45.68	38.80	6" UNK-PVC
TH-14	2030673.01	523808.57	45.55	43.06	1/2" DBC BT
TH-15	2030674.18	523808.84	45.39	40.43	8" WM-STL
TH-16	2030672.03	523808.28	45.27	38.82	2" BT-PVC
TH-17	2030679.09	523807.42	45.75	42.90	1/2" DBC BT
TH-18	NA	NA	NA	NA	8" FM-HDPE
TH-19	NA	NA	NA	NA	4" FM-PVC
EH-1	2029396.64	523874.89			NOTHING FOUND
EH-2	2030624.86	523784.09			NOTHING FOUND
EH-3	2030620.77	523782.59			NOTHING FOUND
EH-4	2030680.08	523801.59			NOTHING FOUND
EH-5	2030666.86	523800.99			NOTHING FOUND

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NO.	BY	DATE	SYMBOL	REVISIONS
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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

WATER MAIN AND
RECLAIMED WATER MAIN
PLAN AND PROFILE

SHEET NO.
9
DWG NO.
C-7
ELECTRICAL
BID PACKAGE

GENERAL NOTES FOR SOIL EROSION AND SEDIMENT CONTROL:

- ALL EROSION AND SEDIMENT CONTROL PRACTICES TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
- ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN 30 DAYS, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF TWO (2) TONS PER ACRE, ACCORDING TO STATE STANDARDS.
- PERMANENT VEGETATION TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER GRADING. MULCH TO BE USED AS NECESSARY FOR PROTECTION UNTIL SEEDING IS ESTABLISHED.
- ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH THE FDOT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", LATEST EDITION, SECTIONS 104, 570, AND 981 TO 987.
- A BITUMINOUS CONCRETE BASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS IN ORDER TO STABILIZE STREETS, ROADS, DRIVEWAYS AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE BITUMINOUS CONCRETE BASE SHALL BE INSTALLED WITHIN 15 DAYS OF THE PRELIMINARY GRADING.
- IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE A TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A THICKNESS OF TWO (2) TO FOUR (4) INCHES MIXED WITH THE TOP TWO (2) INCHES OF SOIL, ACCORDING TO STATE STANDARDS.
- ANY STEEP SLOPES RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION PROCEEDS (I.E. SLOPES GREATER THAN 3:1).
- UNFILTERED DEWATERING IS NOT PERMITTED. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER.
- SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE WILL BE SPRINKLED UNTIL THE SURFACE IS WET, TEMPORARY VEGETATION COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED IN ACCORDANCE WITH STATE STANDARDS FOR EROSION CONTROL.
- ALL SOIL WASHED, DROPPED, SPILLED OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHTS-OF-WAY WILL BE REMOVED IMMEDIATELY.
- ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL NOTE NUMBER 2 (ABOVE).
- ALL SEDIMENTATION STRUCTURES SHALL BE INSPECTED AND MAINTAINED REGULARLY.
- THE CONTRACTOR SHALL PREPARE A PLAN FOR THE PROPER DEWATERING AND DOWNSTREAM SILTATION PROTECTION OF EACH STREAM CROSSING PRIOR TO EXCAVATING THE STREAM BED. PLAN SHALL BE FORWARDED TO THE ENGINEER FOR APPROVAL. THE ENGINEER SHALL BE NOTIFIED FOR INSPECTION PRIOR TO EACH STREAM CROSSING CONSTRUCTION.
- ANY AREAS USED FOR THE CONTRACTOR'S STAGING, INCLUDING BUT NOT LIMITED TO, TEMPORARY STORAGE OF STOCKPILED MATERIALS (E.G. CRUSHED STONE, QUARRY PROCESS STONE, SELECT FILL, EXCAVATED MATERIALS, ETC.), SHALL BE ENTIRELY PROTECTED BY A SILT FENCE ALONG THE LOW ELEVATION SIDE TO CONTROL SEDIMENT RUNOFF.

WHERE APPLICABLE

TEMPORARY SEEDING DETAILS

SEED BED PREPARATION

SOIL TO BE THOROUGHLY PULVERIZED BY DISK-HARROWING AND BE LOOSE AND REASONABLY SMOOTH. APPLY FERTILIZER AT A RATE OF 260 LBS./ACRE OF 16-16-16 OR EQUIVALENT, APPLY DOLOMITIC LIMESTONE AT A RATE OF 800 TO 1000 LBS./ACRE TO PROVIDE A SOIL pH OF 5.5 TO 6.5, LIME & FERTILIZER TO BE WORKED INTO THE TOPSOIL TO A DEPTH OF 4". ADD SANDY LOAM TOPSOIL TO A MINIMUM OF TWO (2) INCHES WHERE DIRECTED BY ENGINEER.

SEED MIXTURE

CONSISTING OF ANNUAL RYE (LOLIUM MULTIFLORUM) AT A RATE OF 174 LBS./ACRE.

PERMANENT SEEDING DETAILS

SEED BED PREPARATION

SOIL TO BE THOROUGHLY PULVERIZED BY DISK-HARROWING AND BE LOOSE AND REASONABLY SMOOTH. APPLY FERTILIZER AT A RATE OF 260 LBS./ACRE OF 16-16-16 OR EQUIVALENT, APPLY DOLOMITIC LIMESTONE AT A RATE OF 800 TO 1000 LBS./ACRE TO PROVIDE A SOIL pH OF 5.5 TO 6.5, LIME & FERTILIZER TO BE WORKED INTO THE TOPSOIL TO A DEPTH OF 4".

SEED MIXTURE CONSISTING OF	RATE	PURITY	GERMINATION
ARGENTINE BAHIA	260 LBS./AC.	95%	80%
PENSACOLA BAHIA	260 LBS./AC.	95%	40%(MIN.)-80%(TOTAL)

SODDING

SOD SHALL BE WELL ROOT MATTED ARGENTINE BAHIA GRASS COMMERCIAL CUT TO A MINIMUM DIMENSION OF 12" x 24" A MAXIMUM OF 72 HOURS PRIOR TO PLACEMENT. SOD SHALL BE LIVE, FRESH AND UNINJURED, REASONABLY FREE OF WEEDS AND OTHER GRASSES, WITH A HEAVY SOIL MAT ADHERING TO THE ROOT SYSTEM. SOD SHALL BE GROWN, CUT, AND SUPPLIED BY A STATE CERTIFIED GROWER.

TREE PROTECTION

- DAMAGED TRUNKS OR EXPOSED ROOTS WILL BE PAINTED IMMEDIATELY WITH A COMMERCIAL GRADE OF "TREE PAINT".
- TREE LIMB REMOVAL, WHERE NECESSARY, WILL BE DONE FLUSH TO TRUNK OR MAIN BRANCH AND THAT AREA PAINTED IMMEDIATELY WITH A COMMERCIAL GRADE OF TREE PAINT.

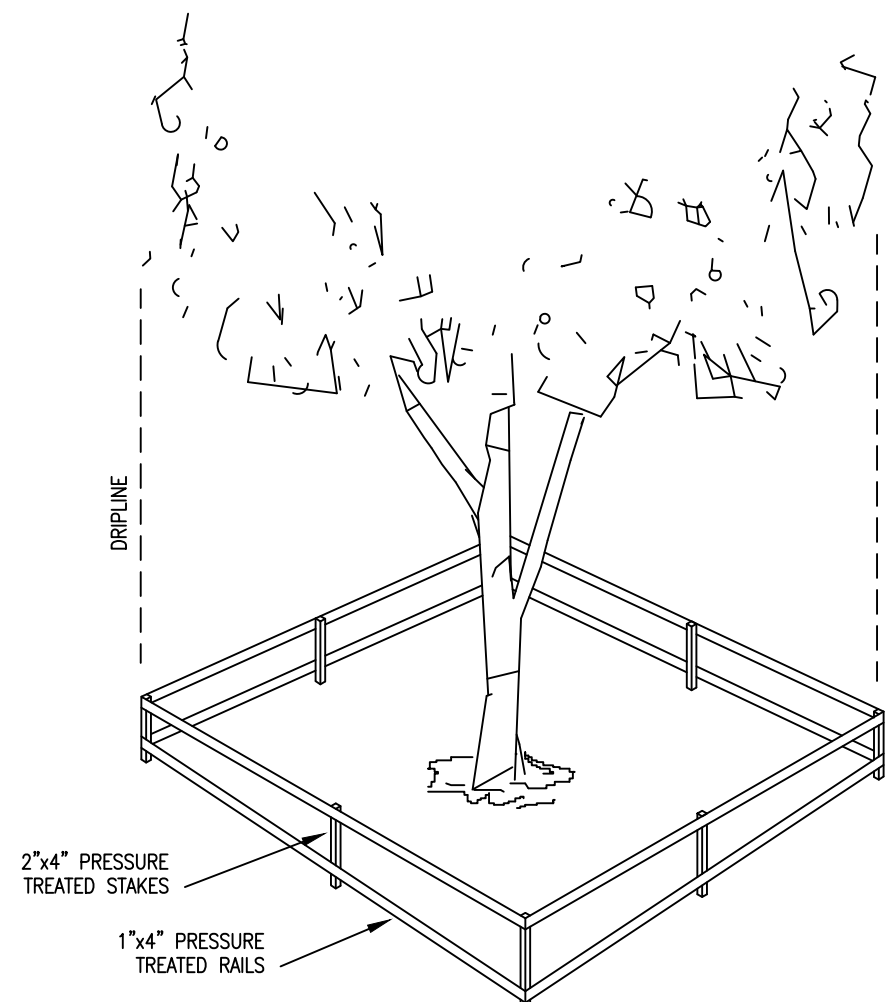
DUST CONTROL

- ALL AREAS OF CLEARING AND EMBANKMENT AS WELL AS CONSTRUCTION HAUL ROADS SHALL BE TREATED AND MAINTAINED IN SUCH A MANNER AS TO MINIMIZE ANY DUST GENERATION.
- DISTURBED AREAS SHALL BE MAINTAINED IN A ROUGH GRADED CONDITION AND TEMPORARILY SEEDED AND/OR MULCHED UNTIL PROPER WEATHER CONDITIONS EXIST FOR THE ESTABLISHMENT OF PERMANENT VEGETATION COVER.
- IN EVENT OF EMERGENCY CONDITIONS, TILLAGE WILL BE SATISFACTORY FREE BEFORE SOIL BLOWING STARTS.

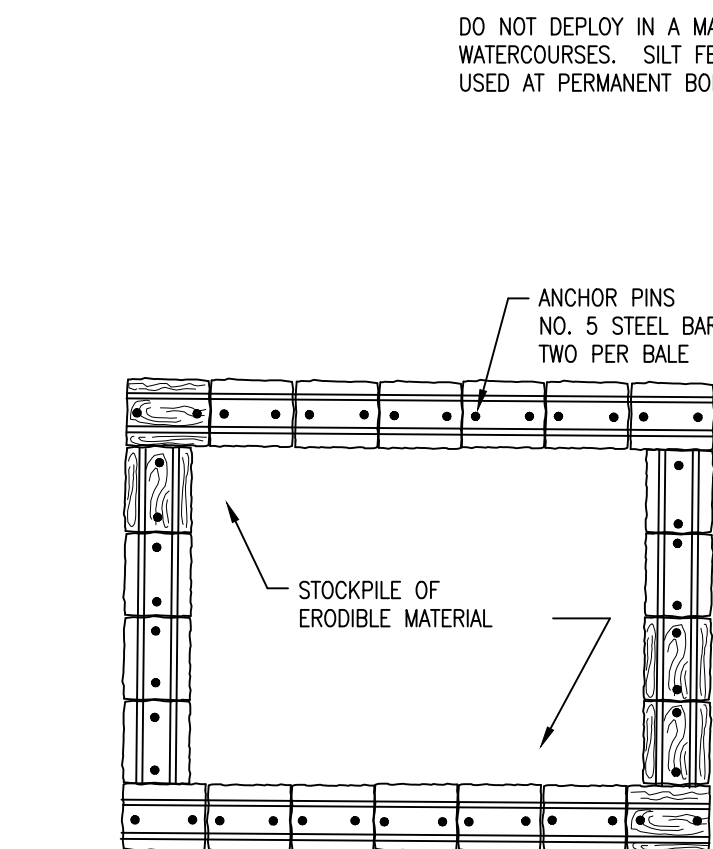
PROPOSED SEQUENCE OF CONSTRUCTION

CONSTRUCTION SHOULD PROCEED IN THE FOLLOWING MANNER:

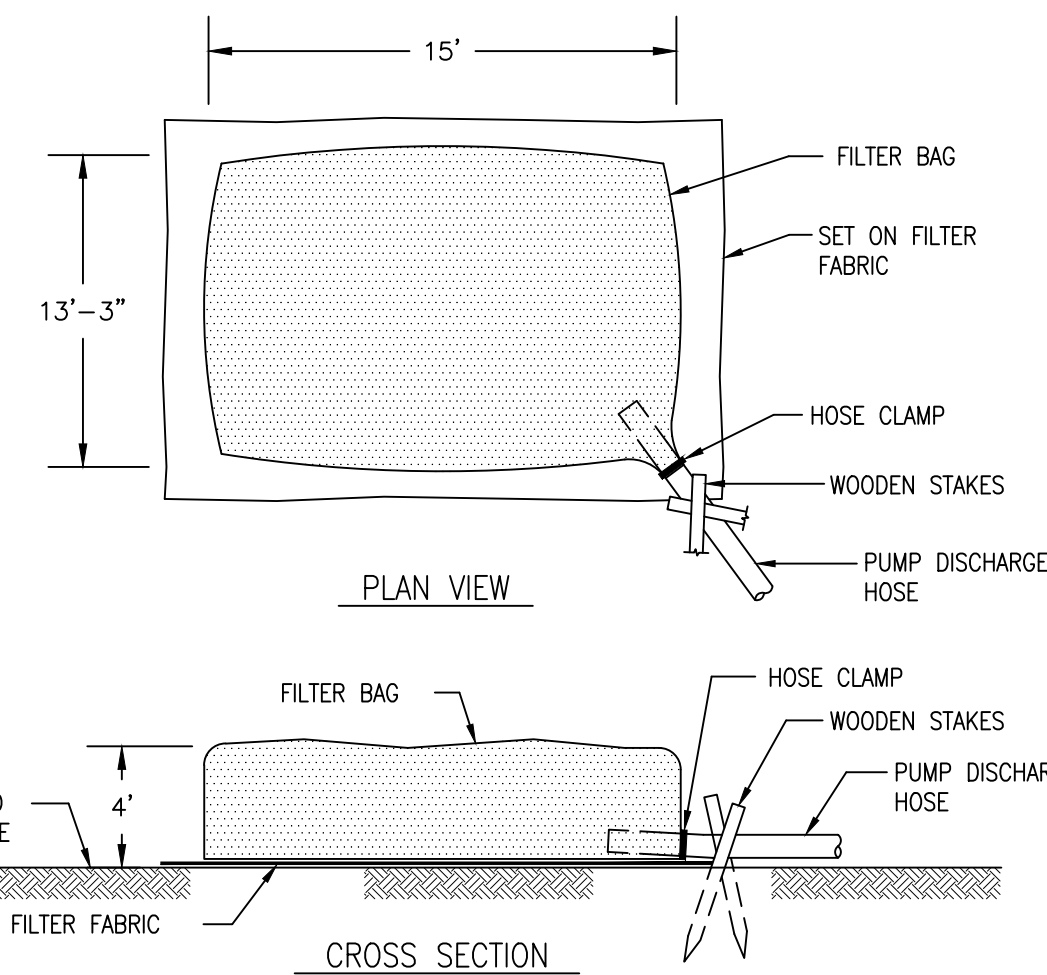
- INSTALL SILT FENCE, HAYBALE BARRIERS AND/OR TURBIDITY BARRIERS AS SHOWN.
- ROUGH GRADE STORMWATER POND.
- CLEAR AND GRUB.
- CONSTRUCT PROPOSED INFRASTRUCTURE.
- REMOVE ACCUMULATED SEDIMENT FROM POND AND SWALE, FINAL DRESS AND STABILIZE.
- ONCE SILTATION AND SEDIMENTATION CONTROL MEASURES ARE WELL ESTABLISHED REMOVE EROSION CONTROL DEVICES.



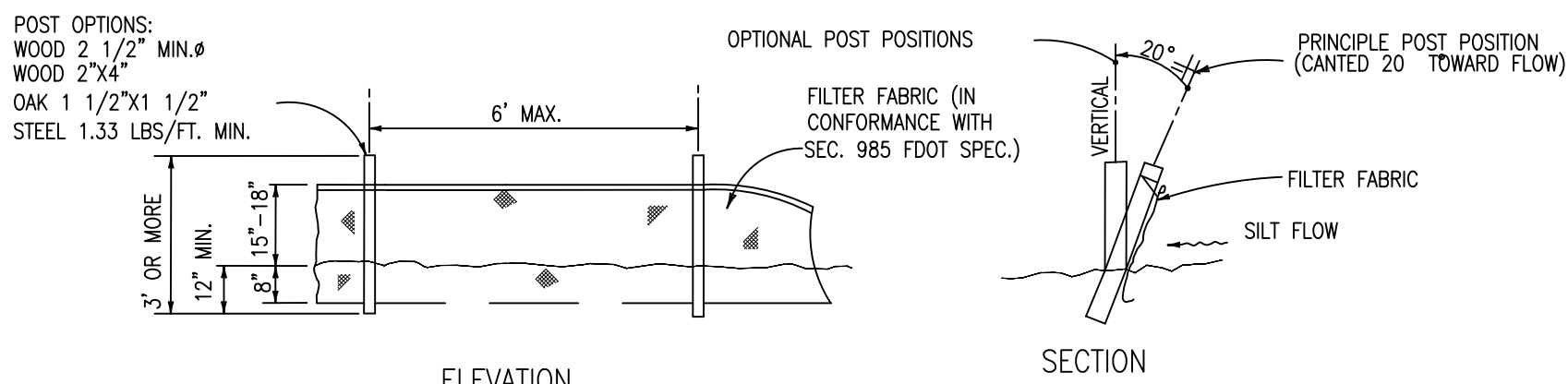
E TREE BARRICADE
NTS



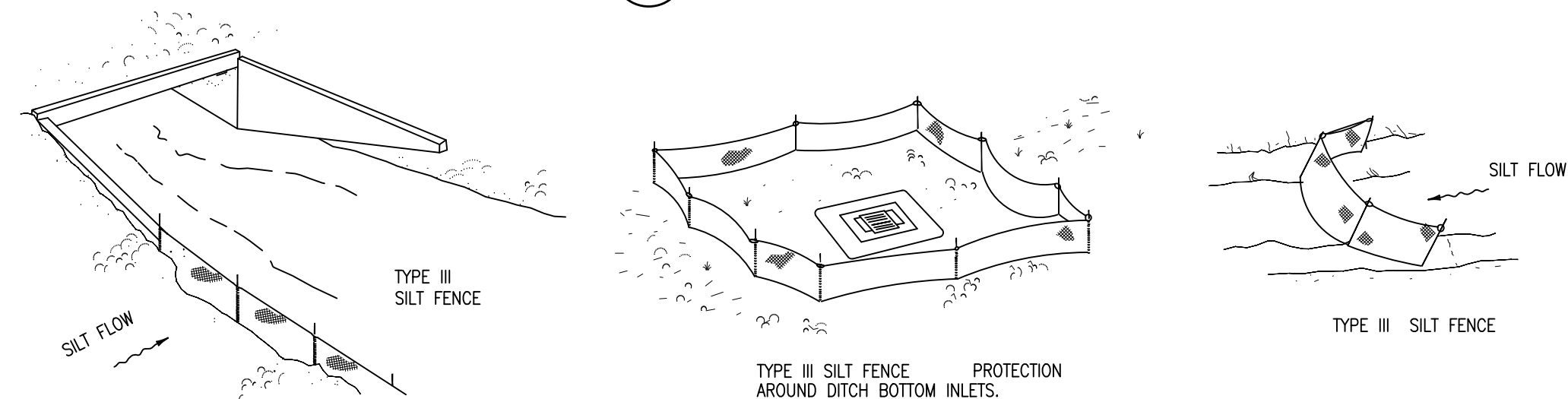
F MATERIAL STOCKPILE DETAIL
NTS



J FILTER BAG DETAILS FOR TRENCH DEWATERING OPERATIONS
NTS

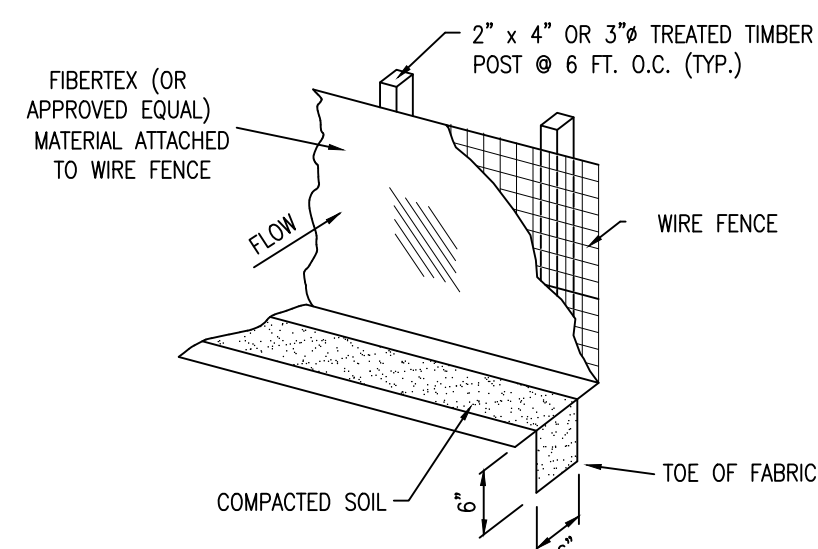


A TYPE III SILT FENCE
NTS

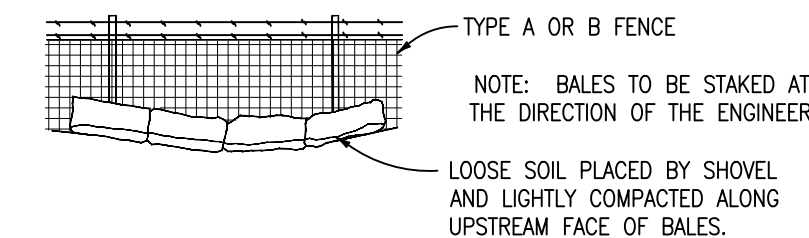


C SILT FENCE APPLICATIONS
NTS

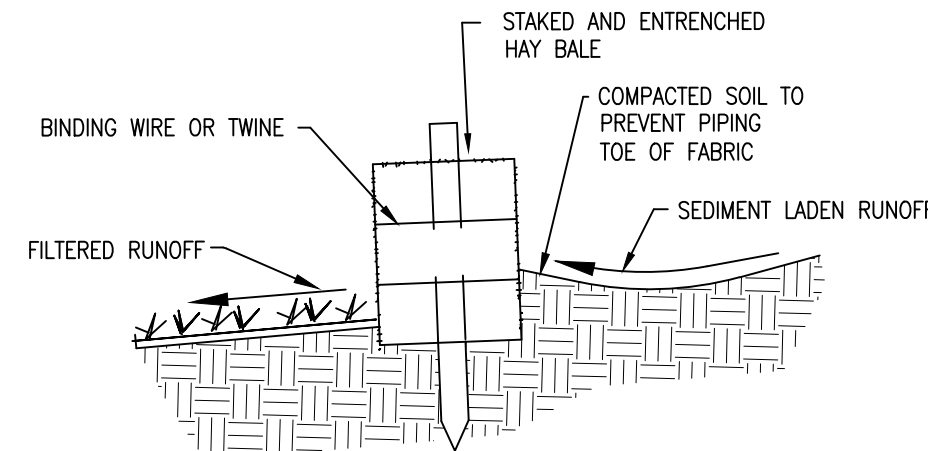
DO NOT DEPLOY IN A MANNER THAT SILT FENCES WILL ACT AS A DAM ACROSS PERMANENT FLOWING WATERCOURSES. SILT FENCES ARE TO BE USED AT UPLAND LOCATIONS AND TURBIDITY BARRIERS USED AT PERMANENT BODIES OF WATER.



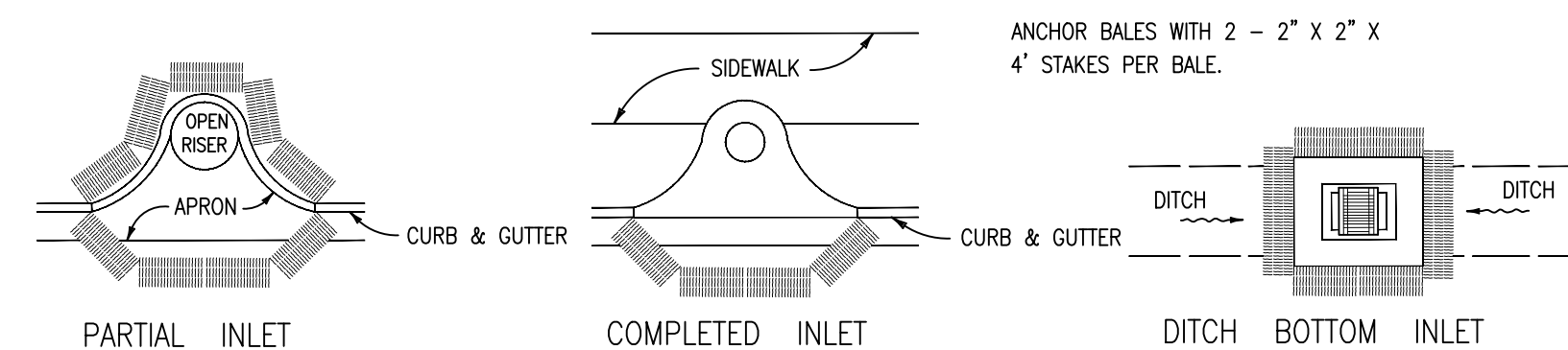
H SILT FENCE DETAIL
NTS



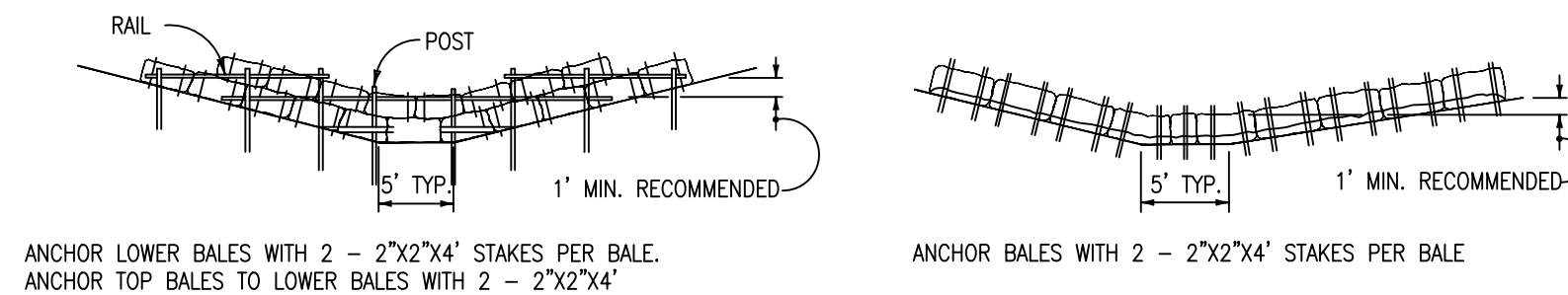
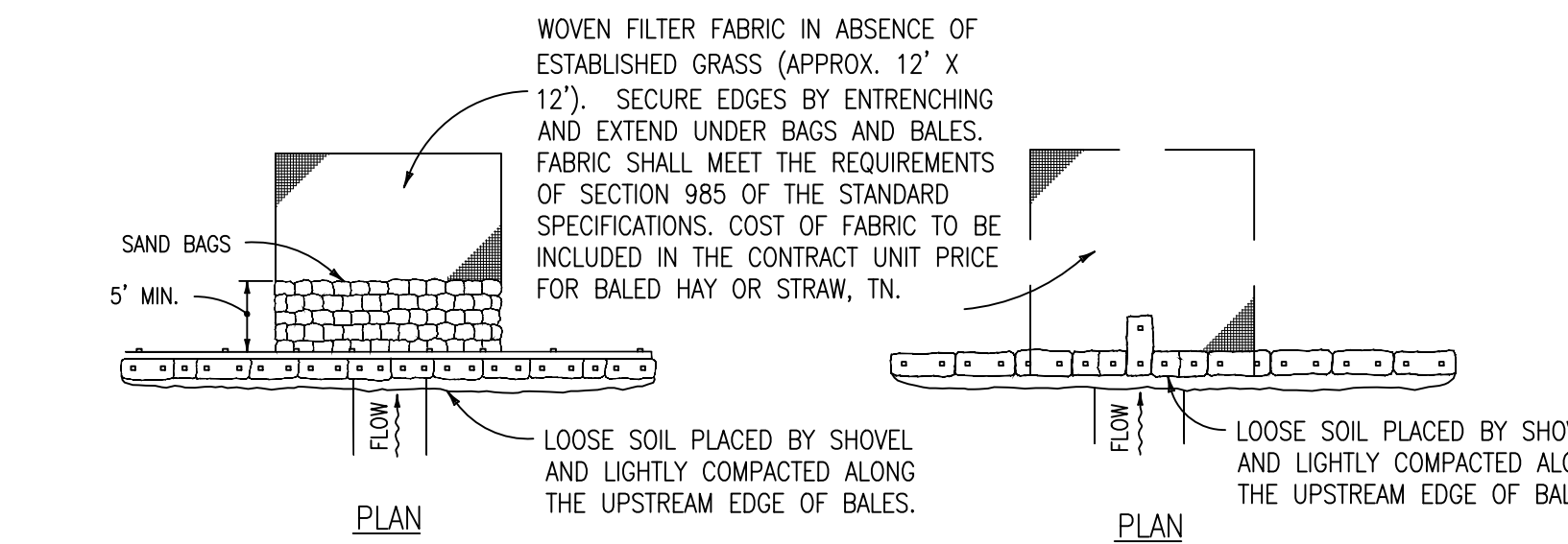
B BALES BACKED BY FENCE
NTS



D DETAIL OF PROPERLY INSTALLED HAY BALE
NTS



D PROTECTION AROUND INLETS OR SIMILAR STRUCTURES
NTS



ELEVATION

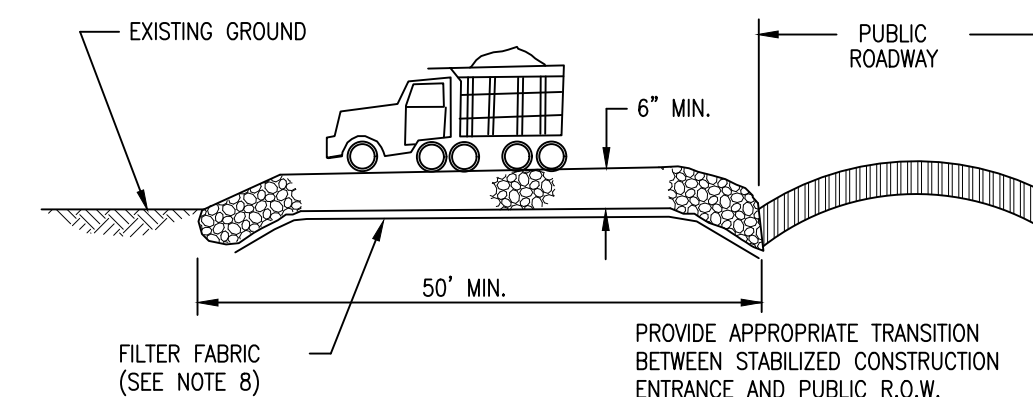
APPLICATION AND SPACING: THE USE OF TYPES I & II BALE BARRIERS SHOULD BE LIMITED TO THE CONDITIONS OUTLINED IN CHART I, SHEET 1 OF 3, INDEX NO. 102

TYPE II

ELEVATION

TYPE I

K BARRIER FOR UNPAVED DITCHES
NTS



G STABILIZED CONSTRUCTION ENTRANCE DETAIL
NTS

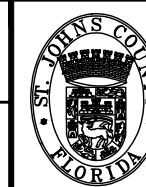
NO.	BY	DATE	SYMBOL	REVISIONS
6				
5				
4				
3				
2				
1	MM	10/20/22		ELECTRICAL CONTRACTOR BID PACKAGE



Mott MacDonald
10245 Centurion Pkwy, N., Suite 320
Jacksonville, Florida 32256
Telephone: (904) 203-1090
Architects Engineers Surveyors
AA - C000035 EB - 0000155 LB - 0006783

DESIGNER: S. WHITE
DRAWN BY: C. RILEY
DATE: OCTOBER 2022
CHECKED BY: S. WHITE
DATE: OCTOBER 2022

DESIGN ENGINEER
STEVEN D. WHITE
FLORIDA REGISTRATION NO.
58809



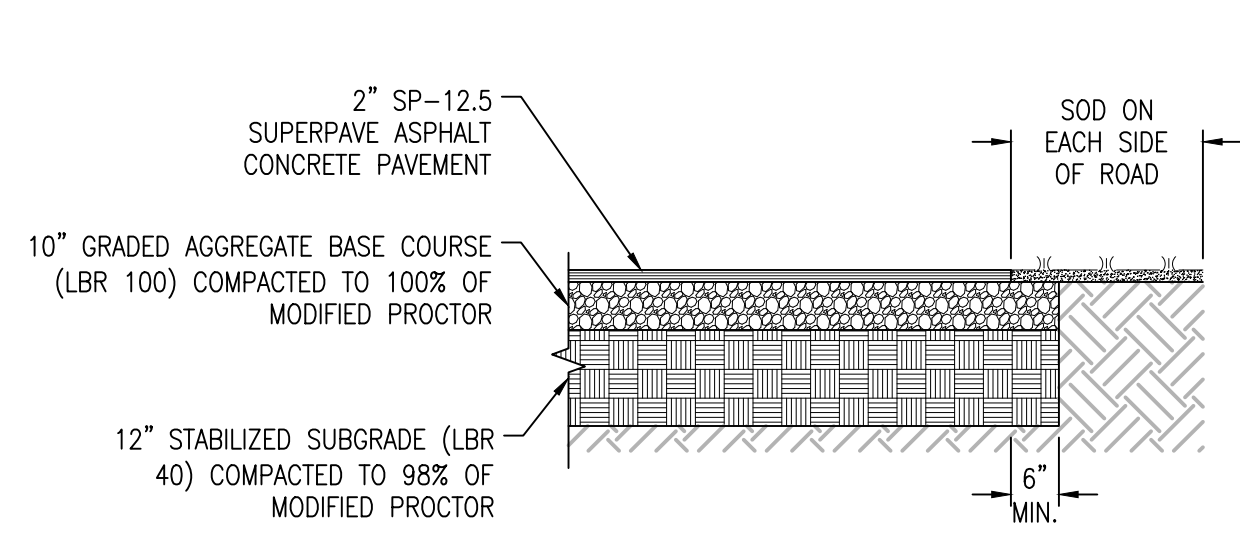
St. Johns County
Utility Department
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PHONE: (904) 209-2626 FAX: (904) 209-2627

GR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

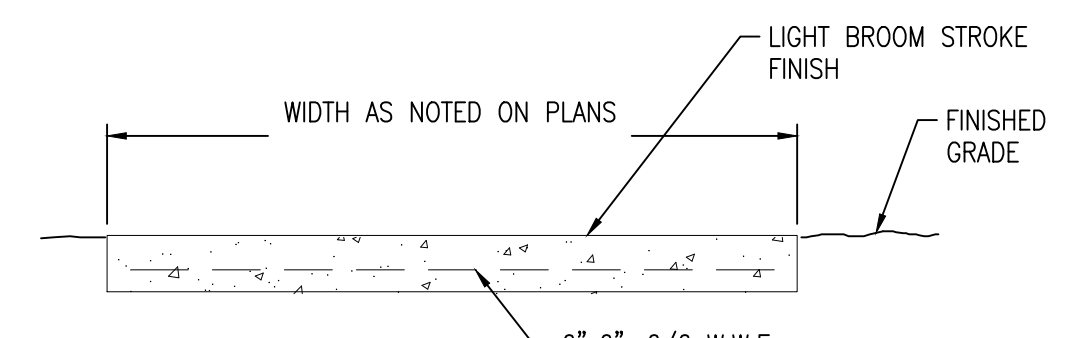
EROSION CONTROL DETAILS

SHEET NO. 10
DWG NO. CD-1
ELECTRICAL BID PACKAGE

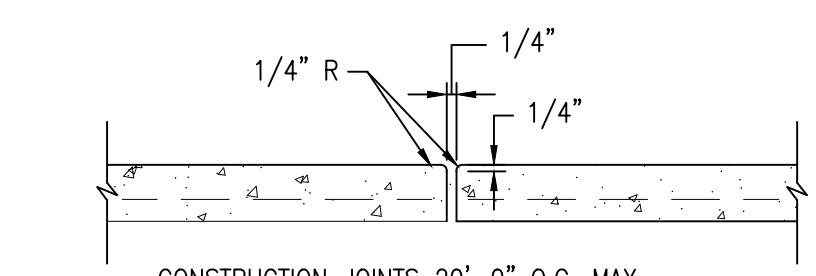
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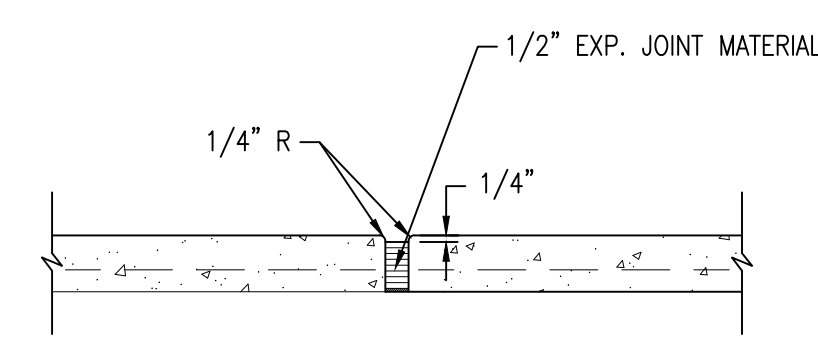
A ASPHALT PAVEMENT
NTS



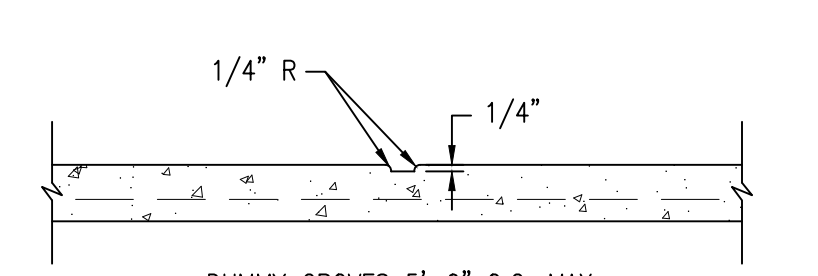
WALK SECTION



CONSTRUCTION JOINT
20'-0" O.C. MAX.
OR 1/2 LENGTH OF WALK



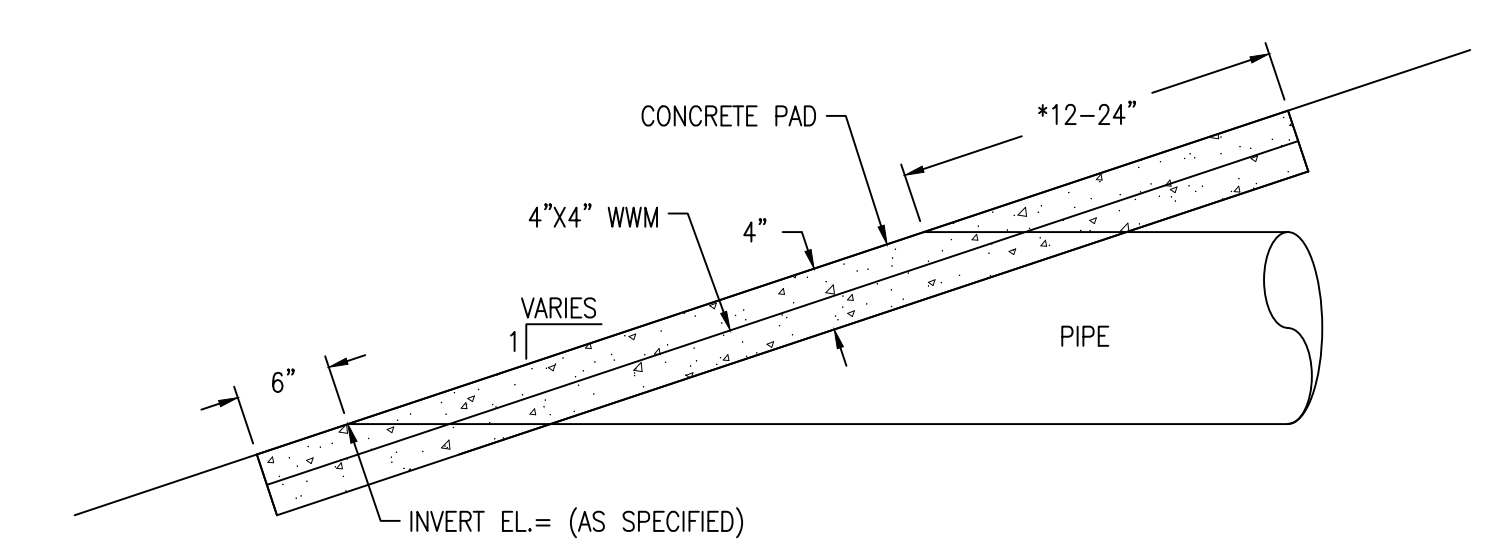
EXPANSION JOINT



DUMMY GROOVE

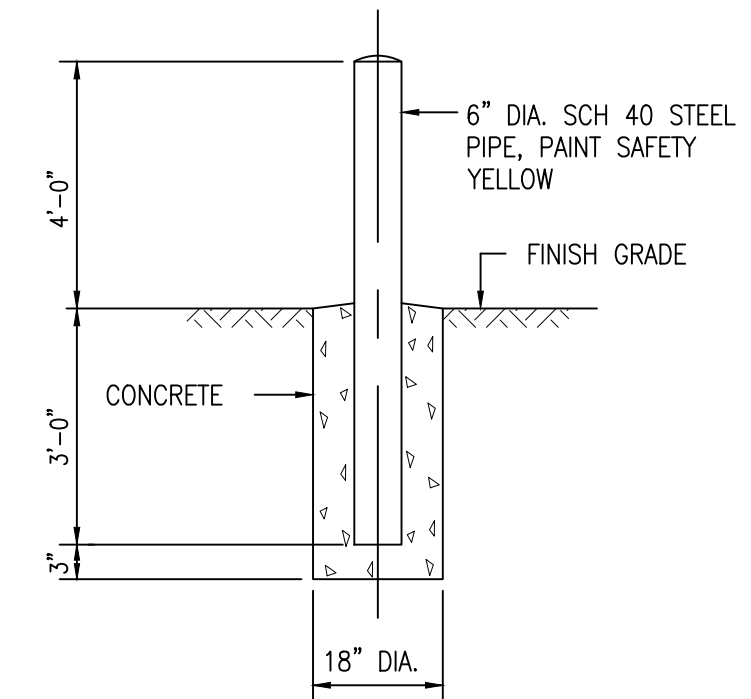
- NOTES:
1. WALK SLOPES VARY, SEE PLAN.
 2. CONCRETE IS 2,500 PSI MEETING REQUIREMENTS OF FDOT STANDARD SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION SECTION 522 LATEST EDITION.

B SIDEWALK DETAILS
NTS

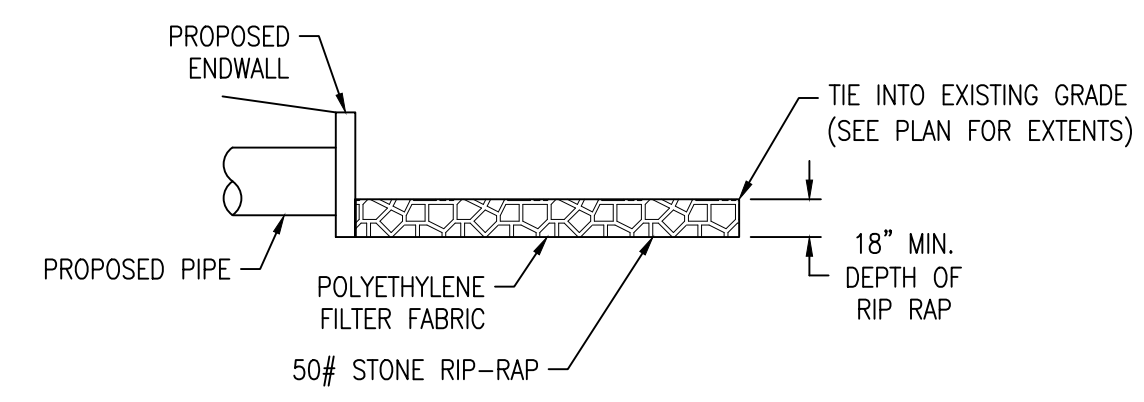


C MITERED END SECTION DETAIL
NTS

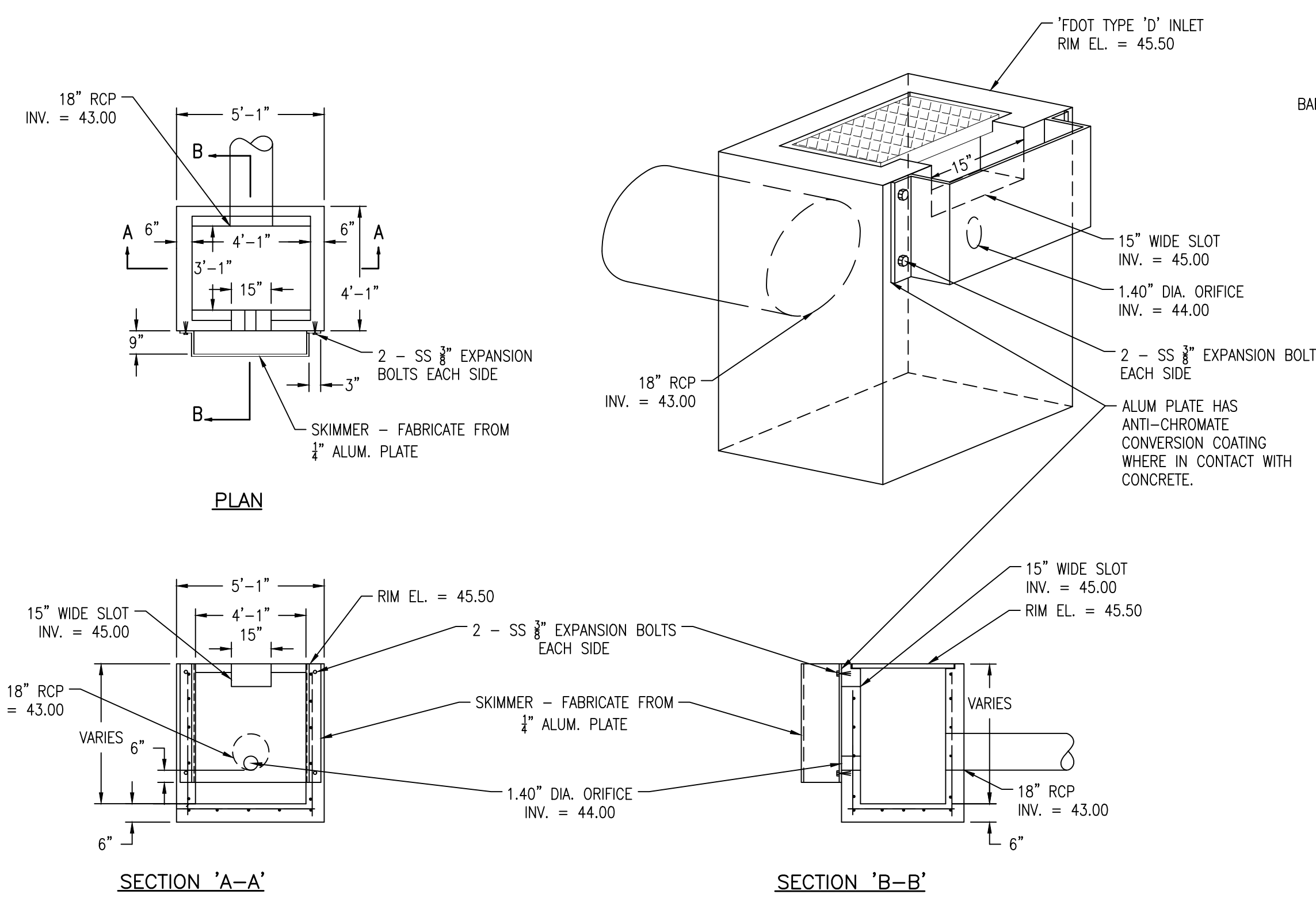
- NOTE:
CUT DRAIN PIPE ENDS TO MITERED SECTIONS. COMPACT SOIL ADJACENT TO ENDS AND SOD ACCORDINGLY. ALSO, COMPACT SOIL LIFT COVERING DRAIN PIPES AND SOD ACCORDINGLY.
- *= 6" TO 8" PIPE = 12" CONCRETE ABOVE PIPE
10" TO 12" PIPE = 18" CONCRETE ABOVE PIPE
>12" PIPE = 24" CONCRETE ABOVE PIPE



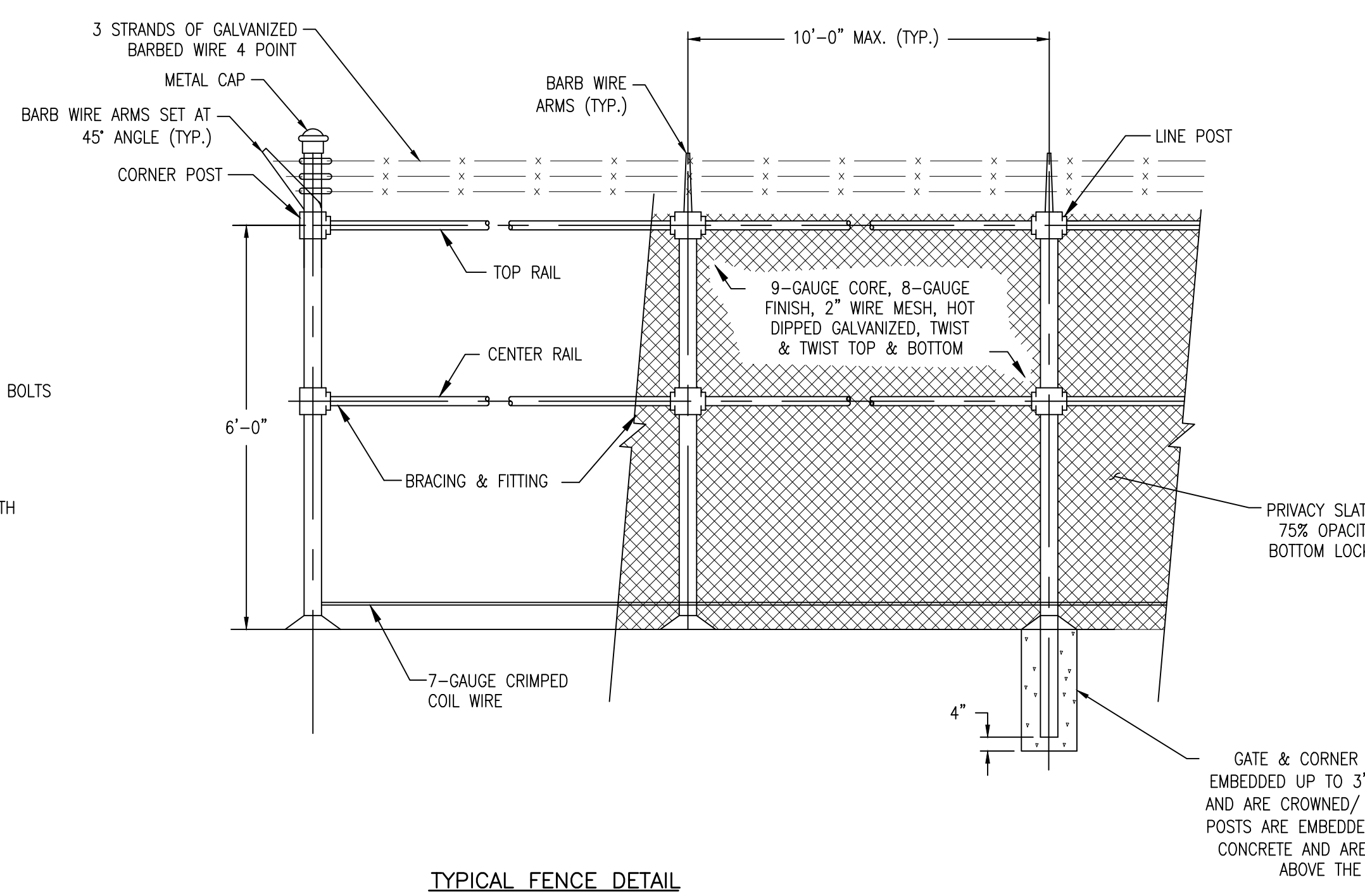
D PIPE BOLLARD
NTS



H RIP-RAP DETAIL
NTS



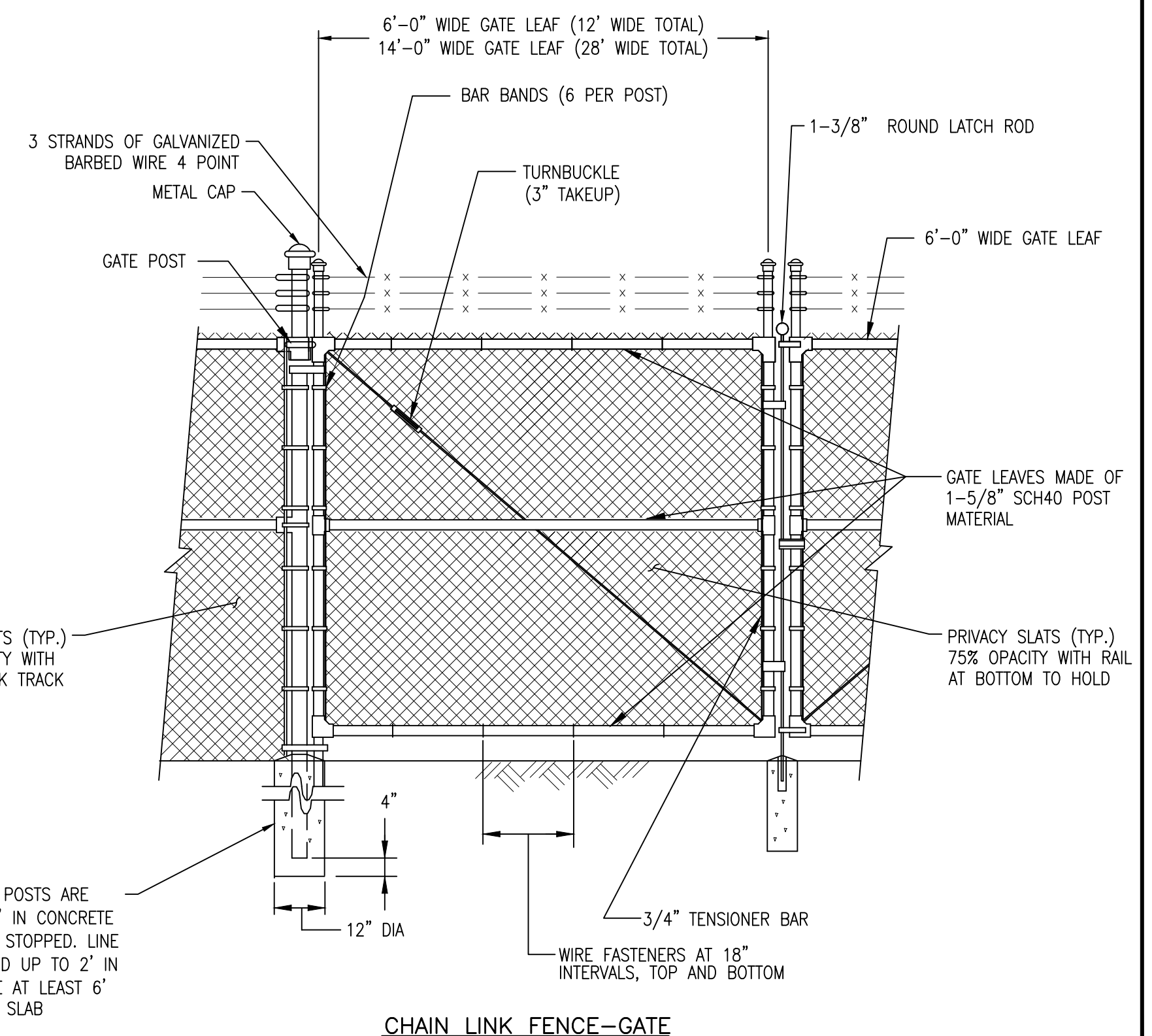
E STORMWATER POND OUTFALL STRUCTURE AND SKIMMER DETAIL
NTS



TYPICAL FENCE DETAIL

- NOTES:
1. ALL FENCING AND POSTS SHALL BE BLACK VINYL COATED.
 2. THE LOCK HASP SHALL BE CAPABLE OF ACCEPTING A STANDARD COUNTY PADLOCK.

F 6' CHAINLINK FENCE DETAIL
NTS



CHAIN LINK FENCE-GATE

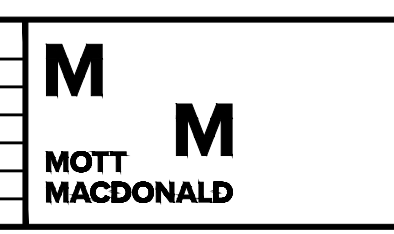
- NOTE:
1. GATE STOPS SHALL BE INSTALLED TO STOP AND SECURE GATE PROPERLY WHEN IN THE OPEN POSITION.

G 12' & 28' DOUBLE SWING GATE DETAIL
NTS

- ALL POSTS AND RAILS ARE SCH40 AND VINYL COATED
GATE POSTS: 4"x9"
CORNER POSTS: 3"x9"
LINE POSTS: 2 1/2"x8"
TOP AND CENTER RAILS: 1-5/8"

User Name: RL36256
Drawing Name: Civil Details.dwg
Drawing Path: C:\pwworking\mwater_wastewater\1036256\d060981

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1	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE



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DRAWN BY: C. RILEY
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CHECKED BY: S. WHITE
DATE: OCTOBER 2022

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FLORIDA REGISTRATION NO.
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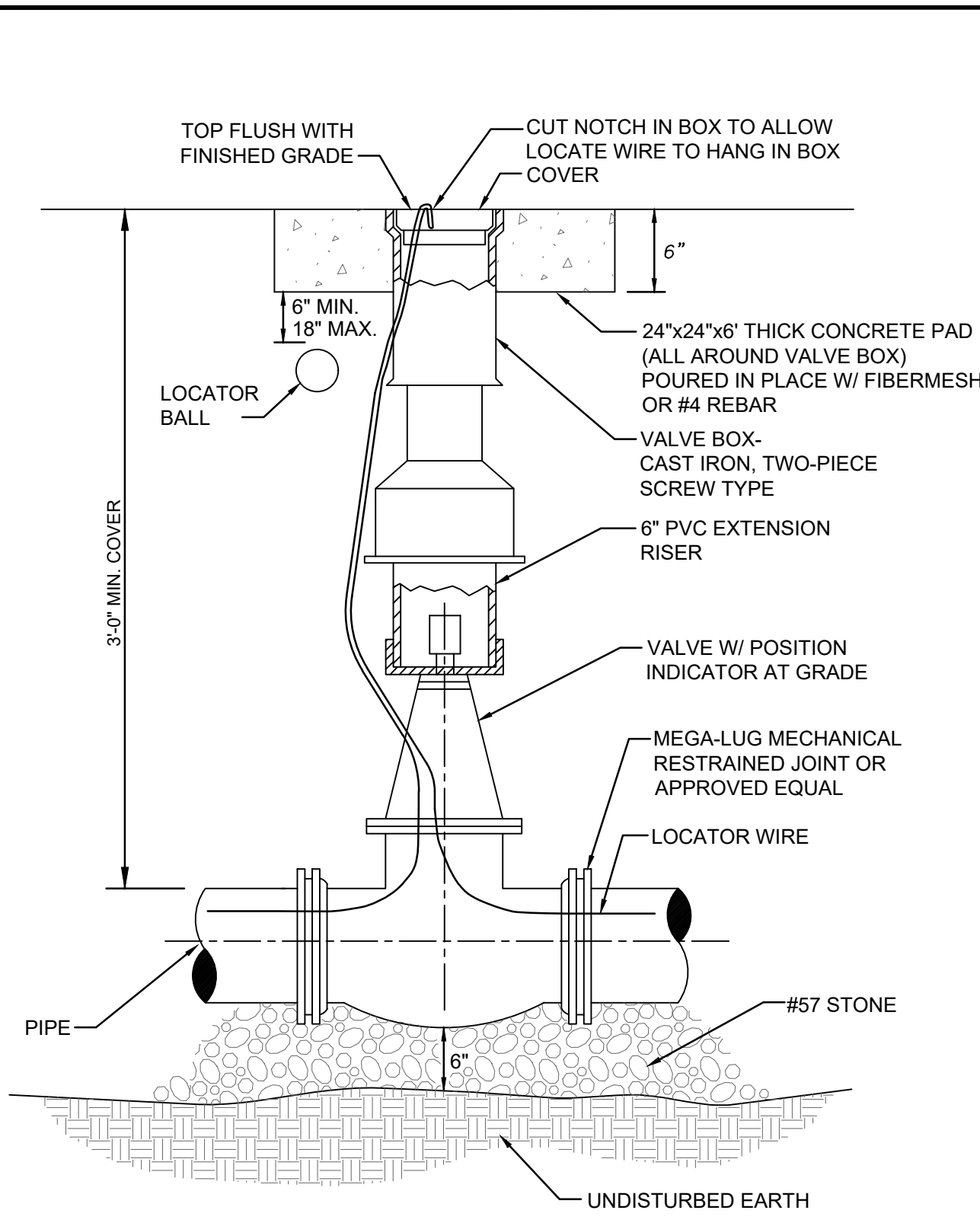
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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

CIVIL DETAILS

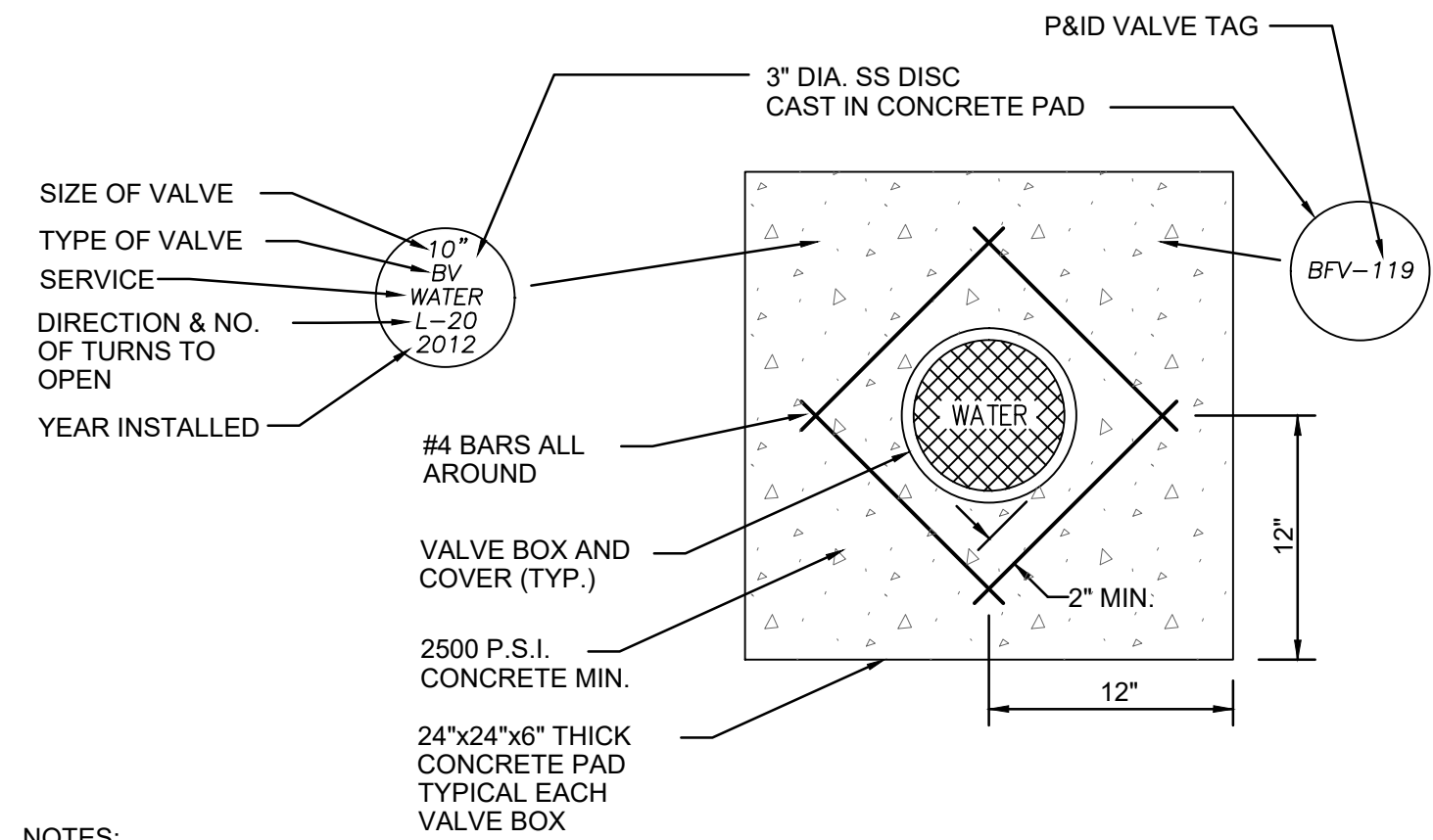
SHEET NO. 11
DWG NO. CD-2
ELECTRICAL BID PACKAGE

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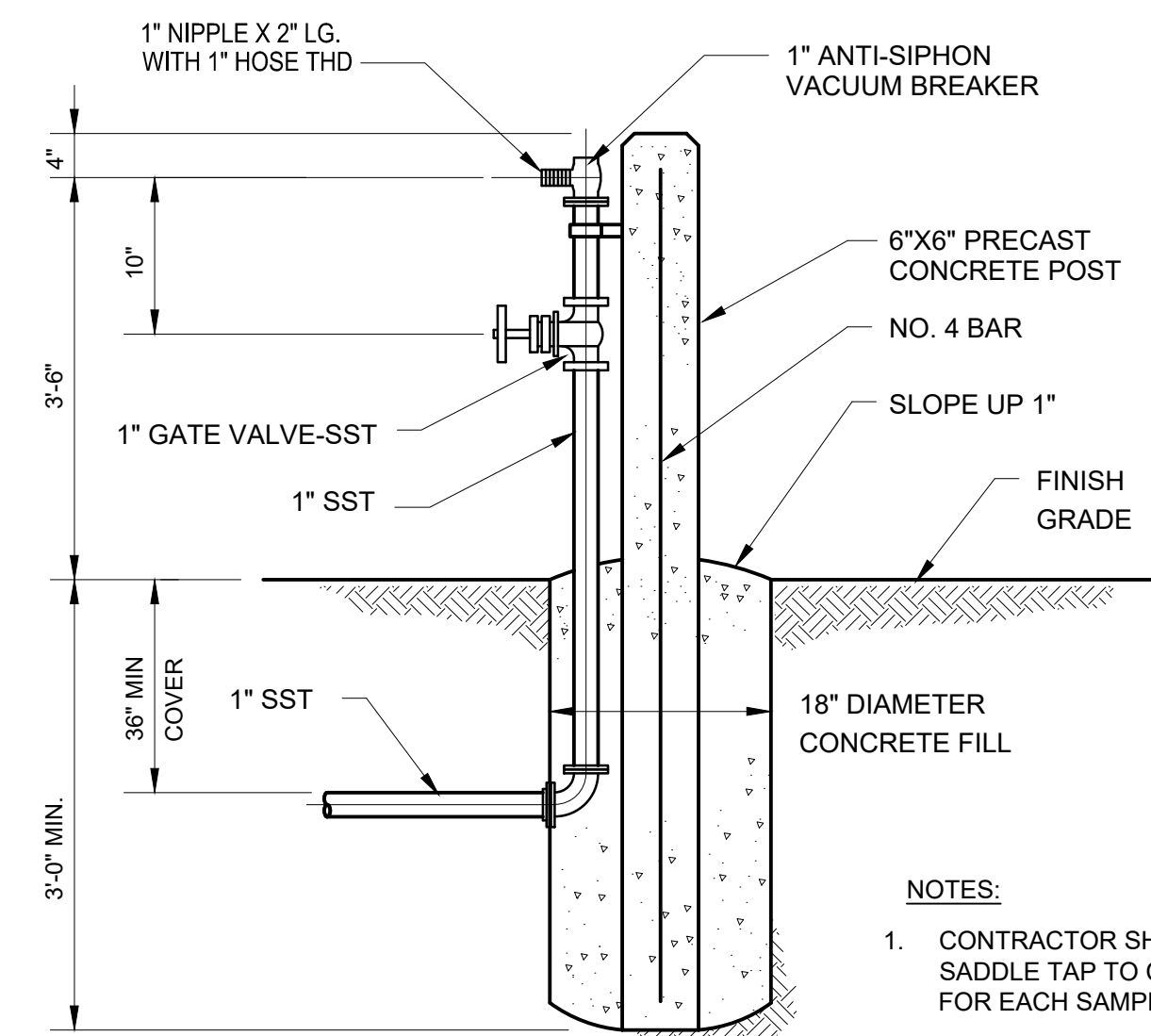


A VALVE AND VALVE BOX
NTS

- NOTES:**
1. NUT EXTENSION REQUIRED IF VALVE NUT IS DEEPER THAN 3' BELOW GRADE.
 2. SST I.D. FOR ALL SIZES.
 3. CORE 1/2" DEEP GROOVE IN CONCRETE PAD TO DENOTE ORIENTATION OF PIPE.
 4. LOCATION OF VALVE TO BE MARKED BY LETTER "V" SCRIBED A MINIMUM OF 4" HIGH AND 1/4" DEEP IN CURB AND CURB PAINTED BLUE FOR WATER AND PANTONE PURPLE 522C FOR REUSE. VALVE BOX COVERS SHALL BE PAINTED BLUE IF MAIN LINE VALVE; PAINTED YELLOW IF SERVING FIRE HYDRANT ONLY.
 5. VALVE BOX COVERS SHALL INCLUDE SERVICE DESIGNATION: WATER OR REUSE.
 6. NEW VALVE PADS AND VALVE TAGGING SHALL BE INSTALLED FOR ALL EXISTING VALVES.

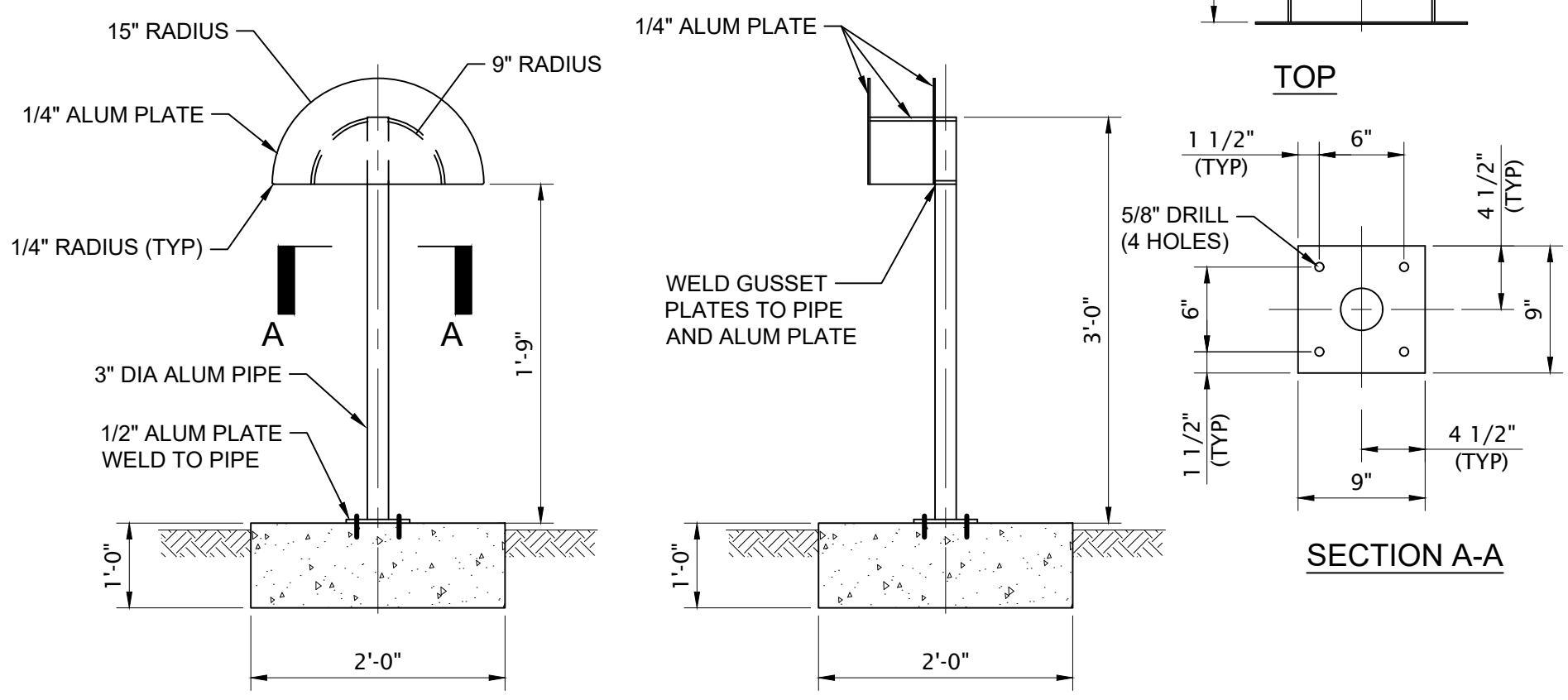


B GRAVEL STRIP AND CURB
NTS



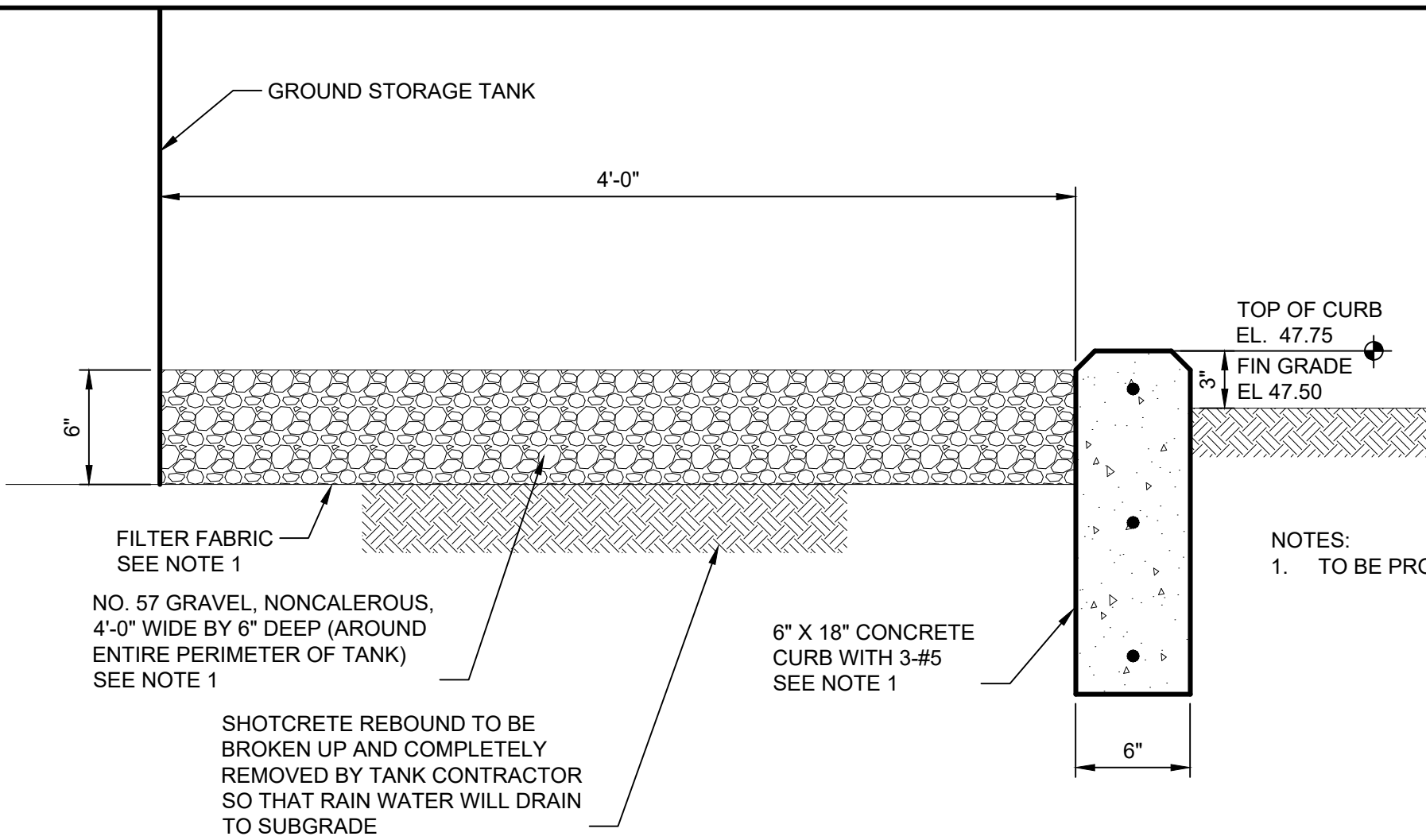
C DISINFECTION SAMPLE TAP/HOSE BIBB
NTS

- NOTES:**
1. CONTRACTOR SHALL PROVIDE SS SADDLE TAP TO CONNECTING MAIN FOR EACH SAMPLE TAP.

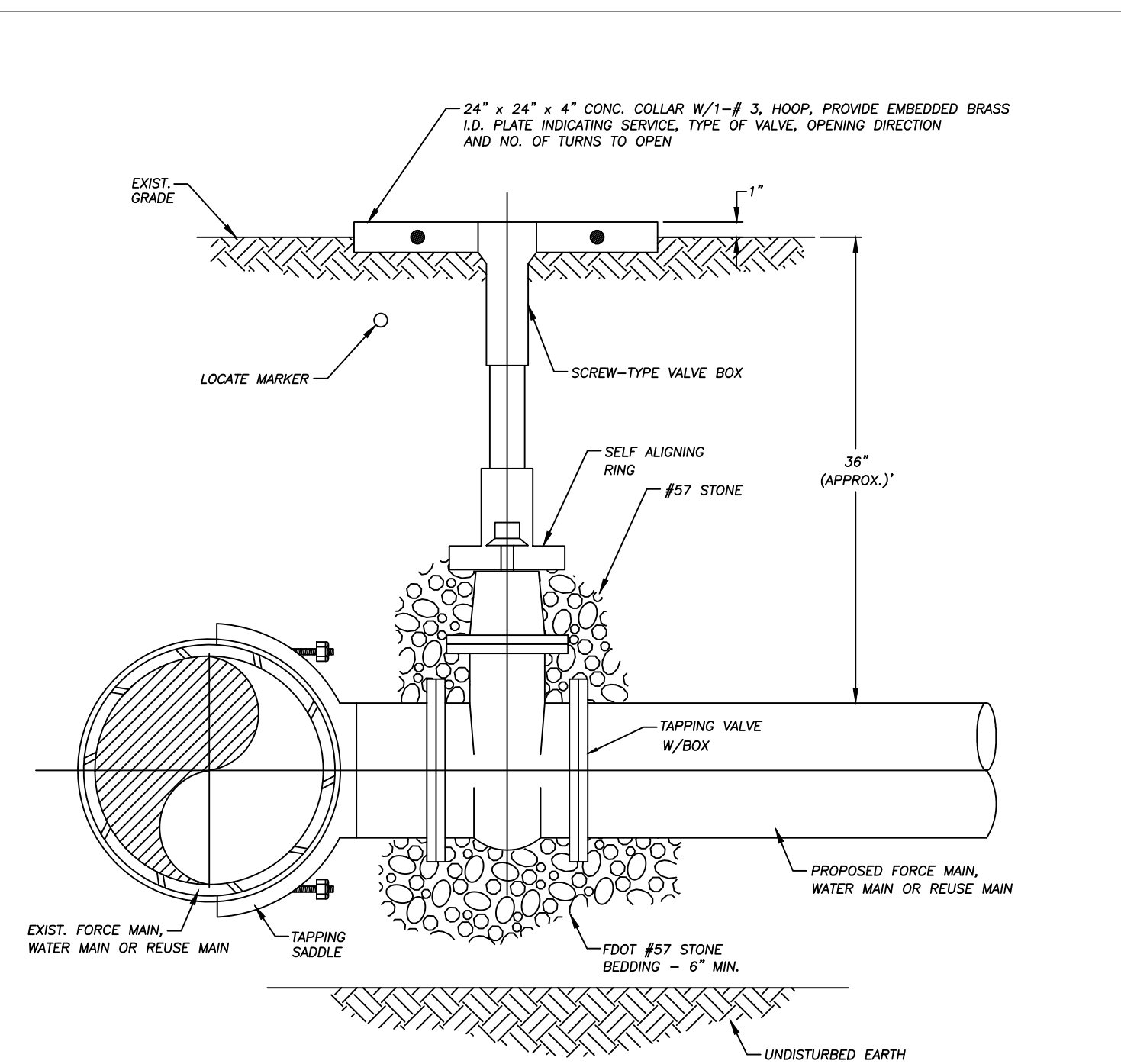


D YARD HOSE BIBB RACK
NTS

- NOTES:**
1. PROVIDE 50'-0" HOSE AT EACH HOSE BIBB RACK LOCATION.



- NOTES:**
1. TO BE PROVIDED AND INSTALLED BY THE CONTRACTOR.



- NOTES:**
1. RESILIENT WEDGE GATE VALVE SHALL BE EPOXY COATED.
 2. TAPPING SADDLE SHALL BE STAINLESS STEEL.
 3. SELF-CENTERED ALIGNMENT RING.

REVISIONS	DATE	BY	COMMENTS
2020			REVISION 1

**ST. JOHNS COUNTY
UTILITY DEPARTMENT**
1205 STATE ROAD 16
ST. AUGUSTINE, FLORIDA 32084
Phone (904) 209-2700 • Fax (904) 209-2802

**TAPPING SADDLE
& TAPPING VALVE
DETAIL**

SCALE: N.T.S.

PLATE:
W-26

E TAPPING SADDLE & TAPPING VALVE
NTS

SJCUD 2021
PLATE W-26

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MACDONALD
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DESIGNER: L. TRACEY
DRAWN BY: B. LEE
DATE: OCT 2022
CHECKED BY: L. SAMEL
DATE: OCT 2022

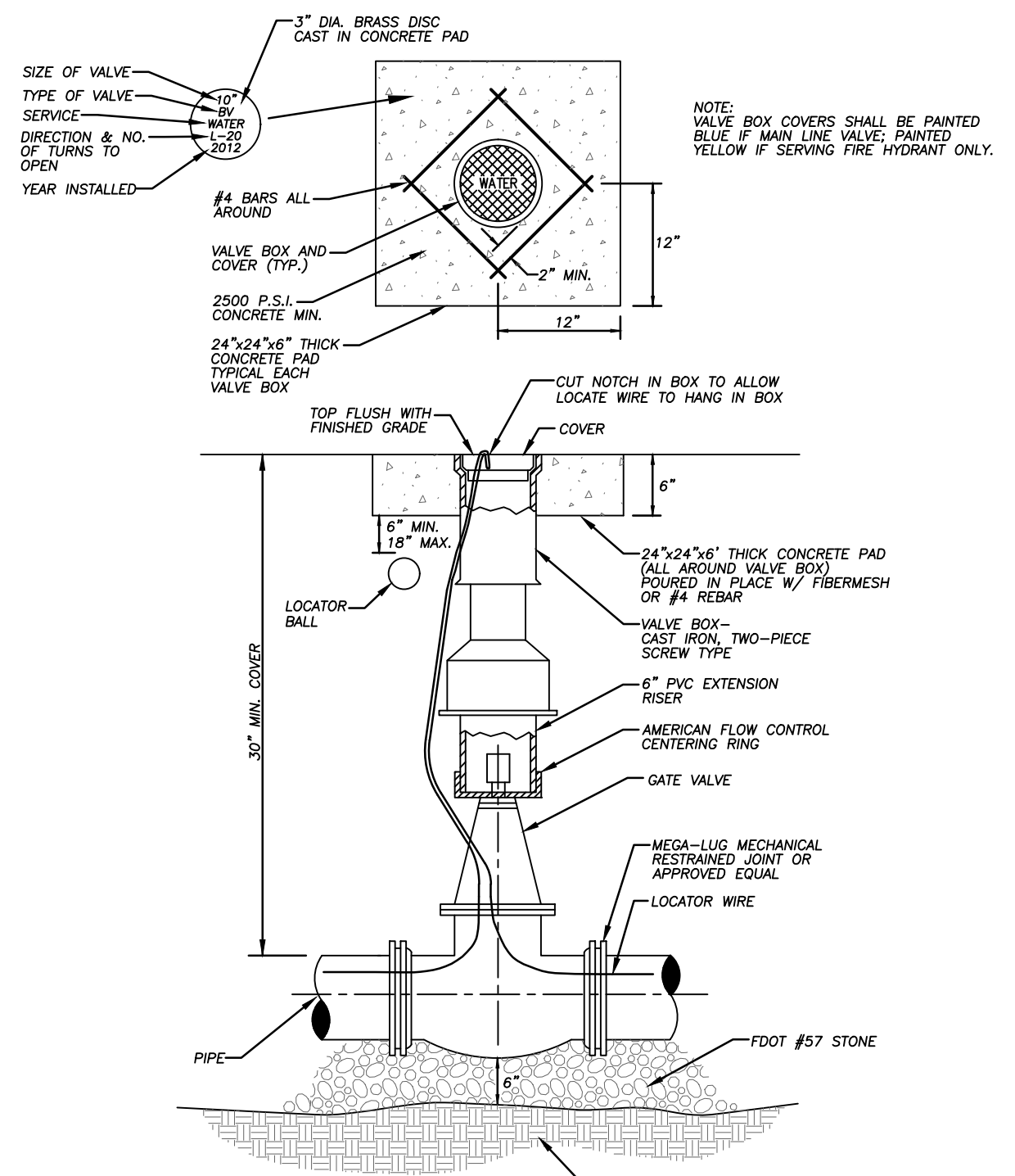
DESIGN ENGINEER
LESLIE S. SAMEL, P.E.
FLORIDA REGISTRATION NO.
68763

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Utility Department
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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

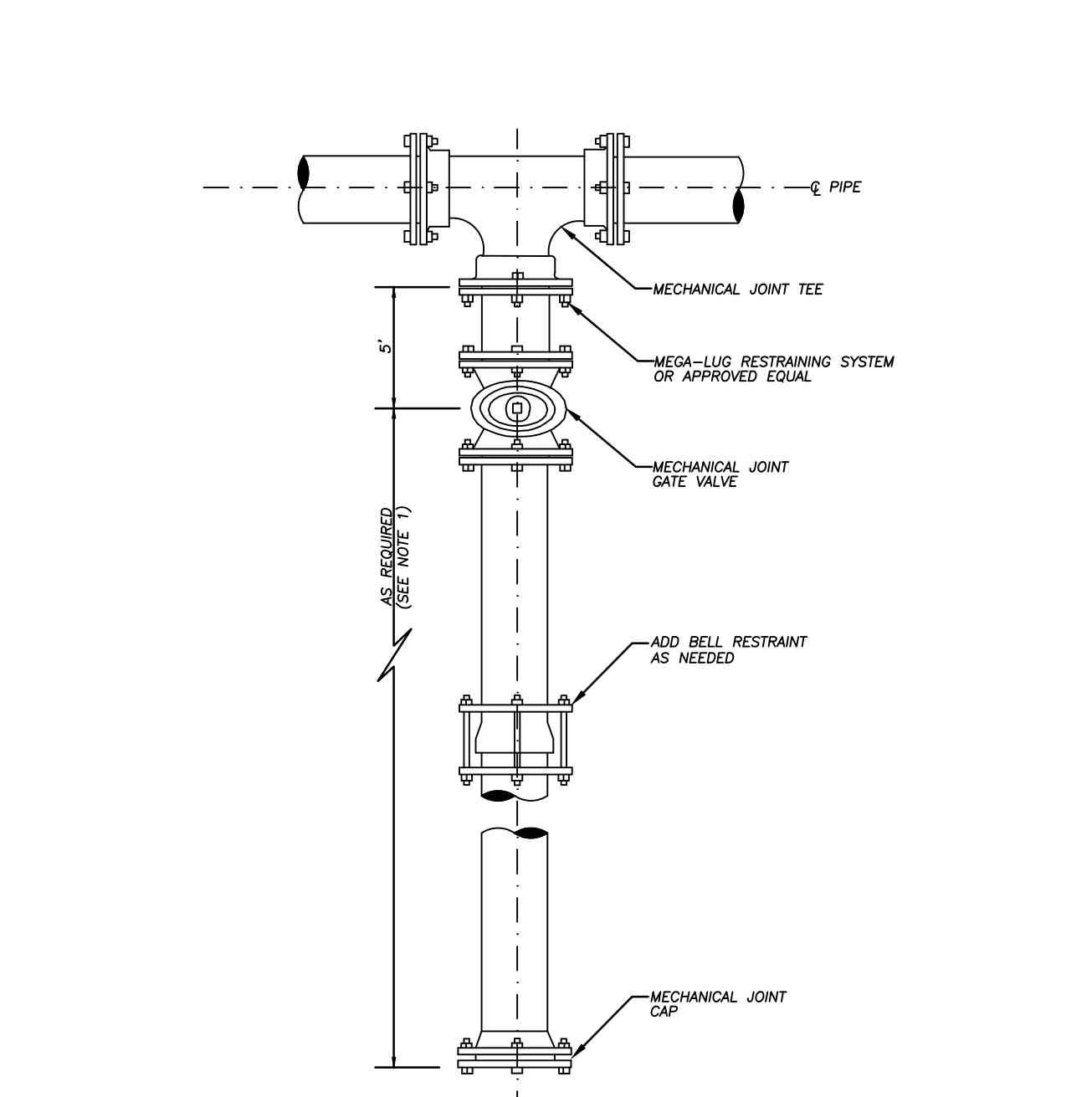
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SHEET NO.
12
DWG NO.
CD-3
ELECTRICAL
BID PACKAGE



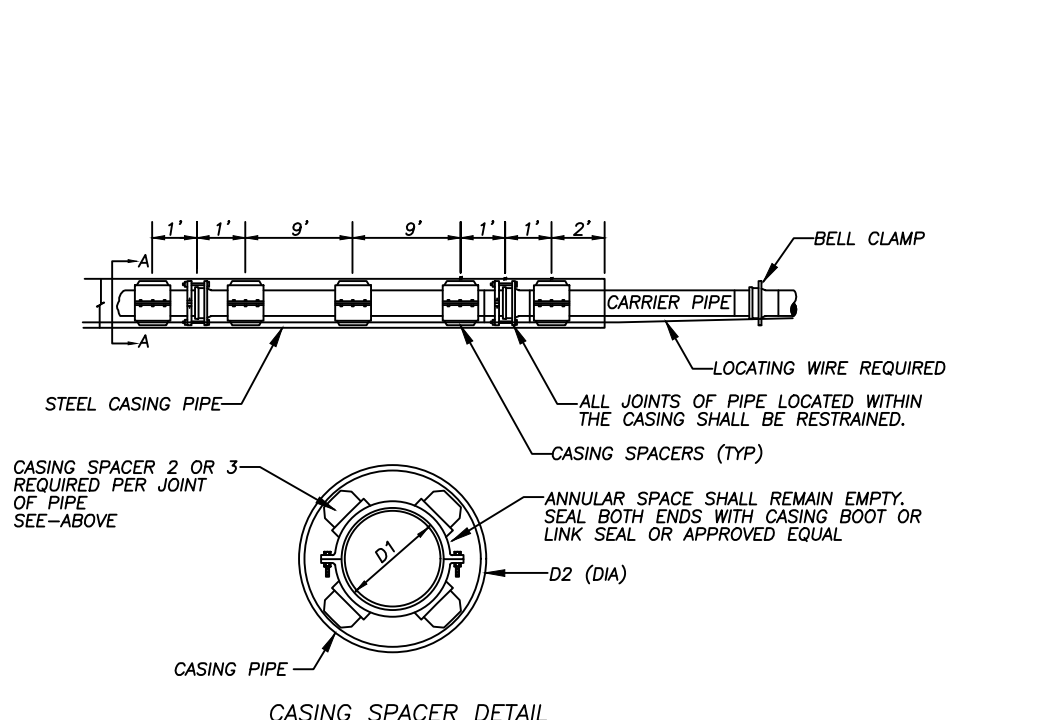
- NOTE:**
- NUT EXTENSION REQUIRED IF VALVE NUT IS DEEPER THAN 3" BELOW GRADE.
 - BRASS I.D. FOR ALL SIZES.
 - SCORE 1/2" DEEP GROOVE IN CONCRETE PAD TO DENOTE ORIENTATION OF PIPE.
 - LOCATION OF VALVE TO BE MARKED BY LETTER "V" SCRIBED A MINIMUM OF 4" HIGH AND 1/4" DEEP IN CURB AND CURB PAINTED BLUE FOR WATER, GREEN FOR SEWER, PANTONE PURPLE 522C FOR REUSE.

A GATE VALVE & BOX
SJCUD 2021
PLATE W-3/W-4



- NOTES:**
- STUB-OUTS SHALL BE EXTENDED AS REQUIRED TO CROSS PAVED AREAS. CAP SHALL BE A MINIMUM OF 5' FROM EDGE OF PAVEMENT.
 - ANYTHING LONGER THAN 20' SHALL BE RESTRAINED ACCORDINGLY.

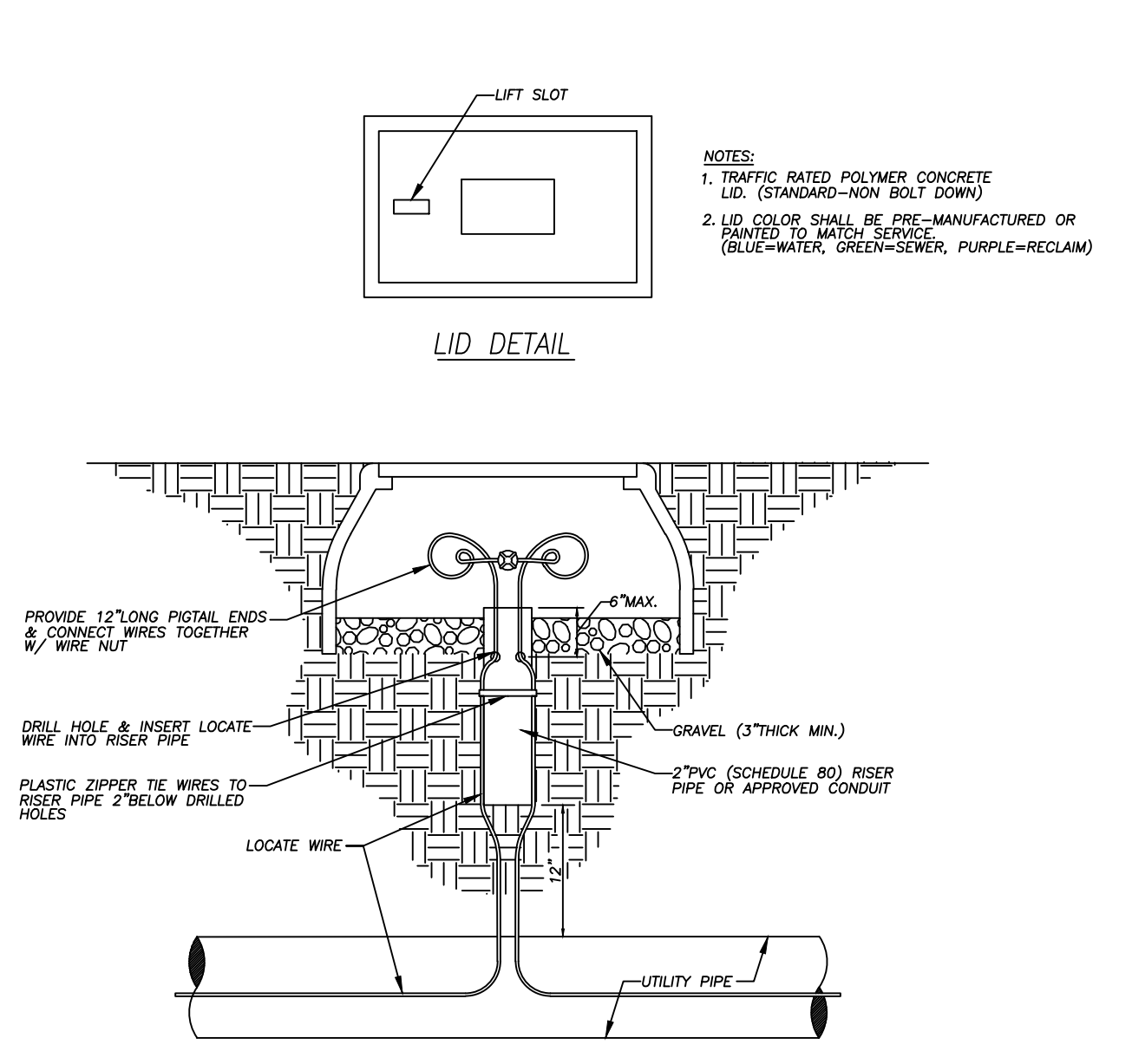
B PLUGGED DEAD END MECHANICAL RESTRAINTS
SJCUD 2021
PLATE W-7



CARRIER PIPE AND CASING PIPE SIZES (MIN.) IN INCHES	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	66
CARRIER PIPE NOM. DIA. (D1)	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54	60	66
STEEL CASING PIPE NOM. DIA. (D2)	14	16	20	24	30	30	30	36	42	48	54	60	66	66	66	66	66
WALL THICKNESS RAILROAD-(CS)	0.25	0.25	0.375	0.375	0.375	0.50	0.50	0.562	0.625	0.625	0.625	0.688	0.781	0.781	0.781	0.781	0.781
WALL THICKNESS RAILROAD-(CSX)	0.25	0.281	0.375	0.375	0.375	0.469	0.469	0.469	0.562	0.625	0.688	0.781	0.844	0.844	0.844	0.844	0.844
WALL THICKNESS-DOT	0.25	0.25	0.25	0.25	0.25	0.312	0.312	0.312	0.375	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
PVC CASING C-900 DR25 (D2)	12	16	20	20	24	30	30	36	42	48	54	60	66	66	66	66	66

- NOTES:**
- MIN. COVER TO TOP OF CASING; a) FDOT-3.0' b) RAILROAD-5.5' TO BASE OF RAIL. 4.5' FOR SECONDARY OR INDUSTRIAL TRACKS EXCEPT FOR F.E.C. (SEE NOTE 3)
 - THE INSIDE DIAMETER OF THE CASING PIPE SHALL BE A MINIMUM OF 4 INCHES GREATER THAN THE OUTSIDE DIAMETER OF THE CARRIER PIPE BELL OR COUPLING. HOWEVER, A MINIMUM OF 6 INCHES IS REQUIRED FOR FLORIDA EAST COAST R.R. CROSSINGS.
 - THE MINIMUM COVER FOR CASING UNDER FLORIDA EAST COAST RAILROAD SHALL BE 5.0 FEET BELOW THE BOTTOM OF TIES FOR ALL TRACKS.
 - ALL CARRIER PIPE JOINTS SHALL BE MECHANICAL RESTRAINED.
 - FOR STREET USES WHICH ARE NOT DOT OR RAILROAD, CONTRACTOR CAN USE STEEL OR PVC CASING UNLESS OTHERWISE INDICATED BY ENGINEER.
 - JOINTS OF C-900 PVC CASING PIPE SHALL BE RESTRAINED.
 - CASING SHALL EXTEND A MINIMUM OF 3' BEYOND EDGE OF PAVEMENT AND AN ADDITIONAL 1' LENGTH PER 1' OF DEPTH.
 - FUSED HDPE OR FUSED PVC CAN BE USED FOR STREET CROSSINGS IN LIEU OF CASINGS.
 - LEAK DETECTOR REQUIRED.

C CASING SPACER DETAIL
SJCUD 2021
PLATE W-12



- NOTES:**
- LOCATE WIRE STATION BOX TO BE INSTALLED WHERE THE WIRE CANNOT BE BROUGHT TO GRADE IN A VALVE BOX WITHIN THE MANDATORY 45' INTERVAL, OR WHERE A SPLICE MUST BE MADE ON THE LOCATE WIRE. NO UNDERGROUND SPLICES.
 - BOXES SHALL NOT BE LOCATED IN ROADWAYS OR DRIVEWAYS, WHERE MAIN IS IN PAVEMENT. THE RISER PIPE SHALL BE ROUTED USING SOLVENT WELD SWEEP FITTINGS SO BOX IS A MINIMUM OF 2 FEET FROM THE EDGE OF PAVEMENT.
 - LOCATION OF LOCATE WIRE STATION TO BE MARKED BY LETTERS "LW" SCRIBED A MINIMUM OF 4" HIGH AND 1/4" DEEP IN CURB AND CURB PAINTED BLUE FOR WATER, GREEN FOR SEWER, AND PANTONE PURPLE 522C FOR REUSE.

D LOCATE WIRE STATION DETAIL
SJCUD 2021
PLATE W-16

REVISIONS	Date	Comments
REVISION 1	9/20	

ST. JOHNS COUNTY UTILITY DEPARTMENT
1205 STATE ROAD 16
ST. AUGUSTINE, FLORIDA 32084
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GATE VALVE & BOX FOR UNPAVED LOCATIONS
4" - 16"
SCALE: N.T.S.

REVISIONS	Date	Comments
REVISION 2	2015	
REVISION 1	9/20	

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1205 STATE ROAD 16
ST. AUGUSTINE, FLORIDA 32084
Phone (904) 209-2700 • Fax (904) 209-2802

PLUGGED DEAD END MECHANICAL RESTRAINTS
SCALE: N.T.S.

REVISIONS	Date	Comments
REVISION 2	2015	
REVISION 1	9/20	

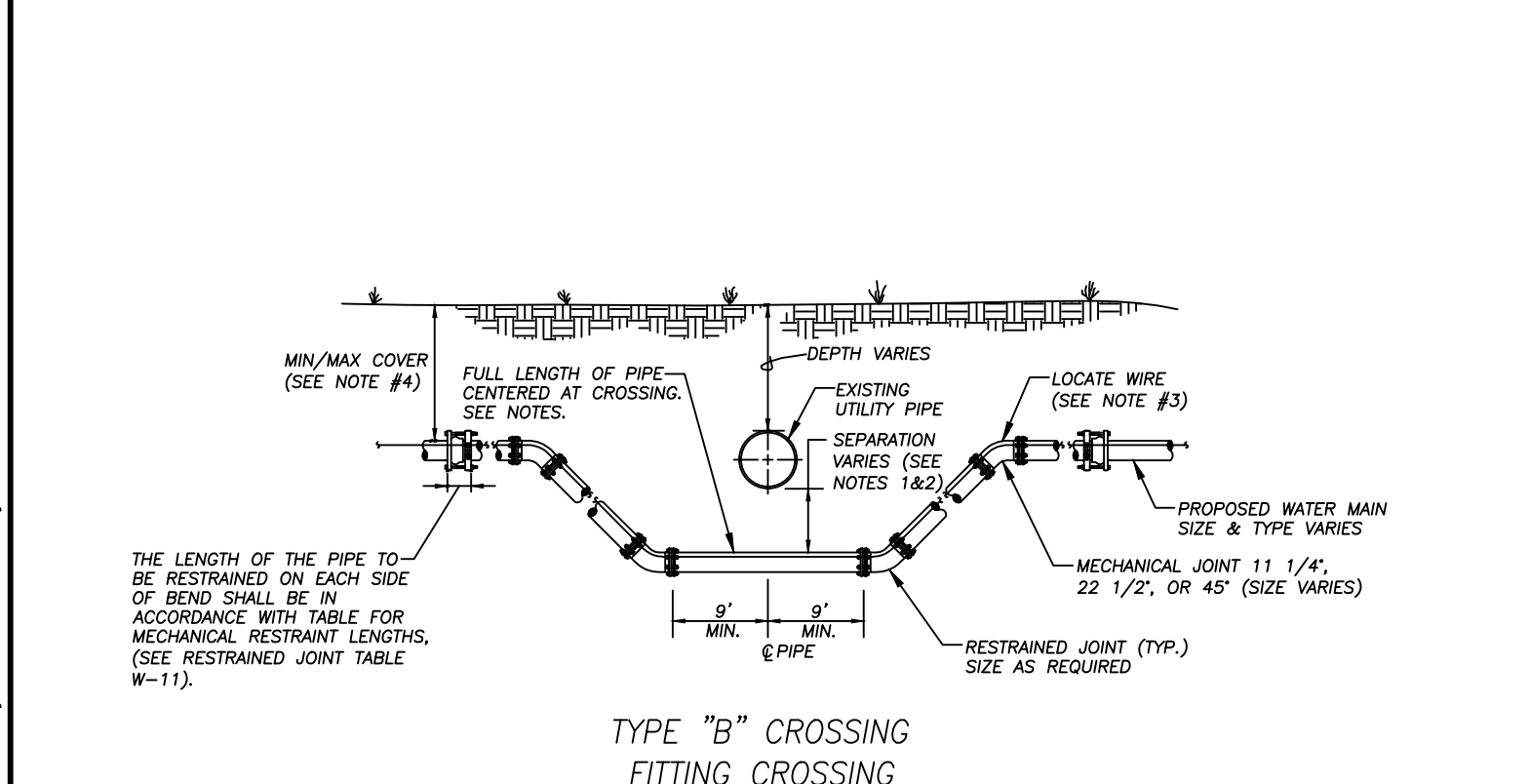
ST. JOHNS COUNTY UTILITY DEPARTMENT
1205 STATE ROAD 16
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CASING DETAIL
SCALE: N.T.S.

REVISIONS	Date	Comments
REVISION 2	2015	
REVISION 1	9/20	

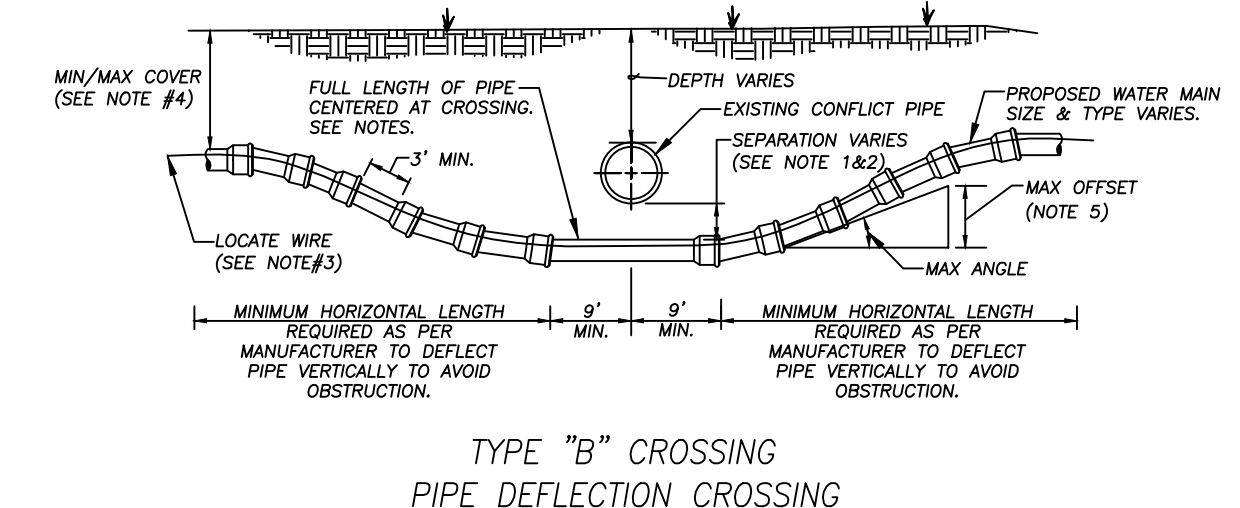
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Phone (904) 209-2700 • Fax (904) 209-2802

LOCATE WIRE STATION DETAIL
SCALE: N.T.S.



- NOTE:**
- THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST, ASTM D 1557.
 - FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE GENERAL NOTES SHEET GN-1.
 - LOCATING WIRE REQUIRED: SEE DETAIL W-16.
 - THE COVER FOR PIPING LESS THAN 24" SIZE SHALL BE 30" (MIN) IN UNPAVED AREA, 36" (MIN) IN PAVED AREAS AND A MAXIMUM COVER OF 60", UNLESS APPROVED BY SJCUD. THE COVER FOR PIPING 24" SIZE AND LARGER SHALL BE 36" (MIN) IN PAVED AND UNPAVED AREAS AND A MAXIMUM COVER OF 84", UNLESS APPROVED BY SJCUD.

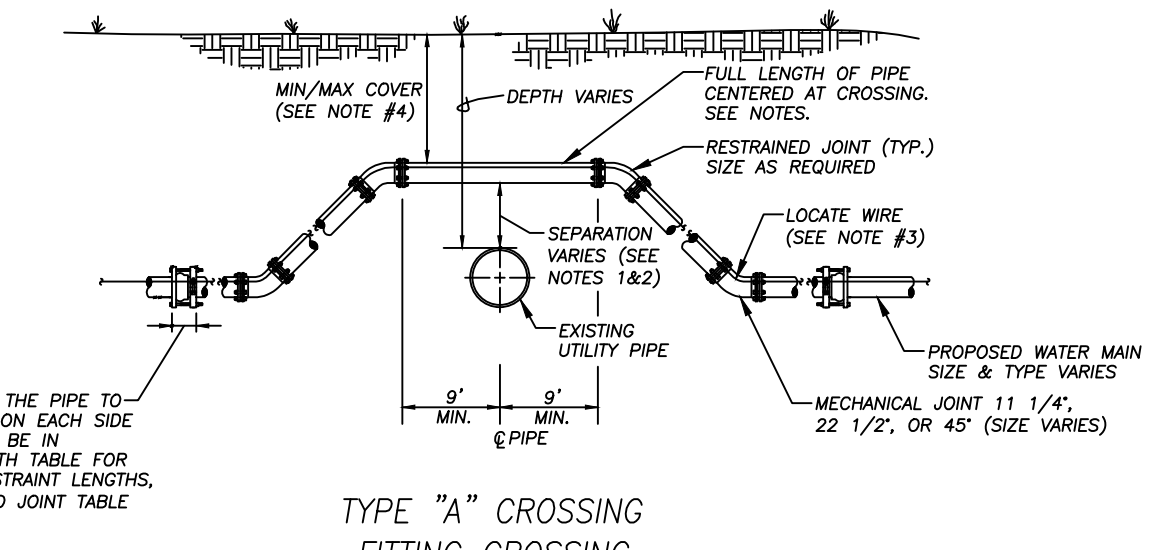
E TYPE "B" PIPE CROSSING WITH FITTINGS
SJCUD 2021
PLATE W-21



- NOTE:**
- THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST, ASTM D 1557.
 - FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE GENERAL NOTES SHEET GN-1.
 - LOCATING WIRE REQUIRED: SEE DETAIL W-16.
 - THE COVER OVER ALL PIPING LESS THAN 24" SIZE SHALL BE A MINIMUM OF 30" IN UNPAVED AREAS AND 36" IN PAVED AREAS WITH A MAXIMUM COVER OF 60" UNLESS APPROVED OTHERWISE BY SJCUD. COVER FOR PIPING 24" SIZE AND LARGER SHALL BE MINIMUM OF 36" (PAVED AND UNPAVED) AND MAXIMUM OF 84" UNLESS APPROVED OTHERWISE BY SJCUD.
 - SJCUD ONLY ALLOWS 50% OF THE PIPE MANUFACTURER'S RECOMMENDATION FOR JOINT DEFLECTION. BENDING THE PIPE BARREL IS NOT ALLOWED UNLESS OTHERWISE APPROVED BY SJCUD. THE MAXIMUM ARE LISTED IN TABLE BELOW. ONLY MANUAL FORCE CAN BE UTILIZED TO OBTAIN THESE JOINT DEFLECTIONS. ALL OFFSETS ARE BASED ON MINIMUM 20LF OF PIPE LENGTH.

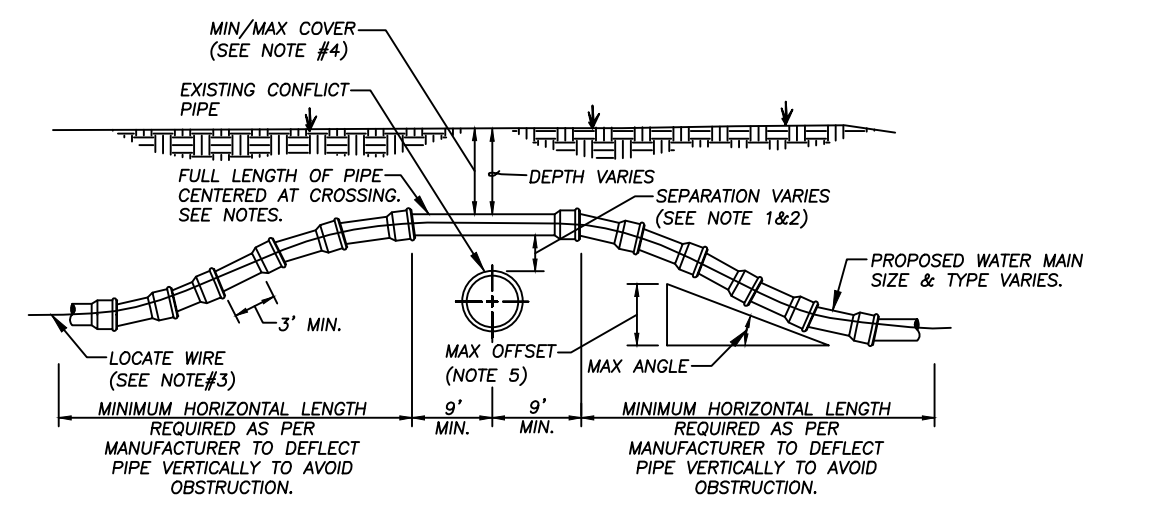
PVC PIPE SIZE	MAX OFFSET (20LF JOINT)
2"	30"
4"	19"
6"	13"
8"	10"
10"	8"
12"	7"
14" & LARGER	5"

F TYPE "B" PIPE CROSSING WITH DEFLECTION
SJCUD 2021
PLATE W-22



- NOTE:**
- THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST, ASTM D 1557.
 - FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE GENERAL NOTES SHEET GN-1.
 - LOCATING WIRE REQUIRED: SEE DETAIL W-16.
 - THE COVER FOR PIPING LESS THAN 24" SIZE SHALL BE 30" (MIN) IN UNPAVED AREA, 36" (MIN) IN PAVED AREAS AND A MAXIMUM COVER OF 60", UNLESS APPROVED BY SJCUD. THE COVER FOR PIPING 24" SIZE AND LARGER SHALL BE 36" (MIN) IN PAVED AND UNPAVED AREAS AND A MAXIMUM COVER OF 84", UNLESS APPROVED BY SJCUD.

G TYPE "A" PIPE CROSSING WITH FITTINGS
SJCUD 2021
PLATE W-23



- NOTE:**
- THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST, ASTM D 1557.
 - FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE GENERAL NOTES SHEET GN-1.
 - LOCATING WIRE REQUIRED: SEE DETAIL W-16.
 - THE COVER OVER ALL PIPING LESS THAN 24" SIZE SHALL BE A MINIMUM OF 30" IN UNPAVED AREAS AND 36" IN PAVED AREAS WITH A MAXIMUM COVER OF 60" UNLESS APPROVED OTHERWISE BY SJCUD. COVER FOR PIPING 24" SIZE AND LARGER SHALL BE MINIMUM OF 36" (PAVED AND UNPAVED) AND MAXIMUM OF 84" UNLESS APPROVED OTHERWISE BY SJCUD.
 - SJCUD ONLY ALLOWS 50% OF THE PIPE MANUFACTURER'S RECOMMENDATION FOR JOINT DEFLECTION. BENDING THE PIPE BARREL IS NOT ALLOWED UNLESS OTHERWISE APPROVED BY SJCUD. THE MAXIMUM ARE LISTED IN TABLE BELOW. ONLY MANUAL FORCE CAN BE UTILIZED TO OBTAIN THESE JOINT DEFLECTIONS. ALL OFFSETS ARE BASED ON MINIMUM 20LF OF PIPE LENGTH.

PVC PIPE SIZE	MAX OFFSET (20LF JOINT)
2"	30"
4"	19"
6"	13"
8"	10"
10"	8"
12"	7"
14" & LARGER	5"

H TYPE "A" PIPE CROSSING WITH DEFLECTION
SJCUD 2021
PLATE W-24

REVISIONS	Date	Comments
REVISION 1	2015	

ST. JOHNS COUNTY UTILITY DEPARTMENT
1205 STATE ROAD 16
ST. AUGUSTINE, FLORIDA 32084
Phone (904) 209-2700 • Fax (904) 209-2802

TYPE "B" PIPE CROSSING WITH FITTINGS
SCALE: N.T.S.

REVISIONS	Date	Comments
REVISION 1	2015	

ST. JOHNS COUNTY UTILITY DEPARTMENT
1205 STATE ROAD 16
ST. AUGUSTINE, FLORIDA 32084
Phone (904) 209-2700 • Fax (904) 209-2802

TYPE "B" PIPE CROSSING WITH DEFLECTION
SCALE: N.T.S.

REVISIONS	Date	Comments
REVISION 1	2015	

ST. JOHNS COUNTY UTILITY DEPARTMENT
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Phone (904) 209-2700 • Fax (904) 209-2802

TYPE "A" PIPE CROSSING WITH FITTINGS
SCALE: N.T.S.

REVISIONS	Date	Comments
REVISION 1	2015	

ST. JOHNS COUNTY UTILITY DEPARTMENT
1205 STATE ROAD 16
ST. AUGUSTINE, FLORIDA 32084
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TYPE "A" PIPE CROSSING WITH DEFLECTION
SCALE: N.T.S.

NO.	BY	DATE	SYMBOL	REVISIONS
1	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

MOTT MACDONALD
Architects Engineers Surveyors
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DESIGN ENGINEER
FLORIDA REGISTRATION NO. 68763

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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

CIVIL DETAILS

SHEET NO. 13
DWG. NO. CD-4
ELECTRICAL BID PACKAGE

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GENERAL NOTES

- It is expected that appropriate substitutions of plant material with the intent to improve the quality and appearance of the project relative to the availability of material and freeze considerations meet with the approval of the Landscape Architect.
- All sod areas shall be verified on plan and on site.
- It is the responsibility of the Landscape Contractor to follow all guidelines set forth from the Landscape Specifications when provided. All plant materials shall be Florida #1 or better (Florida Fancy) as described in "Grades and Standards for Nursery Plants".
- All specimen trees must meet the specifications provided in the plant schedule and plans. Any substitutions for Specimen Trees must meet with the approval of the Landscape Architect.
- Contact the Landscape Architect for any major site changes which alter landscape beds or berming areas.

EARTHWORK

- All site work for rough grading of berms, planters, and planting areas is to be provided by the General Contractor, unless otherwise specified by these plans. Fill for all berms and planters shall be of a suitable, sandy gradation which is porous and percolates well, to insure proper water runoff and drainage. Absolutely no plastic, clayey soil may be used in any planting area.
- The General Contractor shall be responsible for verifying the cubic yard quantities of proposed berms or planter areas.
- The Landscape Contractor is responsible for all final grading of berms, bed areas, and sod areas until acceptable by the Landscape Architect, both before and after landscape installation has begun.
- The Landscape Contractor is to verify soil condition of all planting areas as to pH level and organic stability before planting begins. Recommendations, if any, for improvement to existing soil shall be submitted to Godard Design Assoc. for review and record before installation begins. If soil conditions are found to be unsatisfactory the soil must be amended in accordance with test results and recommendations.
- Any unsuitable material found in landscape beds or berms shall be removed by the General Contractor to a depth of not less than twelve (12) inches and backfilled with said suitable material with reasonable (90%) compaction.
- Any debris, such as wood, concrete, stucco, bricks, etc., shall be removed by the General Contractor and backfilled with suitable material as described in Item #1.

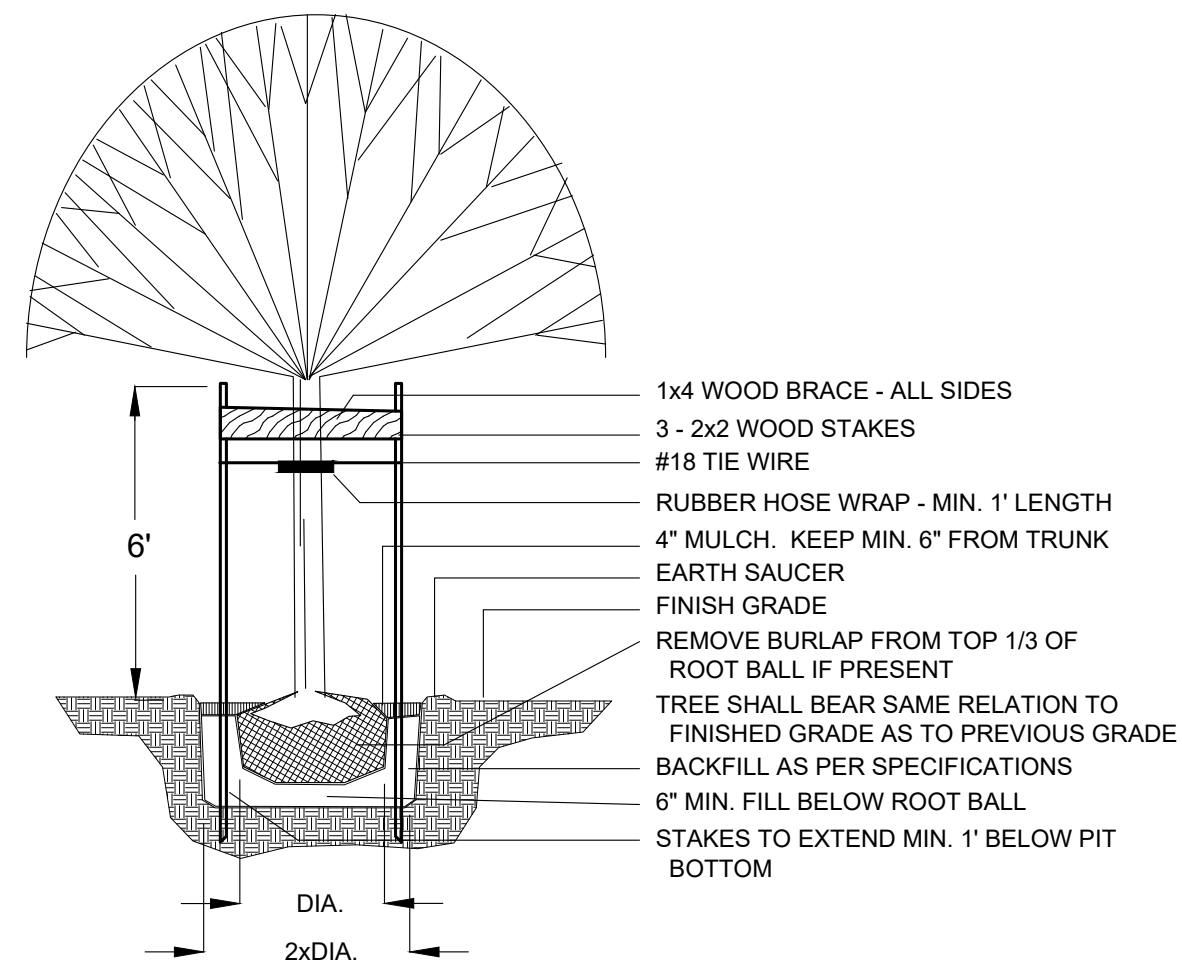
TREE SPADING CONTRACTOR IS RESPONSIBLE FOR:

- Locating and verifying all existing underground utilities in or near proposed tree locations before any trees are placed, and shall coordinate closely with respective utility contractors involved in those areas.
- Scheduling tree spading operations in any area before sidewalks or other impassable structures are installed.
- Replacing any tree which has died due to improper transplanting, as directed by the Landscape Architect and/or Owner.
- Watering in and fertilizing all spaded trees, as well as amending the surrounding soil, until said trees are established. Established shall mean when tree shows no signs of shock, lack of water, or overall poor health until such time as normal watering as supplied by irrigation system can maintain tree in good health.
- Tree spade contractor shall amend soil in the immediate area of the tree if said soil is not acceptable for transplanting. Notify Landscape Architect in writing of proposed soil amendments.

LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR:

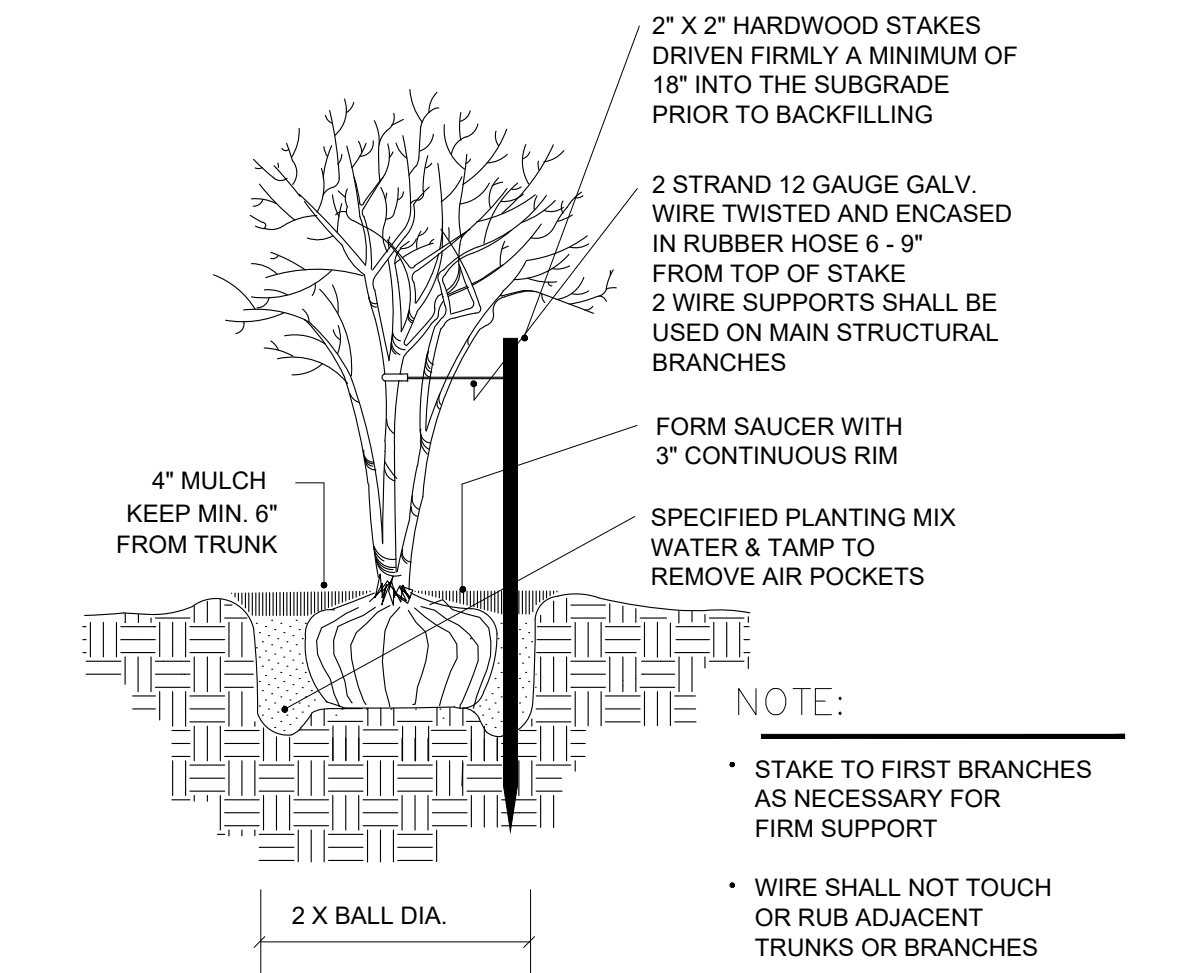
- Watering in and guaranteeing all other trees as per specifications listed on these plans or the written sections.
- Providing mulch, peat, potting soil, and/or fertilizer on site as directed by the plans, specifications, or Landscape Architect.
- Providing positive drainage of all landscaped areas around buildings, islands, amenities, and other areas negatively affected by poor drainage. This note covers all areas not specified on engineering or landscape grading plans.

PLANTING DETAILS



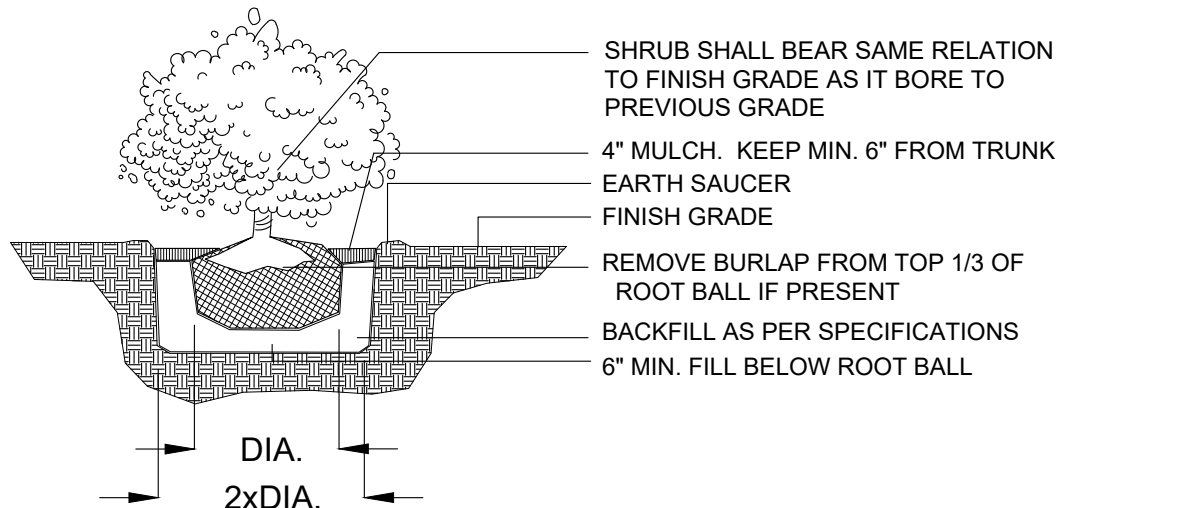
TREE STAKING DETAIL (FOR TREES TO 4" CAL.)

NOT TO SCALE



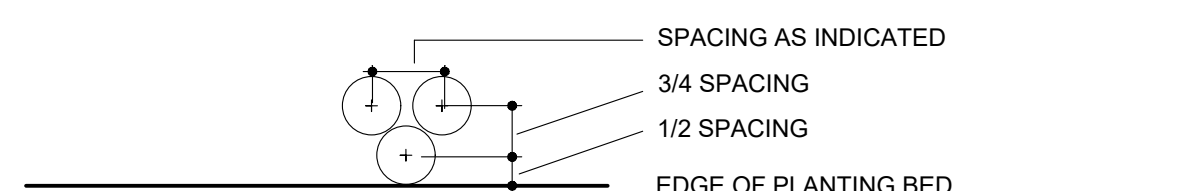
MULTI-TRUNK TREE PLANTING DETAIL

NOT TO SCALE



SHRUB PLANTING DETAIL

NOT TO SCALE



GROUND COVER SPACING

NOT TO SCALE

PLANT SCHEDULE

TREES	BOTANICAL / COMMON NAME	CONT	CAL	QTY
PE	Pinus elliottii / Slash Pine Min. 14'-17' ht. x 5'-6" sprd., 4"-cal. staked	65-Gal.	4"-Cal.	11
QV	Quercus virginiana / Southern Live Oak Min. 15' - 18' ht. x 7'-9" sprd., 4"-cal.	100-Gal.	4"-Cal.	11
SHRUBS	BOTANICAL / COMMON NAME	CONT	SPACING	QTY
VOD	Viburnum obovatum 'Densa' / Dwarf Walter's Viburnum Min. 24" ht. x 18" sprd., 3' o.c.	3-Gallon	36" o.c.	52

GENERAL NOTES:

- ALL PLANT MATERIAL SHALL CONFORM TO THE STANDARDS FOR GRADE #1 OR BETTER AS GIVEN IN THE LATEST "GRADES AND STANDARDS FOR NURSERY PLANTS, PARTS I AND II," FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES OR TO THE STANDARDS AS GIVEN IN THE LATEST "AMERICAN STANDARD FOR NURSERY STOCK," AMERICAN NATIONAL STANDARDS INSTITUTE.
- ALL SPECIMEN TREES, SHRUBS, AND GROUND COVERS MUST MEET THE SPECIFICATIONS PROVIDED IN THE PLANT SCHEDULE AND PLANS. ANY SUBSTITUTIONS FOR SPECIMEN TREES MUST MEET WITH THE APPROVAL OF THE LANDSCAPE ARCHITECT OR THE OWNERS' REPRESENTATIVE.
- WHERE SPECIFIED CONTAINERS AND SIZES DO NOT MATCH, THE LARGER OF THE TWO SPECIFICATIONS SHALL BE USED.
- PLANT SCHEDULE TAKES PRECEDENCE OVER PLANS SINCE THIS CONTAINS ALL PLANTS REQUIRED TO MEET MINIMUM LDC STANDARDS.
- ALL SOD AREAS SHALL BE VERIFIED ON PLAN AND ON SITE.
- IT IS THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR TO FOLLOW ALL GUIDELINES SET FORTH FROM THE LANDSCAPE SPECIFICATIONS WHEN PROVIDED.
- CONTACT THE LANDSCAPE ARCHITECT OR THE OWNERS' REPRESENTATIVE FOR ANY MAJOR SITE CHANGES WHICH ALTER LANDSCAPE BEDS OR BERMING AREAS.
- ALL SITE WORK FOR ROUGH GRADING OF BERMS, PLANTERS, AND PLANTING AREAS IS TO BE PROVIDED BY THE GENERAL CONTRACTOR, UNLESS OTHERWISE SPECIFIED BY THESE PLANS. FILL FOR ALL BERMS AND PLANTERS SHALL BE OF A SUITABLE, SANDY GRADATION WHICH IS POROUS AND PERCOLATES WELL, TO INSURE PROPER WATER RUNOFF AND DRAINAGE. ABSOLUTELY NO PLASTIC, CLAYEY SOIL MAY BE USED IN ANY PLANTING AREA.
- THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR ALL FINAL GRADING OF BERMS, BED AREAS, AND SOD AREAS UNTIL ACCEPTABLE BY THE LANDSCAPE ARCHITECT OR OWNERS' REPRESENTATIVE, BOTH BEFORE AND AFTER LANDSCAPE INSTALLATION HAS BEGUN.
- ANY DEBRIS, SUCH AS WOOD, CONCRETE, STUCCO, BRICKS, ETC., SHALL BE REMOVED BY THE GENERAL CONTRACTOR AND BACKFILLED WITH SUITABLE MATERIAL.
- LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING POSITIVE DRAINAGE OF ALL LANDSCAPED AREAS AROUND BUILDINGS, ISLANDS, AMENITIES, AND OTHER AREAS NEGATIVELY AFFECTED BY POOR DRAINAGE. THIS NOTE COVERS ALL AREAS NOT SPECIFIED ON ENGINEERING OR LANDSCAPE GRADING PLANS.
- VEGETATION THAT EXCEEDS TWENTY-FIVE (25) FEET IN HEIGHT AT MATURITY SHOULD NOT BE PLANTED CLOSER THAN FIFTEEN (15) FEET OF THE VERTICAL PLANE OF AN EXISTING POWER LINE, EXCLUDING SERVICE WIRES.
- BALLED AND BURLAPPED STRAPPING WIRE, AND ANY SYNTHETIC MATERIAL SHALL BE REMOVED PRIOR TO FINAL INSPECTION. WIRE BASKETS SHOULD BE PULLED AWAY FROM THE TOP 1/3 OF ROOT BALL PER ANSI A300 STANDARDS.
- CANOPY TREES MUST BE SPACED A MINIMUM OF 20'-30' APART AND NON-CANOPY TREES MUST BE SPACED A MINIMUM OF 10' APART.
- MULCH SHALL BE PROVIDED A MINIMUM OF TWO TO THREE (2-3) INCHES IN DEPTH AROUND ALL NEWLY PLANTED LANDSCAPING.
- A MULCH RING FOR ALL NEWLY PLANTED TREES, EXCEPT PLANTED PINES, SHALL BE PROVIDED AT LEAST FIVE (5) FEET IN DIAMETER AND NOT CLOSER THAN SIX (6) INCHES FROM THE TREE TRUNK. PLANTED PINES SHALL BE GROUPED IN PLANTING BEDS AND MULCHED AS PER THE DRAWINGS.
- SHRUB LINES ARE TO BE PLANTED AT THE REQUIRED MINIMUM HEIGHT, NOT BY CONTAINER SIZE.
- TREES SHALL NOT BE PLANTED CLOSER THAN 7.5' FROM THE CENTERLINE OF UNDERGROUND UTILITIES.
- ALL DISTURBED AREAS WITHIN THE LIMITS OF CONSTRUCTION WHICH ARE NOT OTHERWISE INDICATED SHALL BE SODDED WITH ARGENTINE BAHIA SOD, UNLESS OTHERWISE NOTED IN THESE OR THE ENGINEERING PLANS.
- ALL PLANTING BEDS SHALL BE MULCHED WITH 4" OF 1" - 1/2" PINE NUGGETS MULCH, EXCEPT FOR THE EDGES OF THE EXISTING TREE LINES, WHERE 4" OF PINE STRAW MULCH IS INDICATED. SEE PLANS FOR MULCHING/SODDING REQUIREMENTS ALONG THESE AREAS.
- SUBSTITUTIONS SHALL NOT BE MADE WITHOUT THE PRIOR WRITTEN CONSENT OF THE LANDSCAPE ARCHITECT OR OWNERS' REPRESENTATIVE.
- ALL TREES MUST MEET MINIMUM CALIPER SIZE, AND SHRUB LINE PLANT HEIGHT (24" MIN.) AS PLANTED FOR SHRUB LINES TO COMPLY WITH ST. JOHNS COUNTY LDC.
- ON MULTI-TRUNKED PLANTED TREES THE "THREE LARGEST STEMS" WILL BE MEASURED TO VERIFY INDICATED TREE CREDITS.
- AN AUTOMATIC UNDERGROUND IRRIGATION SYSTEM PROVIDING 100% COVERAGE SHALL BE INSTALLED IN AREAS INDICATED ON THE IRRIGATION PLANS.
- TREES SHALL HAVE A MINIMUM HEIGHT OF 10' AND 2" OF CALIPER, EXCEPT AS NOTED ABOVE IN THE PLANT SCHEDULE.
- ALL SHRUBS ALONG DRIVEWAYS AND PARKING SPACES SHALL BE PLACED NO CLOSER THAN 2' FROM BACK OF CURBS

IRRIGATION CALCULATIONS:

HOSE BIBB and/or REFILLABLE TREE BAGS WILL BE USED AS THE SOURCE OF IRRIGATION.
SEE IRRIGATION SCHEDULE BELOW. IRRIGATION TO BE USED DURING ESTABLISHMENT PERIOD ONLY
NEW TREES SHALL BE TEMPORARILY IRRIGATED WITH REFILLABLE TREE WATERING BAGS (PER DETAIL) UNTIL PERMANENT IRRIGATION IS ESTABLISHED
Provide each tree with 5 gallons per caliper inch per watering during establishment period (First 90 days).
First 30 days: Water every day
Second 30 days: Water every other day
Third 30 days: Water twice per week
ALL IRRIGATION WILL BE LOW VOLUME

LANDSCAPE CALCULATIONS

MITIGATION REQUIREMENTS

Tree Impacts				
Tree ID	Tree Type	Removed (in.)	Mitigation	
		Caliper Inches	Inches	
T12	Pine	16	0	
T14	Pine	15	0	
T15	Maple	14	14	
T19	Pine	18	0	
T20	Hardwood	8	8	
T21	Hardwood	9	9	
T22	Hardwood	9	9	
T27	Palm	15	6	
T28	Maple	17	17	
T29	Oak	21	21	
T30	Maple	18	18	
T31	Palm	14	6	
T32	Cedar	19	19	
T33	Palm	15	6	
T34	Decid.	15	15	
T35	Maple	20	20	
		243	168	

Preserved Trees

Tree ID	Tree Type	Caliper Inches	Inches
T18	Tallow	8	8
T17	Oak	13	13
T16	Tallow	9	9
T13	Oak	10	10
T9	Pine	9	9
T6	Pine	8	8
T3	Tallow Clst	8	8
T4	Oak	14	14
T2	Tallow Clst	8	8
T1	Oak Clst	8	8
		95	95

Required Tree Inches: Area

Lot Area Requirement	Inches
1.94 Acres @ 80"/Acre =	155

Less Preserved Inches:	95
Less Planted Inches Below:	88
Inches Required:	0

80 Inches / Acre requirement is satisfied

Planting

Quantity	Species	Caliper (in.)	Total Tree Replacement (in.)	Diversity
11	Slash Pine	4	44	50.00%
11	Live Oak	4	44	50.00%
22			88	100.00%

Mitigation required:	168
Total replacement provided:	88
Remaining mitigation:	80
No payment required under Section 4.01.05.F.1.a	
Evergreen Shade Trees:	100.00%
Native Trees:	100.00%

LANDSCAPE REQUIREMENTS

Trees				
Location	Requirement	Required Canopy - C	Existing Canopy	Planted Canopy
East (Ag Cntr Dr.)				
	184 LF @ 1 C / 50LF	4	1	3
South (Adj)				
	377 LF @ 1 C / 50LF	8	0	8
West (Adj)				
	214 LF @ 1 C / 50LF	4	6	3
North (Adj.)				
	407 LF @ 1 C / 50LF	8	0	8
Total		24	7	22

Shrubs & Landscaping

Interior			
VJA	Requirement	Required	Min. Prov.
	4,116 SF @ 5% SF Req.	206	206

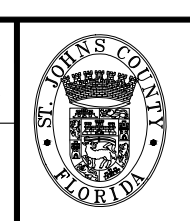
NO.	BY	DATE	SYMBOL	REVISIONS
6.				
5.				
4.				
3.				
2.				
1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

MOTT MACDONALD
Mott MacDonald Florida, LLC

Architects Engineers Surveyors
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10245 Centurion Pkwy. N., Suite 320
Jacksonville, Florida 32256
Telephone: (904) 203-1090

DESIGNER: B. GODARD
DRAWN BY: B. GODARD
DATE: OCT 2022
CHECKED BY: B. GODARD
DATE: OCT 2022

DESIGN LANDSCAPE ARCHITECT
BRETT M. GODARD, PLA, ASLA
FLORIDA REGISTRATION NO.
FL LA0001270



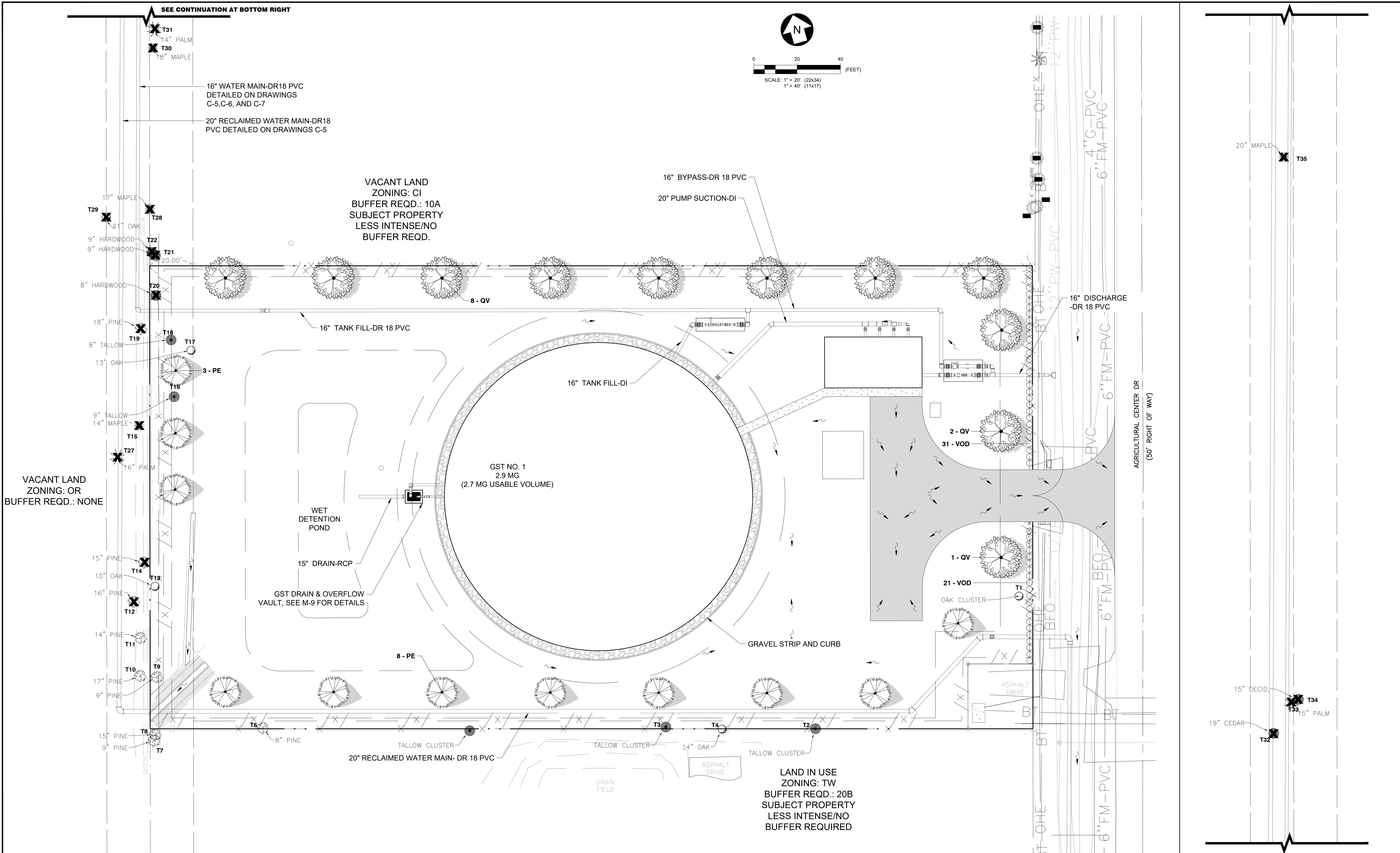
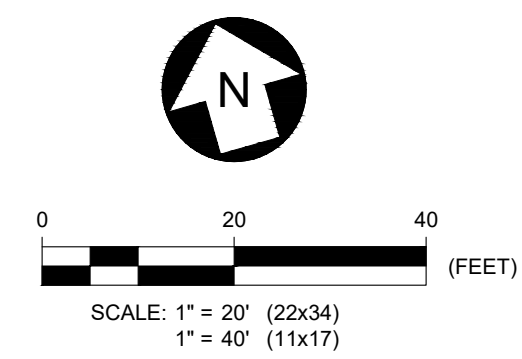
St. Johns County
Utility Department
1205 STATE ROAD 16
ST. AUGUSTINE, FL 32084
PHONE: (904) 209-2626 FAX: (904) 209-2627

CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

GENERAL LANDSCAPE NOTES

SHEET NO. 14
DWG NO. L1
ELECTRICAL BID PACKAGE

SEE CONTINUATION AT BOTTOM RIGHT



VACANT LAND ZONING: OR BUFFER REQD.: NONE

VACANT LAND ZONING: CI
BUFFER REQD.: 10A
SUBJECT PROPERTY
LESS INTENSE/NO
BUFFER REQD.

LAND IN USE ZONING: TW
BUFFER REQD.: 20B
SUBJECT PROPERTY
LESS INTENSE/NO
BUFFER REQUIRED

NO.	BY	DATE	SYMBOL	REVISIONS
6.				
5.				
4.				
3.				
2.				
1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M M
MOTT
MACDONALD
Mott MacDonald Florida, LLC

Architects Engineers Surveyors
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10245 Centurion Pkwy. N., Suite 320
Jacksonville, Florida 32256
Telephone: (904) 203-1090

DESIGNER: B. GODARD
DRAWN BY: B. GODARD
DATE: OCT 2022
CHECKED BY: B. GODARD
DATE: OCT 2022

DESIGN LANDSCAPE ARCHITECT
BRETT M. GODARD, PLA, ASLA
FLORIDA REGISTRATION NO.
FL LA0001270



St. Johns County
Utility Department
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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

LANDSCAPE PLAN

SHEET NO.	15
DWG NO.	L2
ELECTRICAL BID PACKAGE	

PART I-GENERAL

1.01 DESCRIPTION OF WORK

A. The work under this section shall include all services, tools, apparatus, materials, labor and other means of construction required for the landscaping work in accordance with drawing and these specifications.

- 1. Lay out beds, tree locations, shrubs and ground cover as shown on the drawings.
2. The work shall include the preparation of the ground, finish grading, sodding, planting, fertilizing, mulching, preparation and applying peat and fertilizers and all other work required by the drawings and specifications.

1.02 APPLICATION DOCUMENTS

A. The following specifications and standards of the issues listed and referenced to, form a part of this specification to the extent required by the references thereto.

- 1. American Association of Nurserymen, 1949 Edition of Horticultural Standards, (635 - 638 Southern Building, Washington, DC)
2. The Standard Cyclopedica of Horticulture, L.H. Bailey, 1953 Edition, 3 Volumes by the MacMillian Company, New York, New York.
3. Grades and Standards for Nursery Plants, Part 1 and 11, Department of Agriculture, State of Florida, Division of Plant Industry, Post office Drawer 1269, Gainesville, FL 32601.

PART 2 - GENERAL CONDITIONS

2.01 GENERAL REQUIREMENTS

A. Approval and Rejection of Materials and Work: The selection of all materials and execution of all operations required under the drawing and specifications shall be subject to the approval of the Landscape Architect. The Landscape Architect or his representative shall have the right to reject any and all work which in his opinion does not meet with the requirements of the specifications at any stage of the operations. All rejected materials shall be removed from the site.

B. Scientific and Common Names: Attention is called to the fact that the scientific and common names used for the plants required under this contract are generally in conformity with the approved names given in the Standard Plant Names, published by the American Joint Committee on the Horticultural Nomenclature. The names of varieties not included therein are generally in conformity with the names accepted in the nursery trade.

C. All plants shall conform to the varieties specified in the Plant Schedule. No substitutions of varieties or colors will be allowed without prior written or verbal approval of the Landscape Architect.

D. All plant materials shall conform to a Florida No. 1 or better (Florida Fancy). Those not listed by "Grades and Standards for Nursery Plants", published by the Division of Plant Industry, shall conform to a Florida No. 1 as to:

- 1. Health and vitality
2. Condition of foliage
3. Root system
4. Freedom from pest or mechanical damage
5. Heavily branched and densely foliated according to the accepted normal shape of species or sport.

2.02 DEFINITION AND INTENT OF DOCUMENTS

A. The contract documents consist of the contract agreement, the drawings and the specifications, including all modifications thereof incorporated in the documents before their execution, it is specifically agreed upon that this contract shall be in all aspects construed and interpreted in accordance with the laws of the state in which it is executed.

B. The contract documents are complimentary and what is called for by one shall be as binding as if called for by all. The intent of the documents is to include, unless otherwise stated, all labor, materials, equipment and transportation for the proper execution of the work.

- 1. Where there is a conflict between requirements called for in both these written specifications and the drawings, the more strict of the two shall be the contractual obligation, unless specifically noted by the other.

2.03 OWNER'S AUTHORIZED REPRESENTATIVE

A. The Owner shall designate or appoint one person as his representative to work with the Contractor. The Contractor shall be notified in writing of the name and address of this duly appointed representative. This representative shall have full authority to approve work performed by the Contractor, make field changes that are deemed necessary and approve estimate submitted by the Contractor for payment.

2.04 LIABILITY OF CONTRACTOR

A. The contractor shall be liable for any and all damages to property which result from his performance. He shall, with extra cost restore to original condition any areas and/or construction damaged, defaced, disturbed or destroyed by him or his workmen.

B. The contractor shall maintain adequate protection of all his work from damages and shall protect the Owner's and adjacent property from injury or loss arising from this contract.

C. The contractor shall not be obligated to replace, repair or restore any portion of this work which is damaged, defaced, disturbed or destroyed by others or by the owner and/or which results from Owner's negligence.

2.05 TAXES

A. The contractor shall pay all Federal, State and local sales and use tax applicable to materials, processes or devices purchased or used in connection with the work under this contract.

2.06 EXAMINATION AND VERIFICATION OF DRAWINGS AND SITE

A. It shall be the contracting installer's responsibility to report to the Owner's Representative any deviations between drawings, specifications, and the site. Failure to do so prior to installing of the plant material and resulting in replacing and/or relocating same shall be done at the contractor's own expense.

2.07 ORDINANCES AND REGULATIONS

A. All local, municipal and state laws and rules and regulations governing or relating to any portion of this work shall be hereby incorporated into and made a part of these specifications and their provisions shall be carried out by the contractor. Anything contained in these specifications shall not be construed to conflict with any of the above mentioned Rules and Regulations or requirements, and where the Rules, Regulations or Specifications and/or drawings call for or describe materials, workmanship or construction, or a better quality, higher standard or larger size, these specifications and/or drawings shall take precedent over the requirements of said rules, regulations or codes.

2.08 MATERIALS AND WORKMANSHIP

A. Whenever any material is specified by name or number thereof, such specification shall be deemed to be used for the purpose of facilitating a description of the materials and establishing quality, and shall be deemed and construed to be

followed by the word "OR APPROVED EQUAL." No substitution will be permitted which has not been submitted for prior approval by the Owner's Representative. All materials shall be new and without flaws or defects and shall be the best of their class and kind. Sufficient literature and/or samples must be furnished for any materials submitted as "equal" substitutes. All materials shall be guaranteed for a period of one (1) year against material defects and workmanship.

B. All materials and equipment shall be installed in a neat and workmanlike manner. The Owner's Representative reserves the right to direct the removal and replacement of any items, which in his opinion shall not represent an orderly and reasonably neat workmanlike appearance, provided such work can be properly installed in such and orderly way, by the usual methods in such work. Such removal and replacement shall be done, when directed in writing, at the Contractor's expense without additional cost.

2.09 PROJECT INSPECTION

A. It is the intention of these specifications, together with the accompanying drawings to accomplish the work in an efficient and satisfactory manner according to the workmanlike standards established for the nursery industry. Notwithstanding is the fact that these specifications and drawings may be deficient in setting forth a complete detailed description of the work to be done.

2.10 RECORD DRAWINGS

A. The Owner will furnish the Contractor with two sets of blue line prints, showing all work required under this contract, for the purpose of having the Contractor record on one set of prints all changes that may be made during actual installation of the landscape.

B. After final acceptance of the completed installation, the contractor shall be responsible for having complete drawings prepared showing all such changes and these shall be turned over to the Owner for recording purposes.

2.11 MATERIAL STORAGE AND CLEANUP

A. The contractor shall keep the premises free from rubbish and debris at all times and shall arrange for this storage so as not to interfere with Owners operation of the job. All unused materials, rubbish and debris shall be removed from the site.

2.12 EQUIPMENT, TOOLS AND LABOR

A. The Contractor shall furnish all such equipment, tools and labor necessary to push work, in an acceptable manner, to a speedy completion. This contract is based on the Contractor furnishing and using his equipment, tools and labor which are suitable to carry out this contract in a first class manner, unless otherwise hereinafter specified.

2.13 CHANGES OR ADDITIONAL WORK

A. The Owner may, without invalidating the original contract, order such changes or additions as may from time to time be deemed desirable or necessary. In doing so, the contract price shall be adjusted to the mutual agreement of the contractor and the Owner, with all work being done under the conditions of the original contract, except for such adjustments in price and in extension of time as may be necessary.

B. The contractor shall bring to the attention of the Owner's Representative changes which may necessitate deviation(s) in construction from the original plans by other contractors on the job. Changes in price caused by such deviation(s) shall be agreed upon by both Contractor and Owner's Representative before work proceeds.

PART 3 - MATERIALS

3.01 GENERAL

A. Topsoil: Planting areas may use existing soil on the site as long as it has been cleared of unsightly underbrush and their roots, limbs, buried construction debris, pockets of clay, rocks and other extraneous matter.

B. Unsuitable Soil Conditions: Absolutely no plastic or clayey soil is to be used in any planting landscape areas. If such a condition is found, it is to be removed to a depth of 3 feet and 1 foot outside of said planting bed. This area is to be backfilled with materials of suitable sandy gradation which is porous and percolates well with reasonable compaction. If any planting or sod area has a plastic or clayey soil condition which does not allow for proper drainage, then a system of underdrain, turf drain or some other means of releasing underground standing water must be incorporated under the direction of the Landscape Architect and Owner.

C. Soil Tests: The landscape contractor is to test all soil conditions of all existing planting areas, or areas backfilled or composed primarily of existing soil where contents or PH is not previously known, as to its PH and organic content before planting to be sure all unsuitable material has been removed as per 3.01 B. Before any soil addenda are added to the soil, a soil test shall be taken to determine the type and amount of PH controlling materials needed to bring the soil to PH rating of 6.0. Results of soil tests shall be submitted to the Landscape Architect of his representative prior to application of soil addenda.

- 1. Soil samples shall be taken from 5 different locations throughout the work area. Samples may not be taken closer than 50 feet from any other samples site.
2. Samples shall be mixed and tested accordingly.

D. Fertilizer:

- 1. Slow-release commercial fertilizer 866 formula: 50% nitrogen requirement shall be derived from organic sources and the secondary plant foods consisting of 4.5% potash-magnesia, 0.5% manganese sulfate, 0.5% copper sulfate, .05% borax.
2. Wettable Sulphur: Shall be finely ground dusting or wettable but must pass a 375 mesh screen. Analysis of sulphur must be between 90% and 93%.
3. Iron Sulfate: Analysis of 18% to 19% metallic iron.
4. Guarantee of Fertilizer Analysis: Before delivery of fertilizer is made, the contractor shall submit the manufacturer's statement of analysis of the fertilizer indicating the properties of organic matter and the availability of the plant food. The fertilizer is to be delivered to the site in the original containers unopened and bearing a guaranteed analysis fulfilling the required specifications.

E. Superabsorbent: White "Terra-Sorb AG" synthetic acrylamide co-polymer crystals with a particle size of 1 to 3 mm, available from Seedsmiths, 781-9400; Jacksonville, Florida, or approved equal.

F. Mulch: Mulch shall consist of either pine straw or shredded pine bark. Pine bark will be placed in all planting beds, planters or any other area whether or not specified on the plans. Pine straw is to be placed in all natural areas or any other area specified on the plan. All mulch is to be clean, bright and free of weeds, moss, sticks, sawwood, chips or other debris. All mulch is to be installed evenly to a depth as noted on the drawings and cover all areas of the planting beds, etc.

G. Water: Water used for landscaping is to be from Owner provided sources. Water for planting occurring prior to final operation of irrigation system shall be supplied by the Contractor at no cost to the Owner.

3.02 TOPSOIL MIXTURE

A. All topsoil which is used to replace existing soil in tree, shrub and ground cover beds for planting operations as labeled shall be of similar organic content and PH as the existing surrounding soil. Where a topsoil mixture is specifically called for, it shall be prepared and conditioned as follows. These operations shall only be made after consulting with Landscape Architect.

- 1. Mix one part by volume peat and two parts by volume of existing soil and five pounds of 75% organic 6-6-4, 50-9 fertilizer and five pounds of commercial 50% organic 6-6-6 fertilizer to each cubic yard of the mixture. Add wettable sulfur and iron sulphate in quantities necessary to bring the soil to PH rating of 6.0.
2. Fill material for berm areas is to be provided by General Contractor unless otherwise directed by Landscape Architect.

3.03 PLANT MATERIAL

A. Quantity and Size: All plants and trees shall be Florida No. 1 or better, as defined in and in accordance with "Horticultural Standards" (latest edition) of the rules and grading adopted by the American Association of Nurserymen and "Grades and Standards for Nursery Plants". All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free from insect infestations. Any tree with weak, thin trunks not capable of supporting itself when planted in the open will not be accepted. The minimum acceptable size of all plants, measured before pruning, with branches in normal position, shall conform to dimensions as shown in the Plant Schedule. Specific container sizes, when noted, may be used only when the minimum container size equals the minimum size indicated in the Plant Schedule. Reasonable effort shall be made to locate specific sizes. Smaller sizes may be acceptable only after notification of and approval by Landscape Architect. Larger plants of equal quality may be accepted at no additional cost to the Owner. Specimen trees may be specified to be installed by others at the direction of the Landscape Architect.

B. Balled Plants: Plants that are balled and burlapped (B&B) shall be adequately balled with firm natural balls of soil sized as set forth in "Horticultural Standards". Balls shall be firmly wrapped in burlap or equal approved strong cloth. No balled plant shall be planted if the ball is cracked or broken before or during the process of planting.

C. Balled and Wired Plants: Plants that are wire balled and burlapped (WB&B) shall be dug with solid balls of adequate size, the balls securely wrapped with heavy burlap or equal and tightly bound with mesh.

D. Container Grown Plants: Plants that are container grown shall have been grown in pots, cans, tubs or boxes and shall have sufficient roots to hold earth together intact after removal from containers without being rootbound.

E. Options as to Methods: Any plant may be furnished container grown instead of balled if all other requirements as met.

F. Protection Against Drying Out: All plants shall be handled so that roots will be adequately protected at all times from drying out and from other injury, the balls or balled plants which cannot be planted immediately on delivery shall be well protected with soil or other acceptable material.

G. Plant Labels: Durable, legible labels, stating in weather resistant ink or equal, the correct plant name and size, specified in the plant list, shall be securely attached to all plants, bundles and/or containers or plant material delivered at the planting site, for the purpose of inspection and planting identification.

PART 4 - WORKMANSHIP AND INSTALLATION

4.01 SPECIAL TREATMENT AND HANDLING FOR SPECIMEN PLANTS

A. Trees and shrubs for isolated specimen planting shall be selected for shape and symmetrical branching habit which at maturity will produce a strong, full-foliated globe, bush or other specimen. Particular care shall be exercised in the digging, binding and wrapping of such specimens to assure safe loading, shipment and handling or the entire operation of transportation from growing location to the replanting locations shown on the drawings and in Plant Schedule.

4.02 SOIL TESTS

A. Four (4) weeks prior to planting operations, test existing soil for pH and submit report from the University of Florida Extension (IFAS) Soil Testing Laboratory. Collect soil samples in accordance with recommendations of the Laboratory. A soil test kit may be obtained from the County Extension Service.

4.03 GUYING AND STAKING

A. All trees shall be guyed or staked according to the details provided in the drawings.

- 1. Hose: Hose shall be suitable garden hose not less than 1/2" inside diameter.
2. Stakes: Stakes for supporting trees and palms shall be of sound wood of uniform size, creosoted or pressure treated by an approved process. Stakes shall not be less than 2 inches by 4 inches nominal dimensions and not less than 2-1/2 feet in length for guying and not less than 9 feet for staking, and shall be in all cases of sufficient dimensions and length to satisfactorily and firmly guy each tree.
3. Wire: Wire shall be galvanized pliable, zinc-coated iron not less than No. 12 gauge.
4. Turnbuckles: Turnbuckles for guying trees shall be galvanized or cadmium-plated and shall be of adequate size and strength to properly maintain tight guy wires.
5. Option of Contractor: at the option of the contractor, the staking and guying of trees may be omitted. The Contractor assumes all responsibility if he does not stake or guy.

B. Water in Trees: All trees, whether balled container or spaded, shall be watered in properly, immediately after planting. A water hose is to jet water around the perimeter of the ball at least in three separate places. Watering is to continue until all air pockets have been filled. Additional fill may be needed to bring fill to proper height. Retamp for compaction and grade.

C. Tree Spading Operations (by outside contractor supervised by Landscape Contractor)

- 1. Spades will be of sufficient size comparable to trunk caliper so as not to damage the root system.
2. Trees are to be set so as not to have any part of the root ball side exposed. If this occurs then the tree spade contractor is responsible for adding additional fill and hand grade to match existing slope. Landscape logs may be used by the contractor if the conditions warrant as directed by the Landscape Architect.
3. Immediately after spading the tree it is to be watered in properly and a water dish built to retain the water around the root ball.

4.04 PLANT SCHEDULE

A. The species, size, color or other specific requirements to be furnished, and the number of plants required to complete the planting as indicated on the Landscape Plan are given in the Plant Schedule.

- 1. All dimensions given under the plant schedule shall be the minimum acceptable sizes, unless otherwise approved per 3.03.A.

4.05 INSPECTION OF PLANTS

A. The contractor shall be responsible for all certificates of inspection of plant materials that may be required by Federal, State or other authorities to accompany shipment of plants. All plants shall be subject to inspection and approval by the Landscape Architect at any place and at any time. Part of the plants required for the work may be inspected at the place of growth but inspection should not in any way impair the right of rejection at the site. All plants must be inspected and approved before they are planted. All plants that are rejected shall be immediately removed from the site.

4.05 PLANTING SEASON

A. The planting of plant materials may proceed at any time or period or season agreed upon by the Landscape Architect or his representative as being satisfactory.

4.07 GRADING PREPARATIONS

A. Before the preparations of the planting area begin, all barricades around the remaining trees and other protective areas shall be removed by the Landscape Contractor.

B. The finish grade of all planting areas shall be 2-1/2" below the top of abutting curbs, walks, paving and abutments.

C. The General Contractor is responsible for removing all construction debris in any areas to be landscaped at least one day prior to the Landscape Contractors schedule of preparation for landscaping. No debris such as boards, drywall, paint containers, metal bands, pipe, cardboard boxes or any other item which may cause the Landscape Contractor any delayed time, shall be left on the site.

4.08 GRADING

A. General Contractor is to verify exact amount of fill needed as shown on civil grading plans and stock pile on job, if feasible.

B. All fill for berming, landscaping areas such as planters, planting beds and in curb islands shall be of suitable construction material.

C. Absolutely no clay, muck, gumbo or sandy clay may be used. Suitable material will consist of only clean sand, porous gradation.

D. Any unsuitable material found in the above landscaping area will be removed to a depth of three feet and one foot outside the planting bed perimeter, then will be filled with suitable material to reasonable compaction.

E. Rough grading and intermediate rough grading will be done by the General Contractor. Fine grading will be done by the Landscape Contractor.

- 1. Rough grading is the placement of all dirt in designated areas (including planters), balanced to rough grade and shaped to the general intent of the plans as directed by the Landscape Architect.
2. Intermediate rough grading is that work which is needed, by request of the Landscape Architect, to repair all erosion problems on site, including washouts, into the lake, roadway or around building pads.
3. Fine grading is that work which will be done by the Landscape Contractor exclusively. This work consists of hand grading all areas for sodding, all berms that have been properly balanced and shaped by the General Contractor under rough grading.
4. If fine grading has been completed and severe erosion has taken place before sod or plant material has been installed, then intermediate rough grading will be requested and approved by the Landscape Architect and the work will be the responsibility of the General Contractor.
5. If severe erosion has taken place after sod or plant material has been installed, then intermediate rough grading will be requested and approved by the Landscape Architect and the work will be the responsibility of the General Contractor.

4.09 PLANTING OPERATIONS

A. Laying Out Plant Locations: Locations for all plants and outlines for planting areas shall be staked or appropriately laid out on the ground prior to digging pits. Before plants are set, orientation of plant faces, foliage and branchings shall be adjusted for best views.

B. Preparation of Plant Pits: All pits shall be circular in outline, at least twice the width in diameter than that of the plant and excavation shall have near vertical sides. The specified for excavation of plant pits shall be the depths below the finished grades and shall be increased as much as may be necessary to accommodate a bed of the topsoil mixture as specified herein beneath the ball of roots.

C. Obstruction Below Ground: any extraneous matter shall be removed to the depths necessary to permit proper installation of planting. If obstruction is not feasible, remove. The Landscape Architect is to be notified and he is to make adjustment of the plant material.

4.10 SETTING PLANTS

A. Shrubs and Ground Covers: All plants except as otherwise specified, shall be centered in pits. Deep planting shall be avoided and unless otherwise specified or directed, all plants shall be set at such a level that after settlement, they will bear the same relation to the required grade as they have to the natural grade before being transplanted. Make adjustments of position of plants where necessary and prior to complete planting.

B. Compact topsoil mixture, as specified, around balls or roots the full diameter of plant pit and water thoroughly and form a ridge of soil around edge of pit to form a saucer.

4.11 PRUNING

A. All plant materials shall be trimmed and shaped to provide for the desired effect when indicated on plan. All pruning shall be in accordance with standard modern horticultural practice.

4.12 SHRUB & TREE PLANTING

A. Shrubs, B&B 3 gallons and larger, shall be planted in pits, at least 2 times greater in diameter than the ball of earth. The depth of the pits shall be as deep as necessary to permit the required 6 inches of topsoil mixture beneath the ball and to accommodate the ball or roots when the plant is set to the required grade. Backfill with topsoil mixture as specified and thoroughly settle by tamping and watering. A mound of soil shall be formed around each plant so as to produce a shallow saucer.

B. Where required by the plans, spread superabsorbent around new trees only, at a rate recommended by the manufacturer for the ground cover / new plantings. Uniformly spread throughout a 6 foot diameter area centered on each tree. Omit the superabsorbent, if the tree is within an area with a normal high water table.

4.13 GROUND COVER PLANTS

A. Plants planted at a spacing of up to 18 inches and plants of smaller size shall be treated as ground cover plants.

- B. Preparation of top six inches (6") of planting soil shall be prepared as follows (unless noted otherwise in Plant Schedule):
1. Fine grade to remove all extraneous matter.
2. Spread three inches (3") of peat moss or humus uniformly over entire ground cover area.
3. Spread the 50% organic fertilizer at the rate of 40 pounds per 1,000 square feet uniformly over the ground cover area.
4. Spread the 75% organic fertilizer at the rate of 25 pounds per 1,000 square feet uniformly over the ground cover area.
5. Rotor mix or mix by other method to a depth of six inches (6").
6. Regrade to the finished grade before mulching.
7. Plant beds that have a spacing of plants that is 12" or less may be mulched before planting.
8. Thoroughly water and firm the plants into the ground cover mixture.

C. Plants shall be oriented so that the spread on the plants will uniformly cover the space between them.

4.14 SODDING

A. The finish level of all grass areas after settlement shall be one inch below the top abutting curbs, walks, paving and wood borders to allow for the building of turf.

B. The sub-grade soil shall be loosened by roto-tiller or other approved method to a minimum of six inches and graded to remove all ridges and depressions so that it will be after settlement everywhere parallel to and at the proper level to provide finished grades specified hereinbefore. All stones over two inches in dimensions, sticks, debris and other extraneous matter shall be moved during this operation.

C. Soil Tests: Before any soil additives are applied to the soil, a soil test shall be taken to determine the type and amount of PH controlling materials needed to bring the soil to a PH rating of 6.0. Results of soil test shall be submitted to the Landscape Architect or his representatives prior to application of soil additives.

D. Correcting PH: Apply the necessary material to correct the PH.

E. After preparation of subsoil, commercial fertilizer 6-6-6 50% organic shall be applied on all grass areas at the uniform rate of 20 pounds per 1,000 square feet.

F. Solid sod shall be sufficiently thick to secure a dense stand of live grass and shall be free from weeds or undesirable grasses. At the time the sod is cut, the grass shall not have a length of more than two inches.

G. Thickness shall be as uniform as possible, approximately 1-1/2 inches or more, depending on the nature of the sod, so that practically all the dense root system of the grasses will be retained, but exposed in the sod strip, and so that the sod can be handled without undue tearing or breaking.

H. Sod shall be watered before lifting and in sufficient quantities to provide a well moistened condition of the sod, full depth to which it is to be cut.

I. The sod shall be live, fresh and uninjured at the time of planting. It shall be planted as soon as possible after being dug and shall be shaded and kept moist from the time it is dug until it is planted. The sod shall be approved by the Landscape Architect before planting.

J. Sod shall be laid with broken joints and fitted together to form a uniform neat blanket effect. All poor grass, light spots and trash shall be cut out of the sod and patched with good sod.

K. Watering: The grassed areas shall be kept in moist condition for a least two weeks after it is planted and as long as required for a stand of grass.

L. Patching: Weed sodded areas which have to be removed and replaced will be done so by cutting out the affected area - graded to a depth equal to bottom of existing sod adjacent and replaced tightly to form a uniform carpet not noticeable whether the grade is flat or on a slope.

4.15 MULCHING

A. After all plants in a group or in a plant bed have been set and approved, the areas between plants shall be cultivated and raked to an even grade to conform to the required premulching finish grades. All plant beds and plant saucers shall then be uniformly covered with four-inch layer of pine bark, or as specifically noted on drawings.

B. Trees which are not located in plant beds shall be mulched to 5' radius from center of tree. Mulch shall not be placed closer than 6" from the trunk.

C. Ground cover plants (spacing of more than 12 inches) shall be set in the plant beds before mulching is applied to these areas.

PART V - FINAL COMPLETION AND ACCEPTANCE

5.01 CLEAN-UP AND PROTECTION

A. Upon completion of the work, the grounds shall be cleared of all debris, superfluous materials and equipment due to landscape operations.

B. The Contractor shall protect all work included under his contract against trespassing and damage of any kind until final inspection and acceptance. If any material is injured it shall be treated, repaired or replaced as required.

5.02 FINAL INSPECTION

A. At the conclusion of the planting, a final inspection of the work will be made to determine the condition of plant materials. All plants not in a healthy, growing condition as determined by the Landscape Architect or his representative shall be removed from the site and promptly replaced with plants of the like, kind and size in the same manner as specified for the original planting, at no additional cost to the Owner.

B. At the conclusion of this final inspection, if the Landscape Architect or Owner has reason to believe that the plants are not of the specified grade, he will request a regrading inspection by the Division of Plant Industry, and such evidence will be the basis for requesting replacement of plants, and for legal or other action taken by the Division of Plant Industry according to law, should this become necessary.

5.03 HURRICANE DAMAGE OR ACTS OF GOD

A. The Contractor shall not be held responsible for replacement or repairs of plants or planting areas killed or damaged by hurricanes or Acts of God provided he shall have taken all reasonable precautions to minimize their damage.

5.04 GUARANTEE

A. All plants, ground cover materials, trees and palms shall be guaranteed for a period of one (1) year after final inspection and acceptance by the Owner.

5.05 HARM TO PLANT MATERIAL

A. The General Contractor is responsible for damage to any plant materials or sod which is harmed by foot traffic, ladders in beds, paint brush cleaning, spillage of chemicals in landscaped areas, heavy equipment traffic, construction debris left laying, roofing materials or any other circumstances which is obviously the result of construction work aftermath.

(End of Section)

Table with 5 columns: NO., BY, DATE, SYMBOL, REVISIONS. Row 1: 1, MM, 10/2022, ELECTRICAL CONTRACTOR BID PACKAGE.

Architects Engineers Surveyors AA - C0000035 EB - 0000155 LB - 0006783 10245 Centurion Pkwy. N., Suite 320 Jacksonville, Florida 32256 Telephone: (904) 203-1090



DESIGNER: B. GODARD DRAWN BY: B. GODARD DATE: OCT 2022 CHECKED BY: B. GODARD DATE: OCT 2022

DESIGN LANDSCAPE ARCHITECT BRETT M. GODARD, PLA, ASLA FLORIDA REGISTRATION NO. FL LA0001270



St. Johns County Utility Department 1205 STATE ROAD 16 ST AUGUSTINE, FL 32084 PHONE: (904) 209-2626 FAX: (904) 209-2627

CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

Table with 2 columns: SHEET NO., DWG NO. Row 1: 16, L3. Row 2: ELECTRICAL BID PACKAGE.

LEGEND

I.D.	DESCRIPTION	SPECIFICATION
W	WATER SOURCE	5/8" REUSE METER
B	BALL VALVE	1" PVC w/ PURPLE VALVE BOX
M	MAINLINE	1" PURPLE PR-200 PVC
S	SLEEVING	2" SCHEDULE 40 PVC
C	CONTROLLER	HUNTER WVC-100
R	RAIN SENSOR	HUNTER MINI-CLIK
D	DRIP ZONE KIT	HUNTER ICZ-151-R
T	DRIP TUBE	HUNTER HDL-09-12-PC-R
V	AIR VENT	HUNTER HDL-AVR
F	FLUSH VALVE	HUNTER AFV
B	BUBBLER	HUNTER PCB-25-R

WATERING SCHEDULE

USE	ZONE	PGR	START	MINUTES	DAYS/WK	G.P.M.	PREC.	RT.
Low	#1	A	8am	9	4/wk	10.82	1.07	

PROGRAM MONTHLY ADJUSTMENTS

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adjustment	34%	40%	64%	81%	98%	100%	98%	93%	76%	59%	38%	30%

AVERAGE DAILY CONSUMPTIVE USE (O' rainfall)
35.00 gallons

REUSE SUPPLY NOTES

A minimum separation of three feet (outside to outside) shall be maintained between reclaimed water lines and either potable water mains or sewage collection lines.

All piping, valves and valve boxes, sprinkler heads and other outlets, shall be color coded using pantone purple 522c.

The contractor is required to post Advisory signs: 18"x18" metal, prominent color-purple. "DO NOT DRINK" printed in English and Spanish, together with the equivalent standard international symbol.

Install signs visible to the public, unobstructed, in the following locations:
Adjacent to lakes or ponds, not more than 300' apart. These signs must also include "DO NOT SWIM" in English & Spanish. Adjacent to decorative "reuse" water features. These signs must also include "DO NOT SWIM" in English & Spanish.
At each entrance. Medians and rights-of-way. Visible in both directions, not more than 1,000' apart.

Advisory signs to be approved by Water Purveyor prior to installation. The owner must maintain the "reuse" irrigation system in good working condition and must be adjusted properly to minimize spray onto roads, common sidewalks, gutters, neighboring property, or impervious surfaces that allow run-off.

NOTES

ALL WORK SHALL CONFORM TO ANY AND ALL APPLICABLE REGULATIONS AND CODES FOR THE LOCATION OF THE WORK. THE INSTALLER SHALL OBTAIN ANY NECESSARY LOCATES, PERMITS AND INSPECTIONS.

CLARIFY ANY DISCREPANCIES ON THE PLAN PRIOR TO BIDDING.

ALL PIPE AND WIRE UNDER PAVING SHALL BE PLACED IN SCHEDULE 40 P.V.C. SLEEVES FOR THE FULL PAVEMENT COVERAGE LENGTH AND SHALL BE AT LEAST 24" BELOW GRADE.

MAINLINES SHALL BE BURIED TO PROVIDE A MINIMUM COVER OF 18", WHILE ALL LATERAL LINES SHALL HAVE A MINIMUM OF 12".

ALL WORK SHALL BE CLOSELY COORDINATED WITH THAT OF OTHER TRADES, IN ORDER TO AVOID CONFLICTS. REFER TO LANDSCAPE AND UTILITIES PLANS WHEN TRENCHING TO AVOID TREES, SHRUBS AND UNDERGROUND UTILITIES.

ALL PIPING DOWNSTREAM OF SOLENOID VALVE TO BE PURPLE PR-160 P.V.C.

THE DRAWINGS ARE DIAGRAMMATIC. THE CONTRACTOR SHALL BE EXPECTED TO MAKE THOSE MODIFICATIONS NECESSARY IN THE FIELD TO REACT TO ACTUAL FIELD CONDITIONS, WITHOUT DEPARTURE FROM THE DESIGN CONCEPTS OR INTENT. ANY PIPING SHOWN OUTSIDE THE PROPERTY LINE OR RUNNING OUTSIDE A LANDSCAPE AREA IS SHOWN THERE FOR CLARITY ONLY. ALL LINES SHALL BE INSTALLED ON THE PROPERTY AND INSIDE THE LANDSCAPE AREAS.

THE INSTALLER SHALL BE EXPECTED TO BE FAMILIAR WITH AND FOLLOW THE INSTRUCTIONS CONTAINED HEREIN, ON THE DRAWINGS, IN THE CONSTRUCTION DETAILS, AND IN THE WRITTEN SPECIFICATIONS, SHOULD A CONFLICT BE DISCOVERED WITHIN THE DOCUMENTS, HE SHALL IMMEDIATELY NOTIFY THE PROJECT MANAGER AND REQUEST CLARIFICATION.

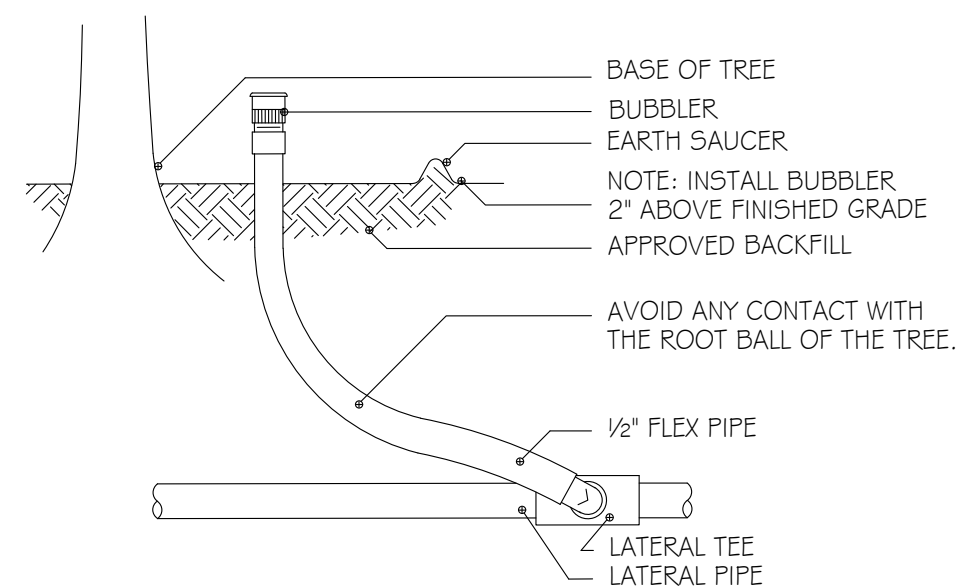
CONTRACTOR SHALL VERIFY WITH OWNERS REPRESENTATIVE ALL CONTROLLER PROGRAMMING, INCLUDING MONTHLY ADJUSTMENTS, PRIOR TO FINAL INSPECTION.

SJRWMD LAWN AND LANDSCAPE IRRIGATION RULE:
IRRIGATION OF NEW LANDSCAPE IS ALLOWED AT ANY TIME OF DAY ON ANY DAY FOR THE INITIAL 30 DAYS AND EVERY OTHER DAY FOR THE NEXT 30 DAYS FOR A TOTAL OF ONE 60-DAY PERIOD, PROVIDED THAT THE IRRIGATION IS LIMITED TO THE MINIMUM AMOUNT NECESSARY FOR ESTABLISHMENT.

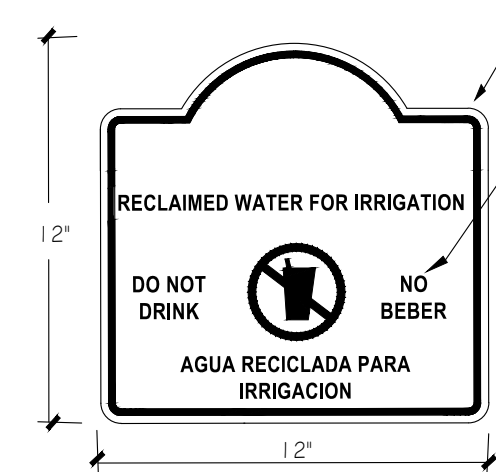
THIS PLAN WAS PREPARED BY A CERTIFIED IRRIGATION DESIGNER AND MEETS THE STANDARDS OF THE IRRIGATION ASSOCIATION, F.B.C. PLUMBING VOLUME APPENDIX F, 373.228 F.S. & F.A.C. 62.610 PART 3.

THE CONTRACTOR SHALL PREPARE AN AS-BUILT DRAWING SHOWING ALL IRRIGATION INSTALLATION. THE DRAWING SHALL LOCATE ALL PIPING AND VALVES BY SHOWING EXACT MEASUREMENTS FROM HARD SURFACES OR PERMANENT FEATURES. PLEASE SHOW WIRE DIRECTION.

DETAILS



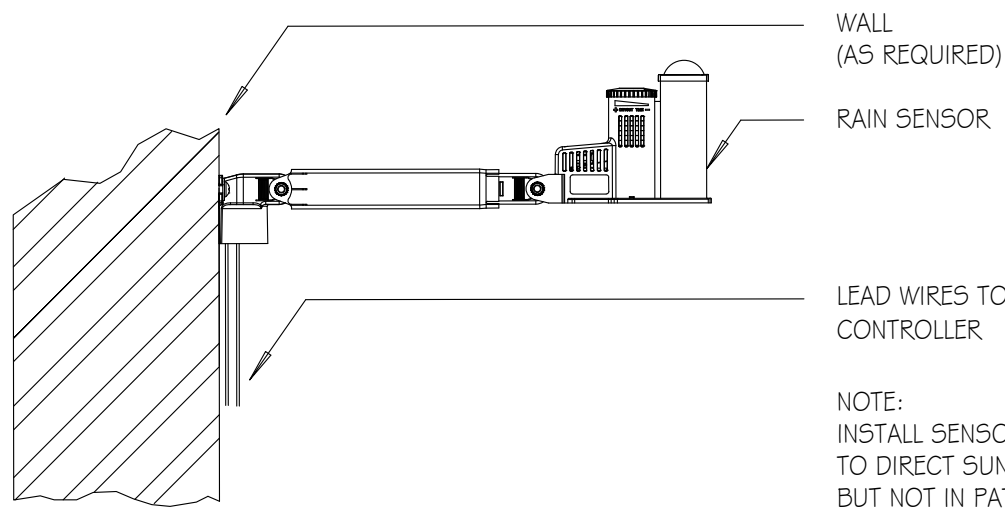
TYPICAL BUBBLER
NOT TO SCALE



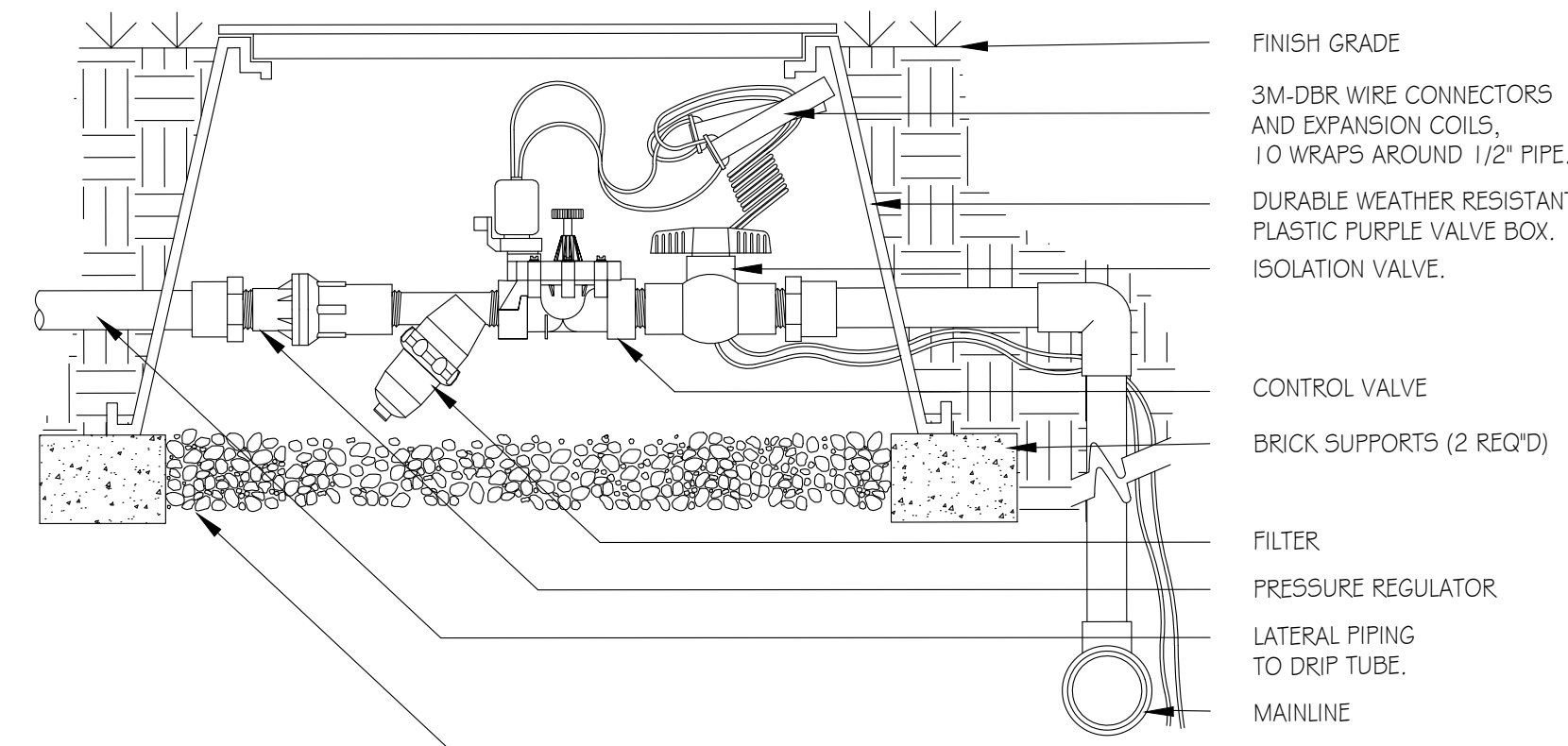
TYPICAL REUSE SIGN (ENTRANCE OR R.O.W.)
NOT TO SCALE



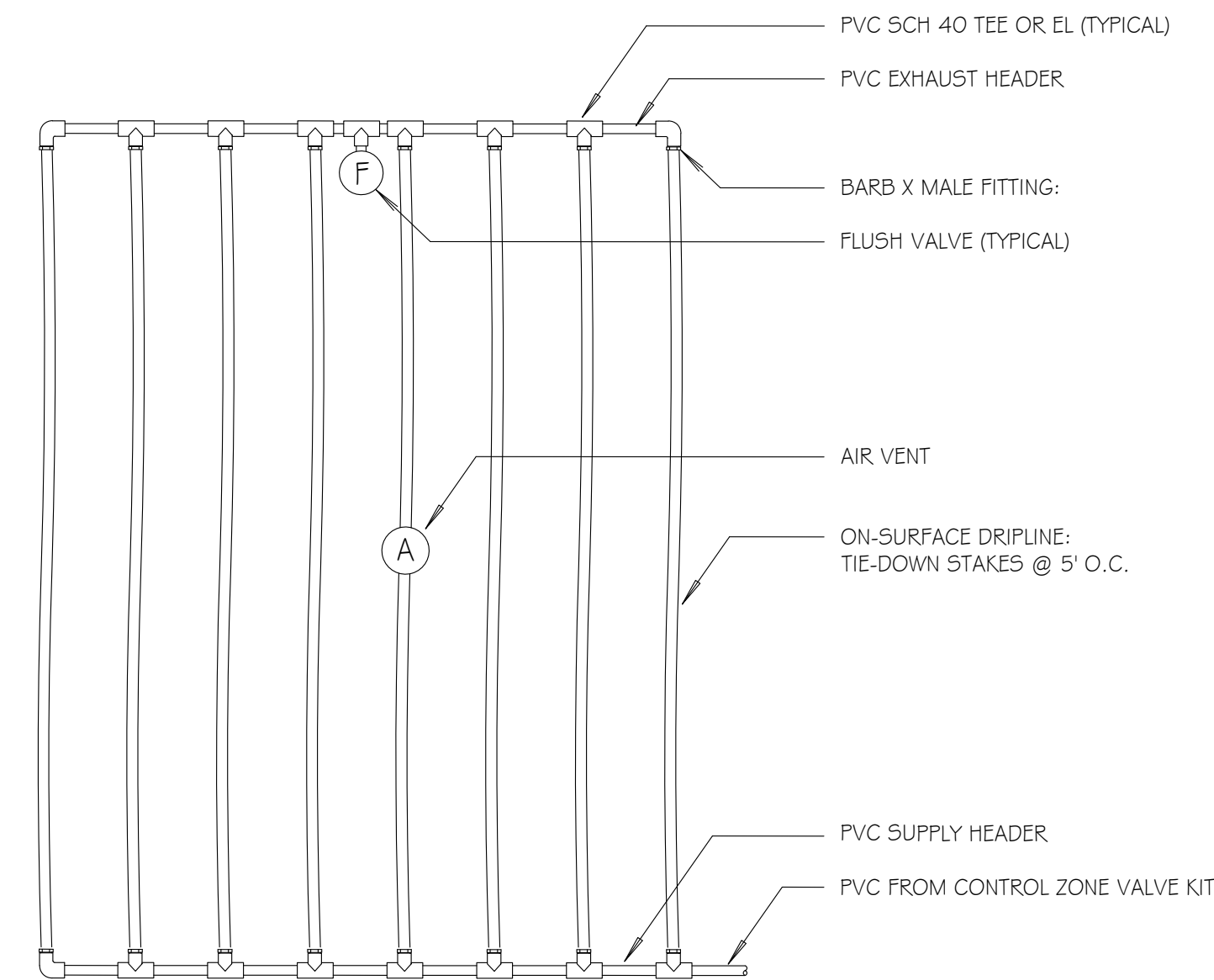
TYPICAL REUSE SIGN (ALONG WATER EDGE)
NOT TO SCALE



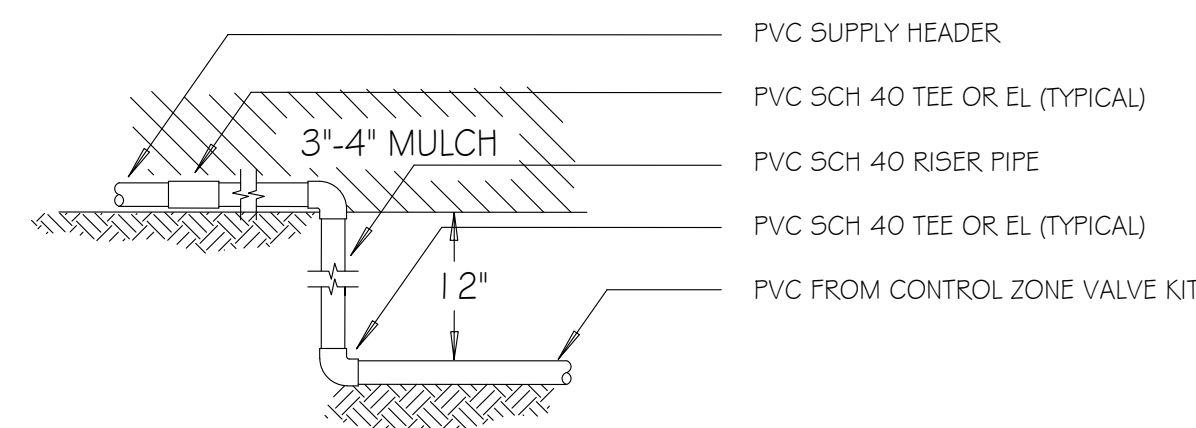
TYPICAL RAIN SENSOR
NOT TO SCALE



TYPICAL DRIP ZONE VALVE
NOT TO SCALE



TYPICAL DRIP GRID
NOT TO SCALE



TYPICAL DRIP GRID CONNECTION
NOT TO SCALE

INSTALL VALVE BOX 2' ABOVE FINISH GRADE IN SHRUB AREAS.

FINISH GRADE

3M-DBR WIRE CONNECTORS AND EXPANSION COILS, 10 WRAPS AROUND 1/2" PIPE. DURABLE WEATHER RESISTANT PLASTIC PURPLE VALVE BOX. ISOLATION VALVE.

CONTROL VALVE

BRICK SUPPORTS (2 REQ'D)

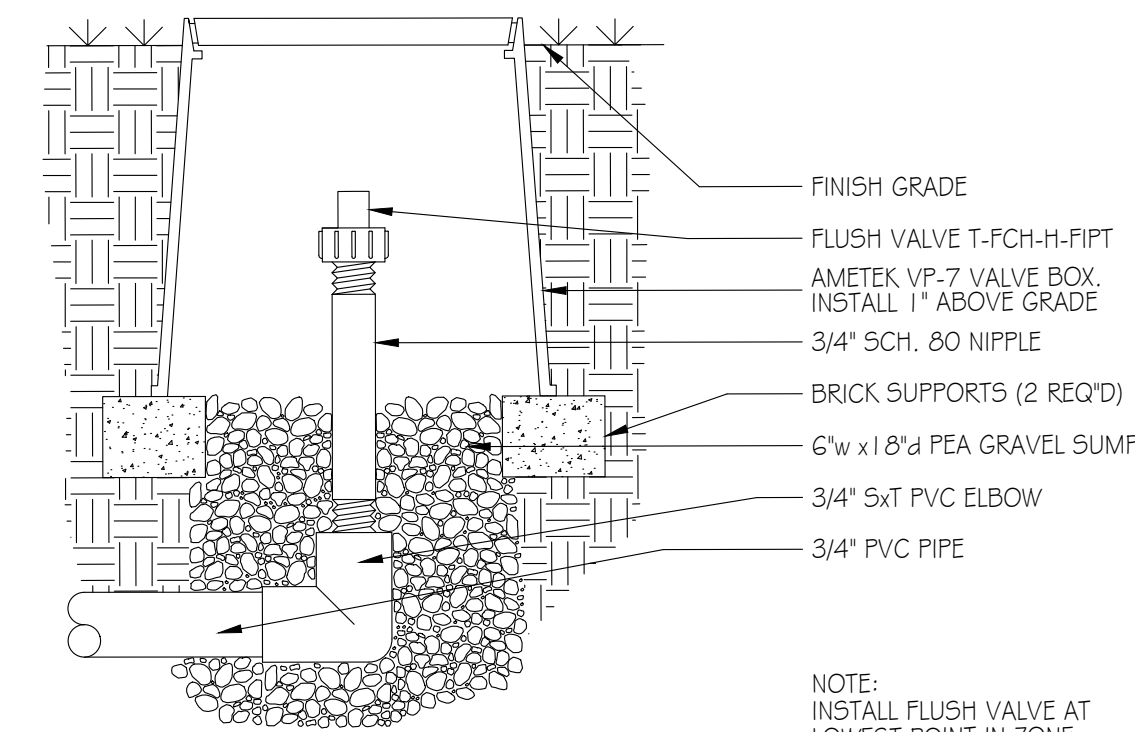
FILTER

PRESSURE REGULATOR

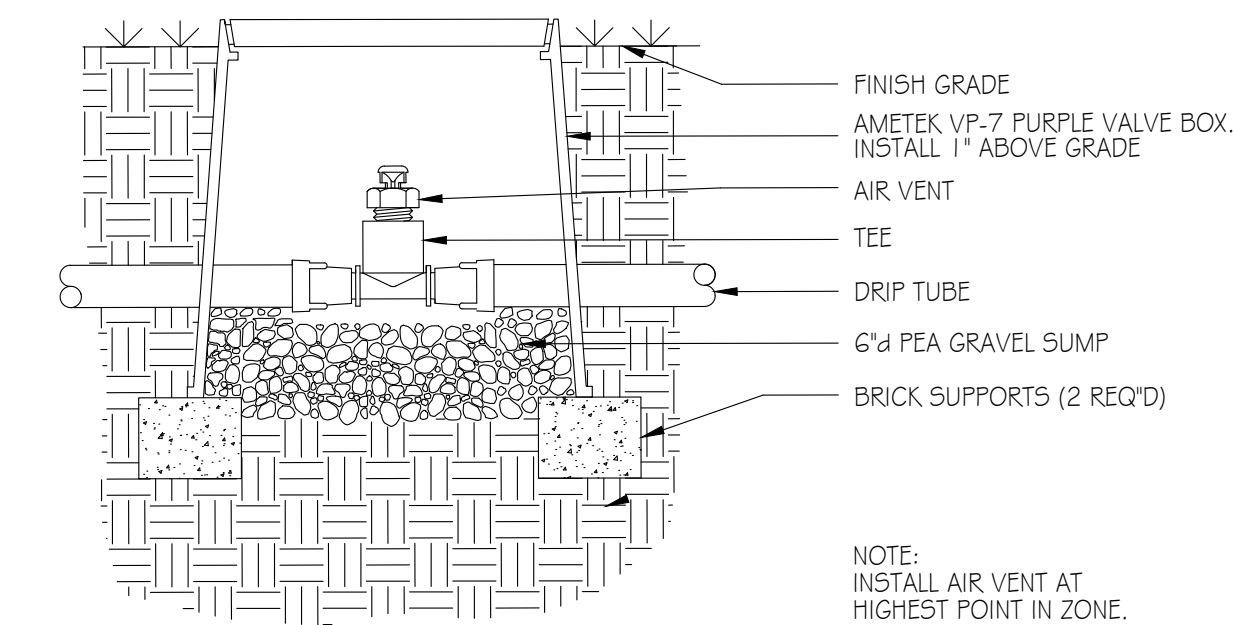
LATERAL PIPING TO DRIP TUBE.

MAINLINE

4" PEA GRAVEL BASE W/ FILTER LINING.



TYPICAL FLUSH VALVE
NOT TO SCALE



TYPICAL AIR/VACUUM RELIEF
NOT TO SCALE

NO.	BY	DATE	SYMBOL	REVISIONS
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1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M M
MOTT MACDONALD
Mott MacDonald Florida, LLC

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BRETT M. GODARD, PLA, ASLA

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DATE: OCT 2022
CHECKED BY: B. GODARD
DATE: OCT 2022

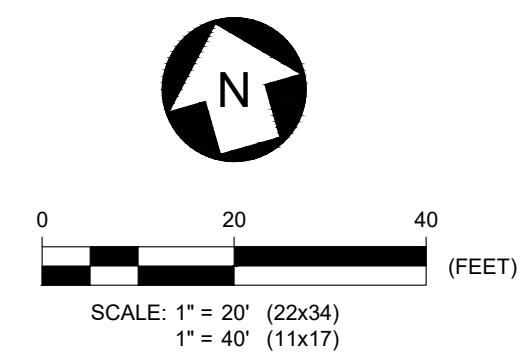
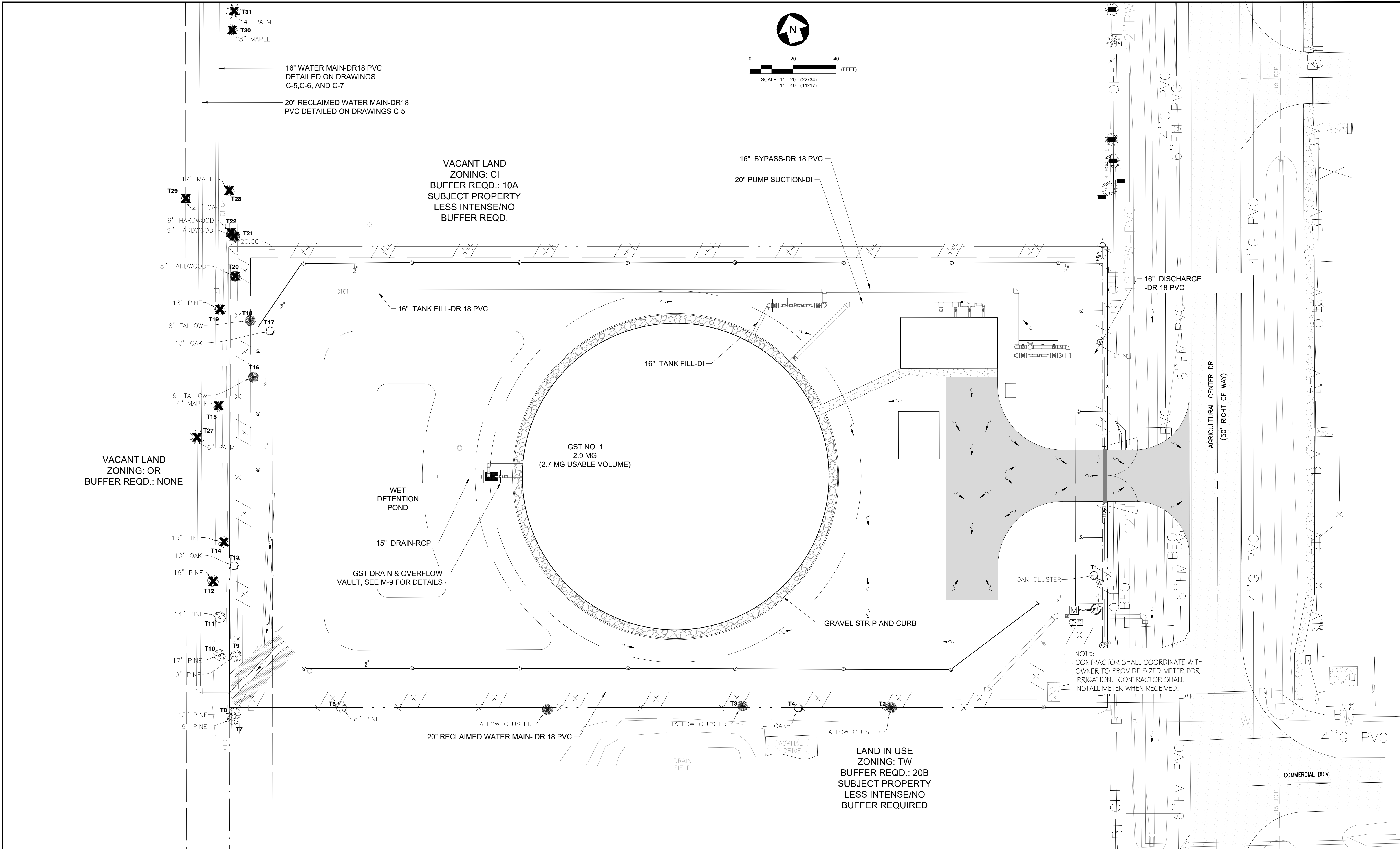
DESIGN LANDSCAPE ARCHITECT
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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

GENERAL IRRIGATION NOTES

SHEET NO. 17
DWG NO. L4
ELECTRICAL BID PACKAGE



NOTE:
 CONTRACTOR SHALL COORDINATE WITH
 OWNER TO PROVIDE SIZED METER FOR
 IRRIGATION. CONTRACTOR SHALL
 INSTALL METER WHEN RECEIVED.

NO.	BY	DATE	SYMBOL	REVISIONS
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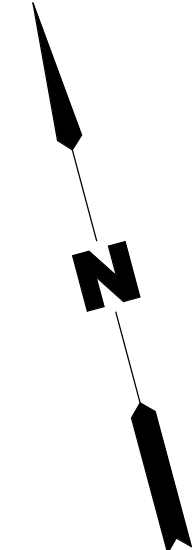
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**CR-208 GROUND STORAGE TANK
 AND BOOSTER PUMP STATION**

IRRIGATION PLAN

SHEET NO.
 18
 DWG NO.
 L5
 ELECTRICAL
 BID PACKAGE



BUILDING CODE SUMMARY

GENERAL INFORMATION
 Name of Project: CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION
 Address: 3575 AGRICULTURAL CENTER DR,
 ST AUGUSTINE,
 FL 32092

Proposed Use: F2
 Owner or Authorized Agent: SJCUD

CODES REVIEWED:
 2020 FLORIDA BUILDING CODE, BUILDING (FBC-B)
 2020 FLORIDA BUILDING CODE, MECHANICAL (FBC-M)
 2020 FLORIDA BUILDING CODE, PLUMBING (FBC-P)
 2020 FLORIDA FIRE PREVENTION CODE, (FFPC)
 2020 NEC

BOOSTER PUMP AND ELECTRICAL ROOM BUILDING

BUILDING CLASSIFICATION
 OCCUPANCY - SECTION 306.4
 CONSTRUCTION - SECTION 602.2

BUILDING HEIGHTS AND AREAS
 TABLE 503

OCCUPANT LOAD
 TABLE 1004.1 EXCEPTION 1

SPRINKLERS

EXITS PER SPACE
 SECTION 1015

MAX. TRAVEL DISTANCE
 TABLE 1016.1
 COMMON PATH OF TRAVEL

FIRE SEPARATION DISTANCE

FIRE RESISTANCE RATING
 TABLE 602

STAIRS

RAMPS

HAZARDOUS CHEMICALS
 INTERIOR STORAGE

EXTERIOR STORAGE

GROUP F-2 SPECIAL PURPOSE FACTORY INDUSTRIAL
 TYPE II B

MAX. AREA 23,000 SF ACTUAL 1,058 SF
 MAX. HEIGHT 55 FEET ACTUAL 14 FEET
 MAX. STORIES 3 ACTUAL 1

5 EMPLOYEES MAXIMUM FOR MAINTENANCE; BLDG.
 IS AN UNOCCUPIED STRUCTURE; 100 GROSS

NO; BLDG. IS NOT SPRINKLERED.

REQUIRED 1 ACTUAL 2
 TOTAL THIS BUILDING

MAXIMUM 300 FEET ACTUAL 51 FEET

MAXIMUM 75 FEET

TYPE II B > 30 FEET FROM OTHER BLDG. AND PROPERTY LINE = 0 HR.

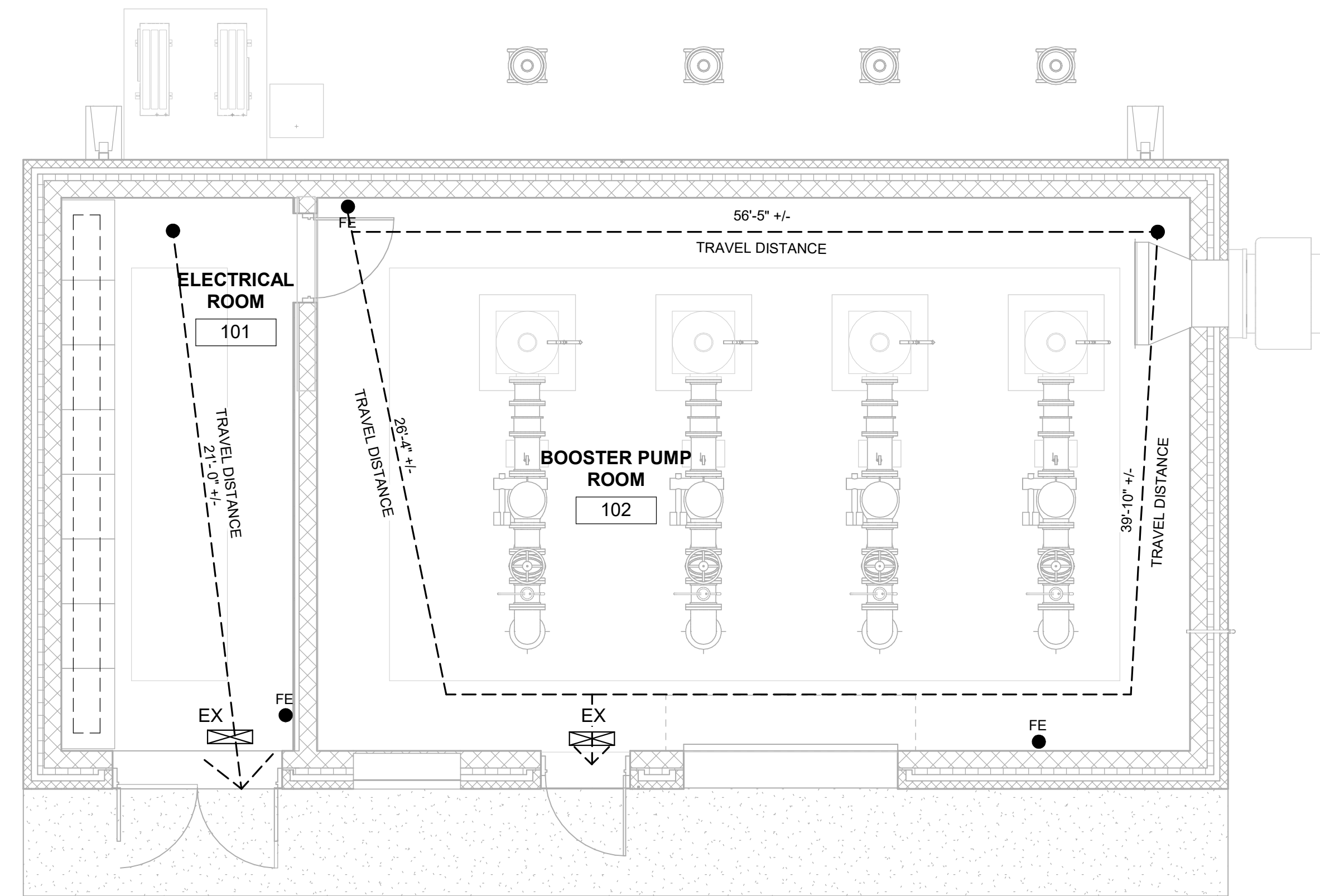
0 HR. RATING FOR EXTERIOR WALLS

N/A

N/A

N/A

N/A



LEGEND	
FE	- FIRE EXTINGUISHER
EX	- EXIT SIGN

① LIFE SAFETY PLAN
 1/4" = 1'-0"



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CR-208 GROUND STORAGE TANK
 AND BOOSTER PUMP STATION

CODE SUMMARY AND LIFE SAFETY
 PLAN

SHEET NO.
 19
 DWG NO.
 A-0
 ELECTRICAL
 BID PACKAGE

ABBREVIATION SCHEDULE

A	ABV ABOVE AFF ABOVE FINISHED FLOOR ACC ACCESS ACOUS ACOUSTIC ACR ACRYLIC ADJ ADJACENT ADJT ADJUSTABLE ADD ADDENDUM ADH ADHESIVE AGS AGGREGATE AHU AIR HANDLING UNIT AC AIR CONDITIONING ACU AIR CONDITIONING UNIT ALT ALTERNATE ALUM ALUMINUM ALSF ALUM STOREFRONT ANOD ANODIZED APPROX APPROXIMATE ARCH ARCHITECT A D AREA DRAIN ASPH ASPHALT AUTO AUTOMATIC AUX AUXILIARY	E	EP ELECTRICAL PANELBOARD EWC ELECTRIC WATER COOLER EL ELEVATION ELEV ELEVATOR EMERG EMERGENCY ENC ENCLOSURE ENGR ENGINEER ENT ENTRANCE EQ EQUAL E.F.S. EXTERIOR INSUL & FINISH SYSTEM E.F.S. EXTERIOR FINISH SYSTEM EST ESTIMATE EF EXHAUST FAN EXIST EXISTING EXP EXPANSION EXPO EXPOSED EXT EXTERIOR EXTR EXTRUDE EX EXIT SIGN	L	LB POUND LAM LAMINATE LAV LAVATORY LH LEFT HAND L LENGTH LVL LEVEL LT LIGHT LW LIGHTWEIGHT LF LINEAR FEET LTEL LINTEL LIN LINEAR LKR LOCKER LLH LONG LEG HORIZONTAL LLV LONG LEG VERTICAL LVR LOUVER	S	SF GL SAFETY GLASS S S SANITARY SEWER SC SCALE SCR SCREW SCHED SCHEDULE SCN SCREEN SEAL SEALANT SECT SECTION SHT SHOWER SHWR SIMILAR SKL SKYLIGHT SLV SLEEVE SM SMOOTH S SOUTH SPKR SPEAKER SPEC SPECIFICATIONS SPRLR SPRINKLER SQ SQUARE S STL STAINLESS STEEL STD STANDARD STA STATION STL STEEL STIFF STIFFENER STOR STORAGE ST STREET STRUCT STRUCTURAL SUSP SUSPENDED SW SWITCH SYM SYMMETRICAL SYN SYNTHETIC SYS SYSTEM S F SQUARE FEET
B	BSMNT BASEMENT BM BEAM BRDG BRIDGING BRG BEARING B.M. BENCH MARK BEL BELOW BTWN BETWEEN BULD BEVELED BIT BITUMINOUS BLK BLOCK BLKG BLOCKING BD BOARD BT BOLT BS BOTH SIDES BW BOTH WAYS BTM BOTTOM BRKT BRACKET BRK BRICK BR BRONZE BLDG BUILDING B U BUILT UP	F	FOC FACE FOF FACE OF CONCRETE FOM FACE OF MASONRY FOS FACE OF STUD FOW FACE OF WALL FASTEN FASTEN FT FEET FN FENCE FIN FINISH FGL FIBERGLASS FA FIRE ALARM FHC FIRE HOSE CABINET FH FIRE HYDRANT FP FIREPROOF FLG FLASHING FW FLAT WASHER FLX FLEXIBLE FL FLOOR FLUR FLUORESCENT FTG FOOTING FDN FOUNDATION FR FRAME FURN FURNISH FURR FURRING FUT FUTURE FD FLOOR DRAIN FEC FIRE EXTINGUISHER CABINET FE FIRE EXTINGUISHER	M	MACH MACHINE M H MANHOLE MFD MANUFACTURED MFR MANUFACTURER MRB MARBLE MAS MASONRY M O MASONRY OPENING MAT MATERIAL MAX MAXIMUM MSL MEAN SEA LEVEL MECH MECHANICAL MED MEDIUM MBR MEMBER MEMB MEMBRANE MEN MEN MTL METAL MEZZ MEZZANINE MWW MILLWORK MIN MINIMUM MR MIRROR MISC MISCELLANEOUS MOD MODULAR MLD MOLDING MTD MOUNTED MOV MOVABLE MUL MULLION	T	TEL TELEPHONE TV TELEVISION TER TERRAZZO THK THICK THRESH THRESHOLD TOL TOLERANCE T&G TONGUE AND GROOVE T/B TOP AND BOTTOM T/C TOP OF CONCRETE TOM TOP OF MASONRY T/R TOP OF RAIL TOS TOP OF STEEL TOW TOP OF WALL TR THREAD TYP TYPICAL TMPD TEMPERED
C	CAB CABINET CSMT CASEMENT CI CAST IRON CIP CAST IN PLACE CB CATCH BASIN CK CAULK CLG CEILING CEM CEMENT CER CERAMIC CHAM CHAMFER CLOS CLOSET CO CLEAN OUT CLR CLEAR CLS CLOSURE CTD COATED CH COAT HOOK CRS COLD ROLLED STEEL COL COLUMN COMB COMBINATION COMP COMPRESSED CONC CONCRETE CMU CONCRETE MASONRY UNIT CONN CONNECTION CONST CONSTRUCTION CONT CONTINUOUS CONTR CONTRACTOR CTL CONTROL CJ CONTROL JOINT CPR COPPER CG CORNER GUARD CORR CORRUGATED CMP CORRUGATED METAL PIPE CTR COUNTER CFL COUNTERFLASHING CRS COURSE	G	GA GAUGE GALV GALVANIZED GI GENERAL IRON GEN GENERAL GL GLASS GCMU GLASS CONC MASONRY UNIT GFCI GROUND FAULT CIRCUIT INTERRUPT G S T GLAZED STRUCTURAL TILE GR GRADE GRN GRANITE GRL GROUT GWB GYPSUM WALLBOARD GYP GYPSUM	N	NL NAILABLE NAT NATURAL NOM NOMINAL N NORTH NIC NOT IN CONTRACT NTS NOT TO SCALE NO NUMBER	U	UC UNDERCUT UNF UNFINISHED UL UNDERWRITERS LABORATORIES UTIL UTILITY UR URINAL
D	DP DAMPPROOFING DKG DECKING DEG DEGREE DEM DEMOLISH DMT DEMOUNTABLE DEP DEPRESSED DTL DETAIL DIAG DIAGONAL DIA DIAMETER DIFF DIFFUSER DIM DIMENSION DISP DISPENSER DO DITTO DIV DIVIDER DR DOOR DBL DOUBLE D A DOUBLE ACTING DT A DOVETAIL ANCHOR DN DOWN D S DOWNSPOUT D DRAIN DT DRAIN TILE DWR DRAWER DWG DRAWING DF DRINKING FOUNTAIN	H	HDR HEADER HC HANDICAPPED HDNR HARDENER HDW HARDWARE HDWD HARDWOOD HD HEAD HTG HEATING HVAC HEATING / VENTILATION / AC HT HEIGHT HEX HEXAGONAL H HIGH HM HOLLOW METAL HK HOOK HORIZ HORIZONTAL HB HOSE BIBB HWH HOT WATER HEATER HR HOUR H PT HIGH POINT	O	OC ON CENTER OPNG OPENING OPP OPPOSITE OZ OUNCE OD OUTSIDE DIAMETER OH OPPOSITE HAND OHD OVERHEAD OFF OFFICE	V	VB VAPOR BARRIER VAR VARNISH VTR VENT THROUGH ROOF VENT VENTILATION VRM VERMICULITE VERT VERTICAL VEST VESTIBULE VCT VINYL COMPOSITION TILE
I	IND INCLUDE INDICATE INFO INFORMATION ID INSIDE DIAMETER INSUL INSULATION IC INTERCOM INT INTERIOR INV INVERT IP IRON PIPE ILLUM ILLUMINATED	J	JAN JANITOR JT JOINT JST JOIST JB JUNCTION BOX	P	PG PAGE PNT PAINT PNL PANEL PB PANIC BAR PAR PARALLEL PK PARK PTN PARTITION PVMT PAVEMENT PERF PERFORATE PERIM PERIMETER PERP PERPENDICULAR PLAS PLASTER PLYWDPLYWOOD POLYVINYL CHLORIDE PVC POLYVINYL CHLORIDE PE PORCELAIN ENAMEL PTC POST TENSIONED CONCRETE PSF POUNDS PER SQUARE FOOT PIP POURED IN PLACE PCC PRECAST CONCRETE PREFAB PREFABRICATED PREFIN PREFINISHED PRF PREFORMED PSC PRESSURE TREATED CONCRETE PROJ PROJECT PROP PROPERTY PT PRESSURE TREATED	W	WH WALL HYDRANT WC WATER CLOSET WP WATERPROOFING WGT WEIGHT WWF WELDED WIRE FABRIC W WIDE FLANGE W WEST, WIDE, WATER WOM WOMEN WIN WINDOW W/ WITH W/O WITHOUT WD WOOD
K	K PL KICK PLATE K O KNOCK OUT	Q	QT QUARRY TILE	R	R RADIUS RL RAILING RWC RAINWATER CONDUCTOR RECD RECEIVED REQD REQUIRED RWD REDWOOD REF REFERENCE RFL REFLECTED REINF REINFORCEMENT RES RESILIENT		

SYMBOLS

SELECT COMPACT FILL	
POROUS FILL	
CONCRETE	
PLASTER, GROUT, STUCCO FINISH	
MASONRY VENEER, GENERAL HATCHING	
CONCRETE BLOCK	
PLYWOOD SHEATHING	
ROUGH WOOD	
FINISH WOOD	
INSULATION	
METAL	
RIGID INSULATION	

SYMBOLS LEGEND

NORTH ARROWS	
INTERIOR ELEVATION	SHEET NO. DETAIL NO.
EXTERIOR ELEVATION	DETAIL NO. TYP. SHEET NO.
SECTION	DETAIL NO. TYP. SHEET NO.
DOOR SYMBOL	
WINDOW SYMBOL	
ROOM TAG	
SPOT ELEVATION	
DETAIL CALLOUT / ENLARGED PLAN	DETAIL NO. TYP. SHEET NO.
COLUMN CENTERLINE	
PARTITION TYPE	
REVISION / ADDENDA TAG	

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DRAWN BY: C. Gable
DATE: OCTOBER 2022
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DESIGN ENGINEER
THOMAS A. JARMAN
FLORIDA REGISTRATION NO.
AR0016110

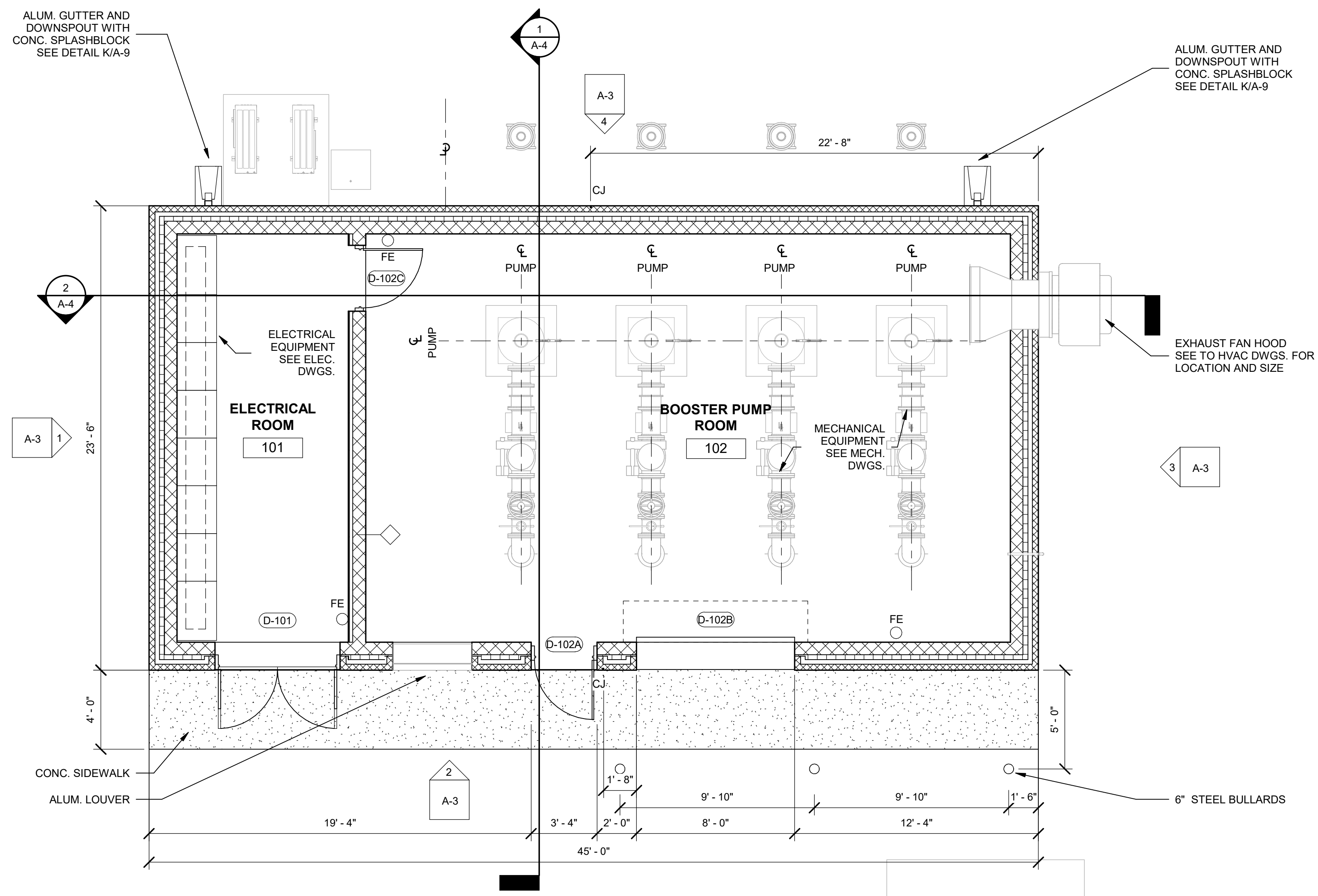
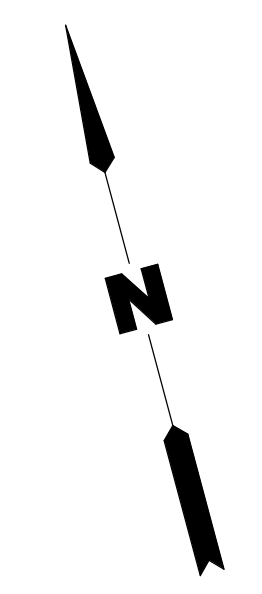


St. Johns County
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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

ARCHITECTURAL LEGENDS AND
ABBREVIATIONS

SHEET NO.
20
DWG NO.
A-1
ELECTRICAL
BID PACKAGE



1 FLOOR PLAN
1/4" = 1'-0"



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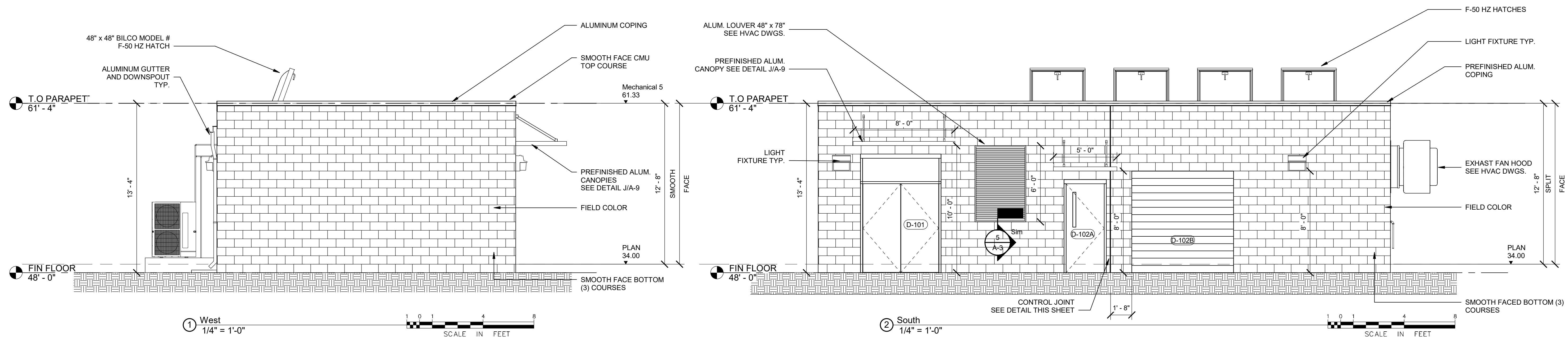
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FLOOR PLAN

SHEET NO. 21
DWG NO. A-2
ELECTRICAL BID PACKAGE

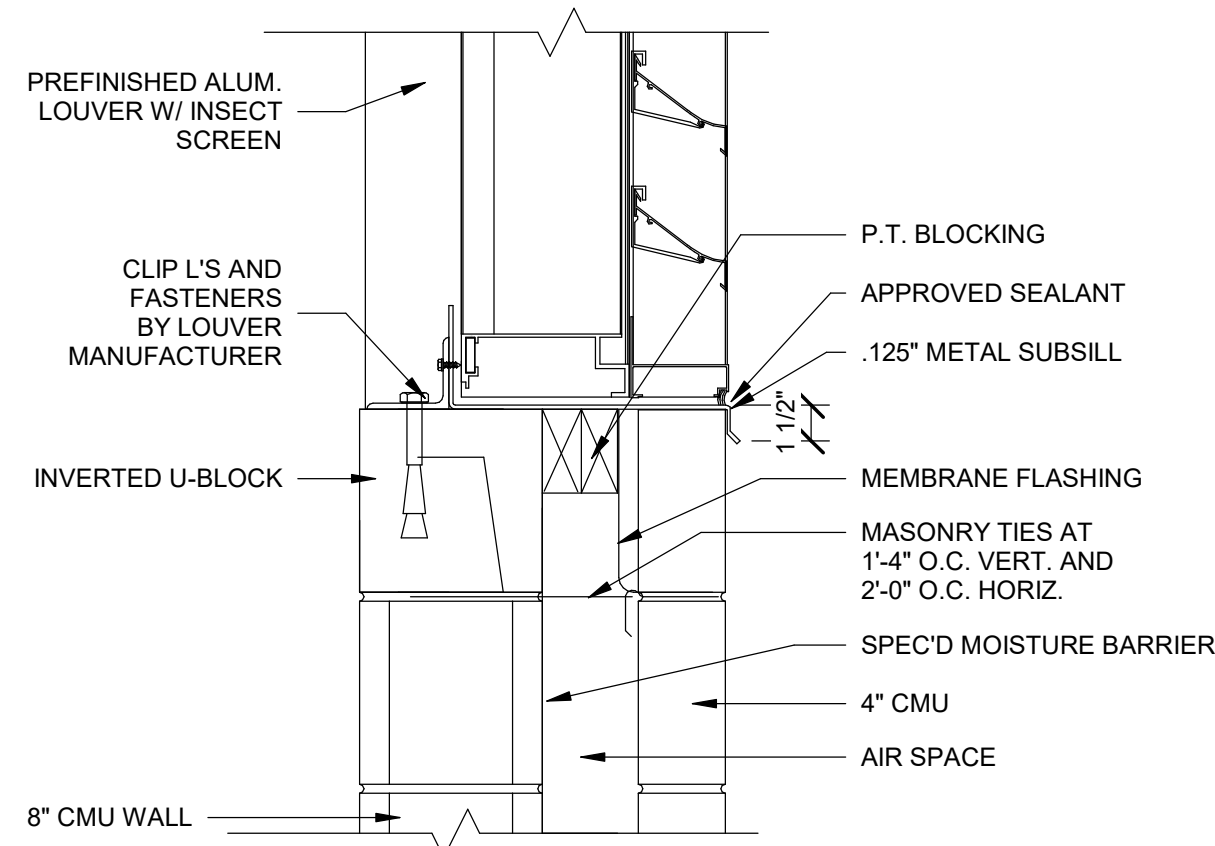
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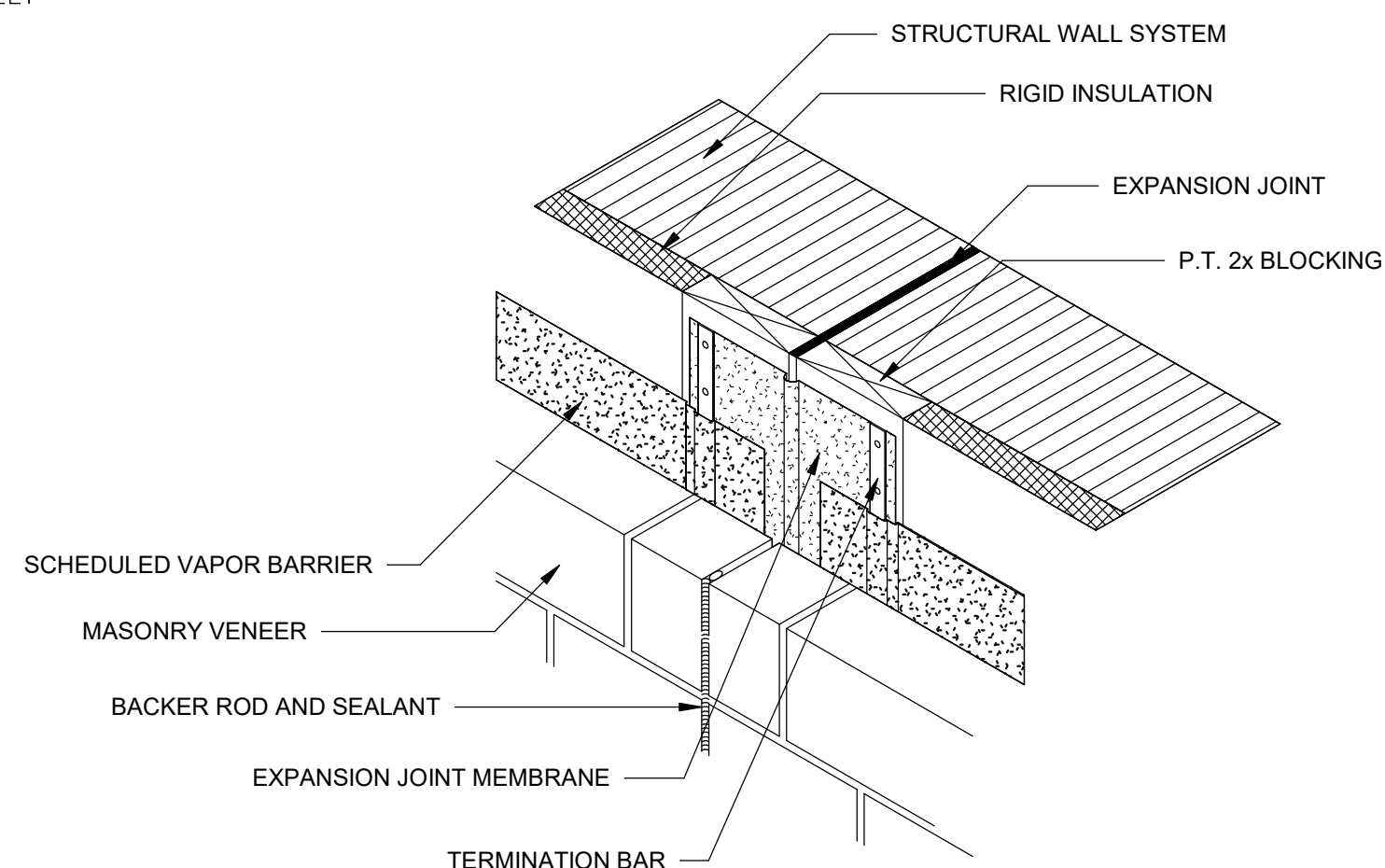


1 West
1/4" = 1'-0"

2 South
1/4" = 1'-0"



5 LOUVER SILL DETAIL
1 1/2" = 1'-0"

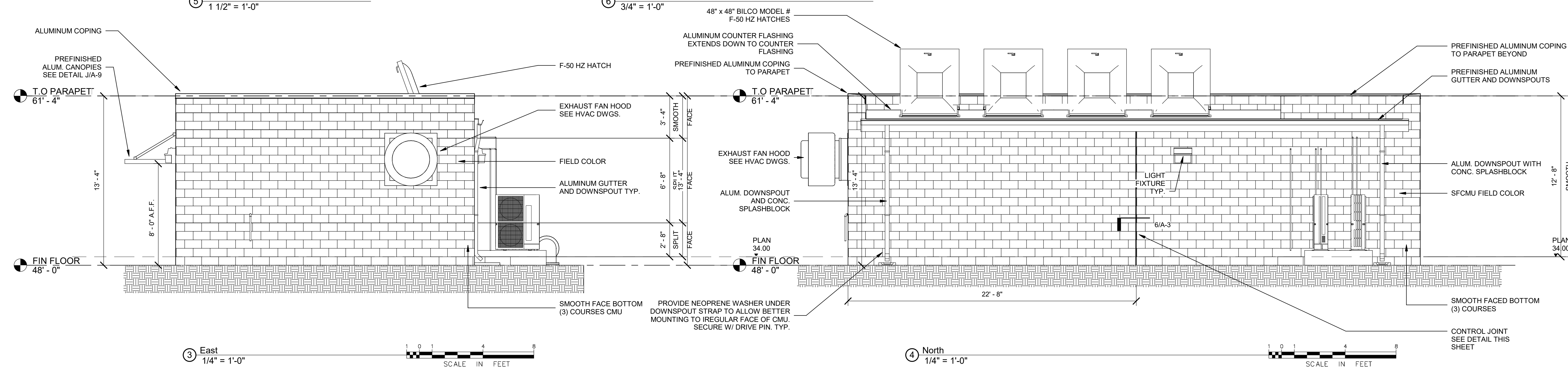


6 CONTROL JOINT DETAIL
3/4" = 1'-0"

GENERAL NOTES

KYNAR NOTE:
ALL METAL ROOF TRIMS, FASCIA'S, FLASHINGS, GUTTERS AND DOWNSPOUTS, AND CANOPIES SHALL BE KYNAR 500 FINISH TYP. ALL COLORS TO MATCH

BLOCK COLOR NOTE:
FIELD COLOR ARGOS "BISCUIT"
MORTAR COLOR ARGOS "SAVANNAH IVORY"



3 East
1/4" = 1'-0"

4 North
1/4" = 1'-0"

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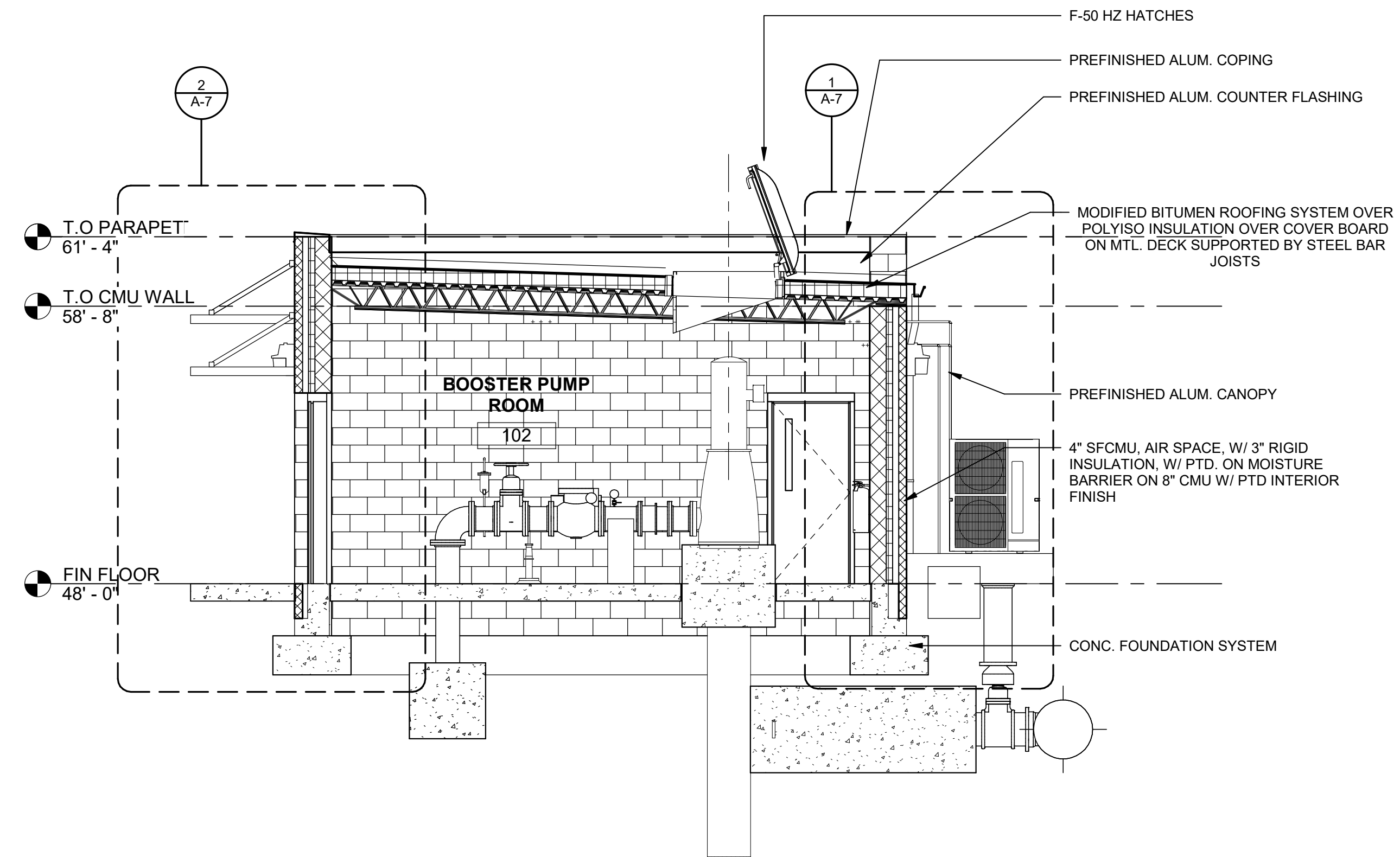
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

EXTERIOR ELEVATIONS

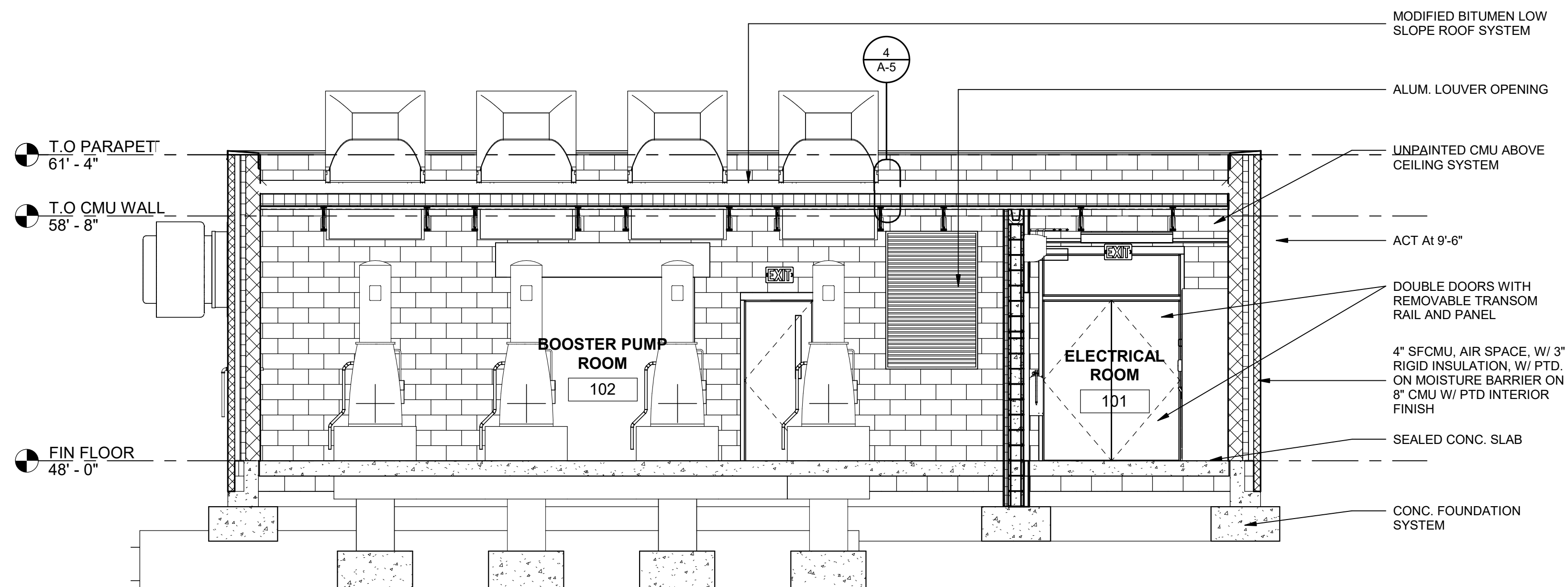
SHEET NO.
22
DWG NO.
A-3
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① BUILDING SECTION 1
1/4" = 1'-0"



② BUILDING SECTION 2
1/4" = 1'-0"



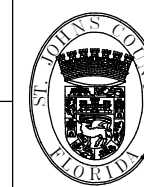
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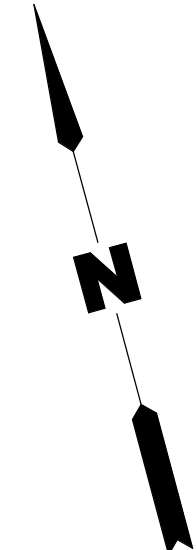
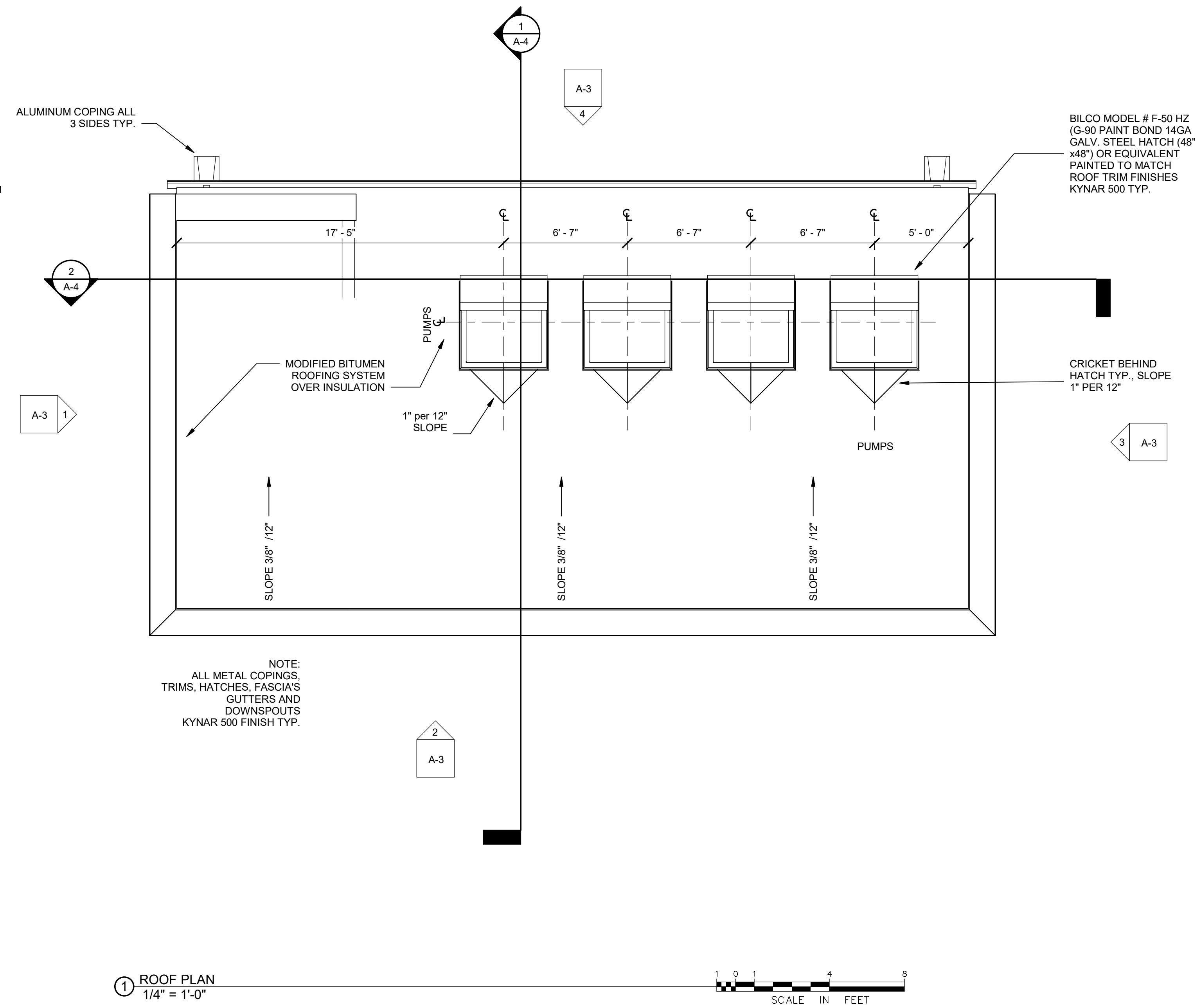
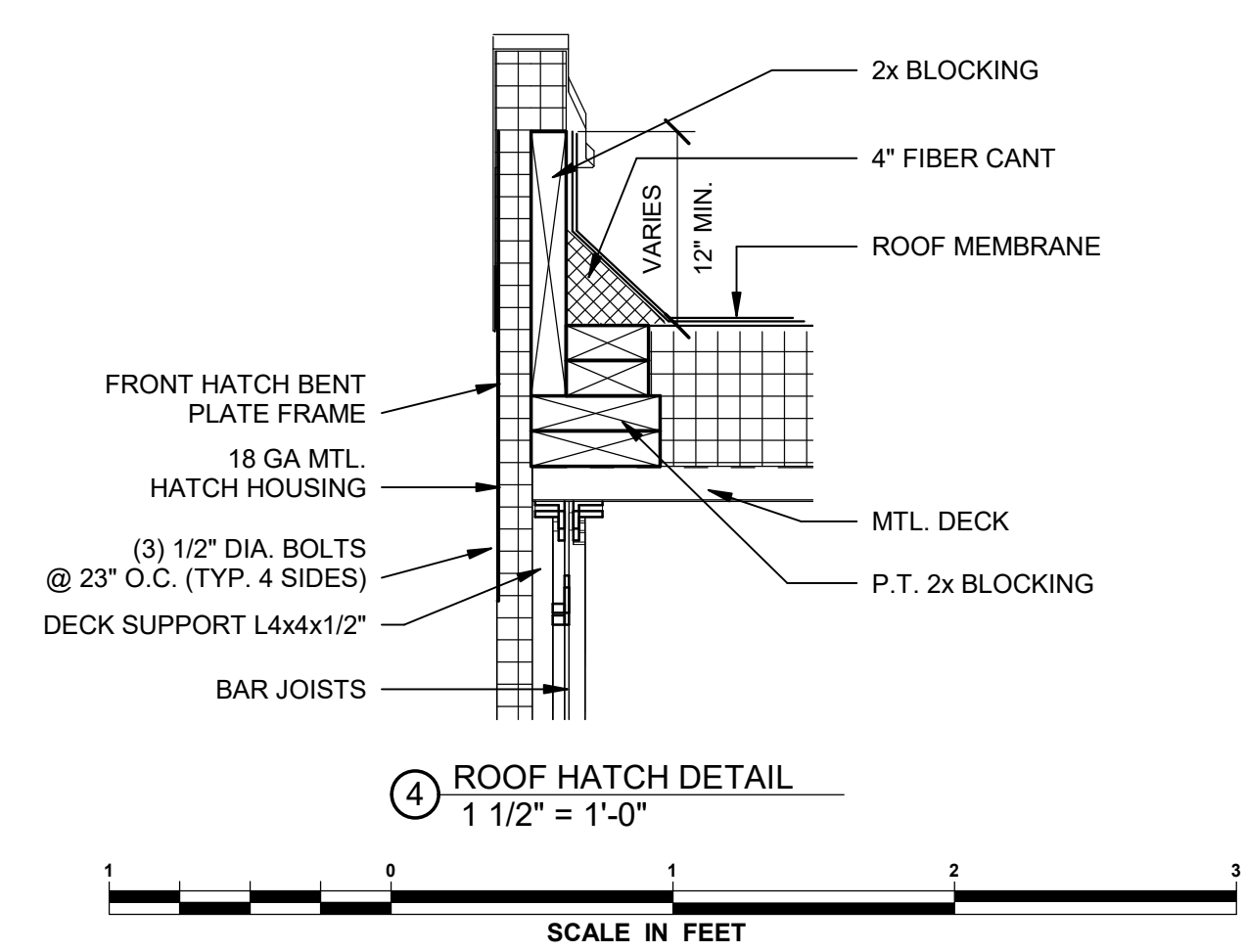
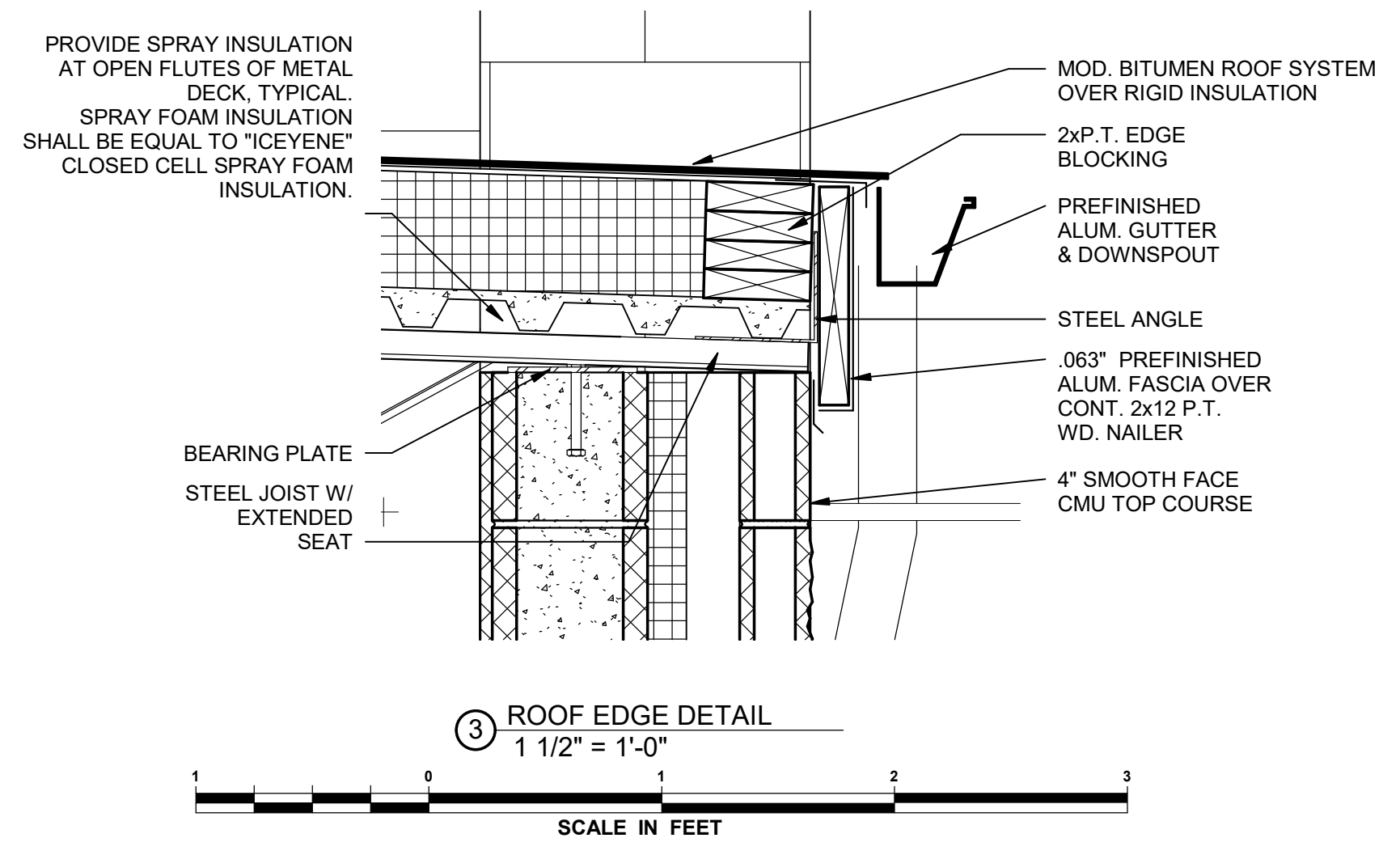
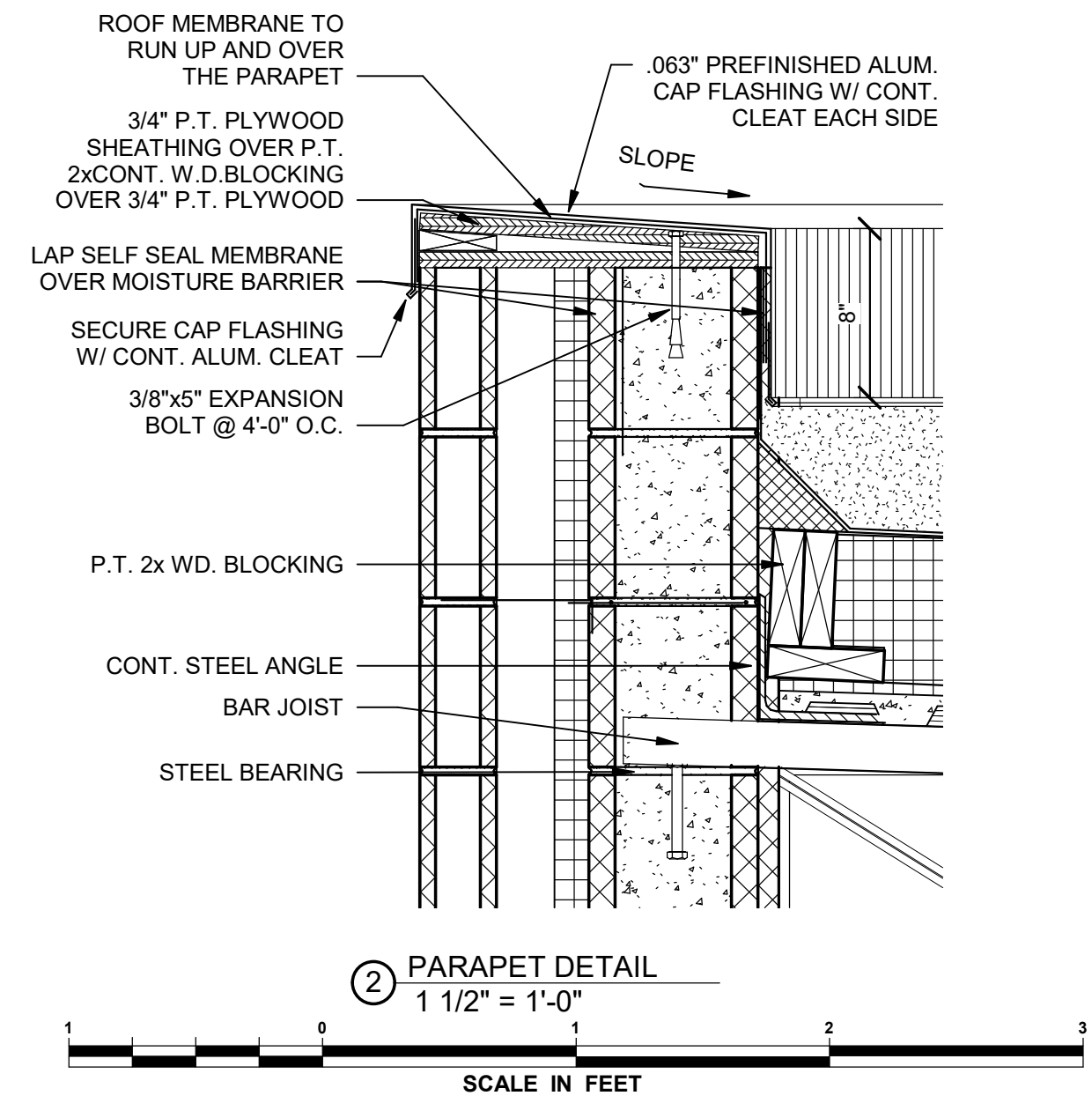
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

BUILDING SECTIONS

SHEET NO.
23
DWG NO.
A-4
ELECTRICAL
BID PACKAGE

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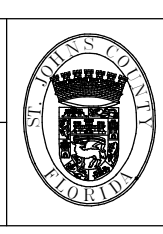
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1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M
MOTT
MACDONALD
Mott MacDonald Florida, LLC

Architects Engineers Surveyors
AA - C0000035 EB - 0000155 LB - 0006783
10245 Centurion Pkwy. N., Suite 320
Jacksonville, Florida 32256
Telephone: (904) 203-1090

DESIGNER: T. Jarman
DRAWN BY: Q. Gable
DATE: OCTOBER 2022
CHECKED BY: Bob Fritz
DATE: OCTOBER 2022

DESIGN ENGINEER
THOMAS A. JARMAN
FLORIDA REGISTRATION NO.
AR0016110

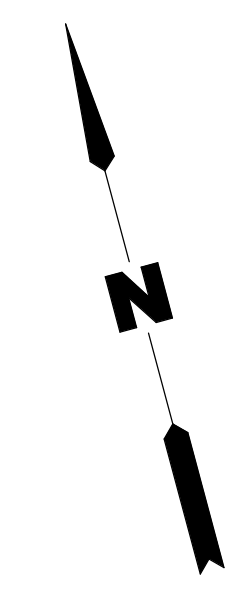


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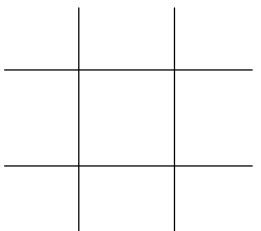
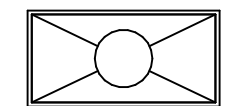



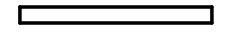
CR-208 GROUND STORAGE TANK
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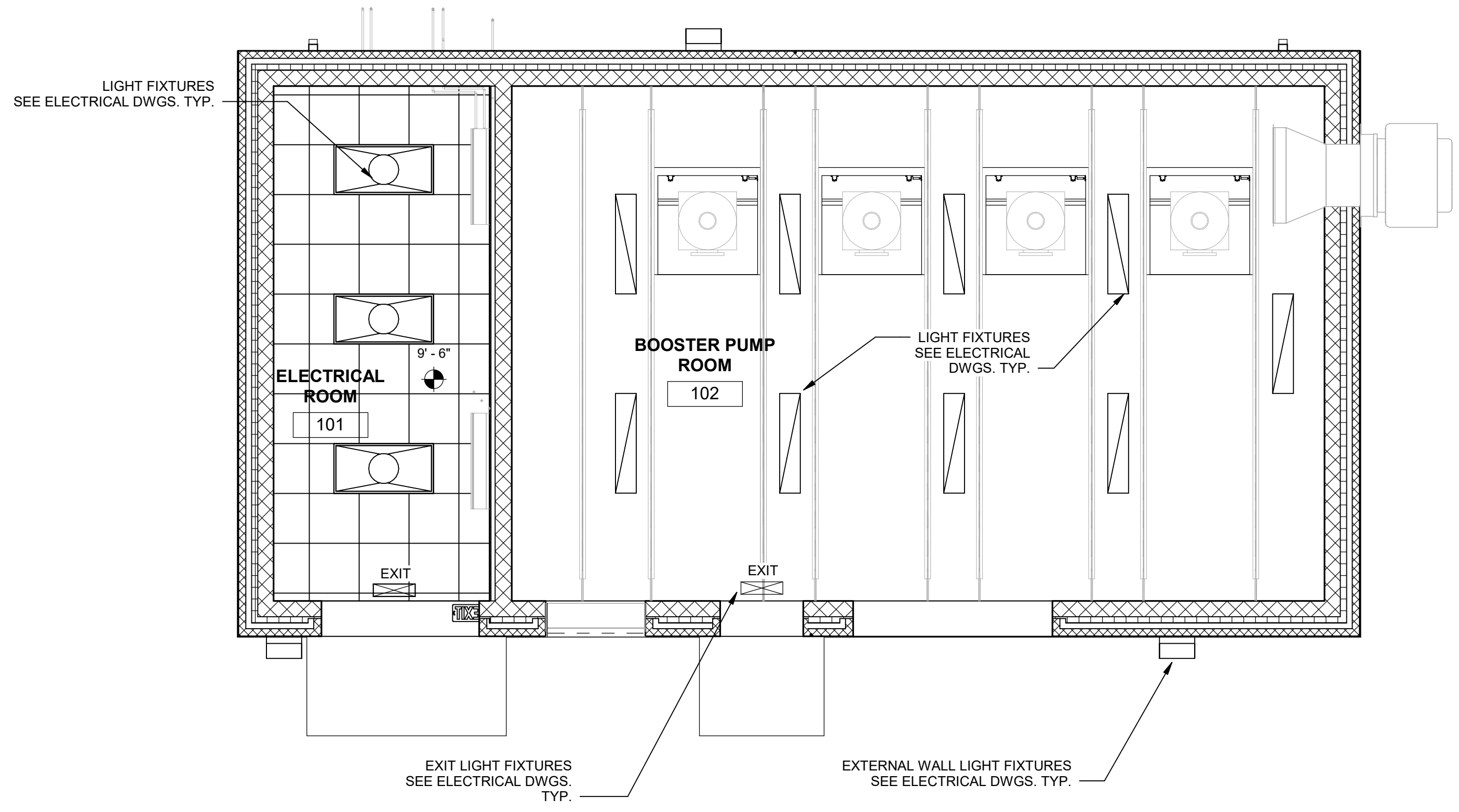
ROOF PLAN

SHEET NO.
24
DWG NO.
A-5
ELECTRICAL
BID PACKAGE



LIGHTING LEGEND

	2x2' SUSPENDED CEILING GRID
	RECESSED 2x4 FLUORESCENT FIXTURE
	SURFACE MOUNTED 1x4 FLUORESCENT FIXTURE
	CEILING HEIGHT SPOT ELEVATION
	ILLUMINATED EXIT SIGN
	HEADER AT DOOR, WINDOW OR CASED OPENING



① FIN FLOOR
1/4" = 1'-0"

1 0 1 4 8
SCALE IN FEET

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M
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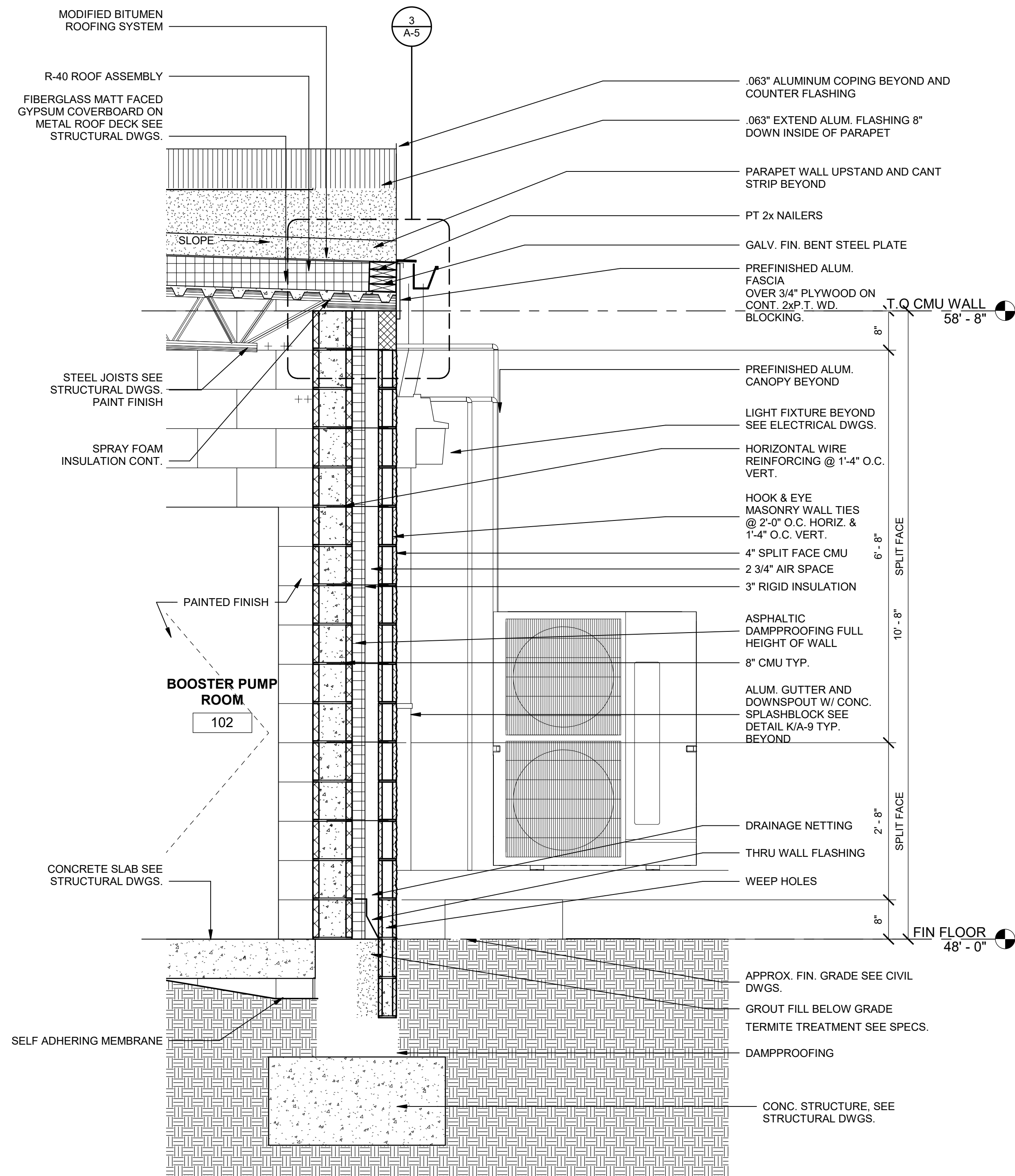


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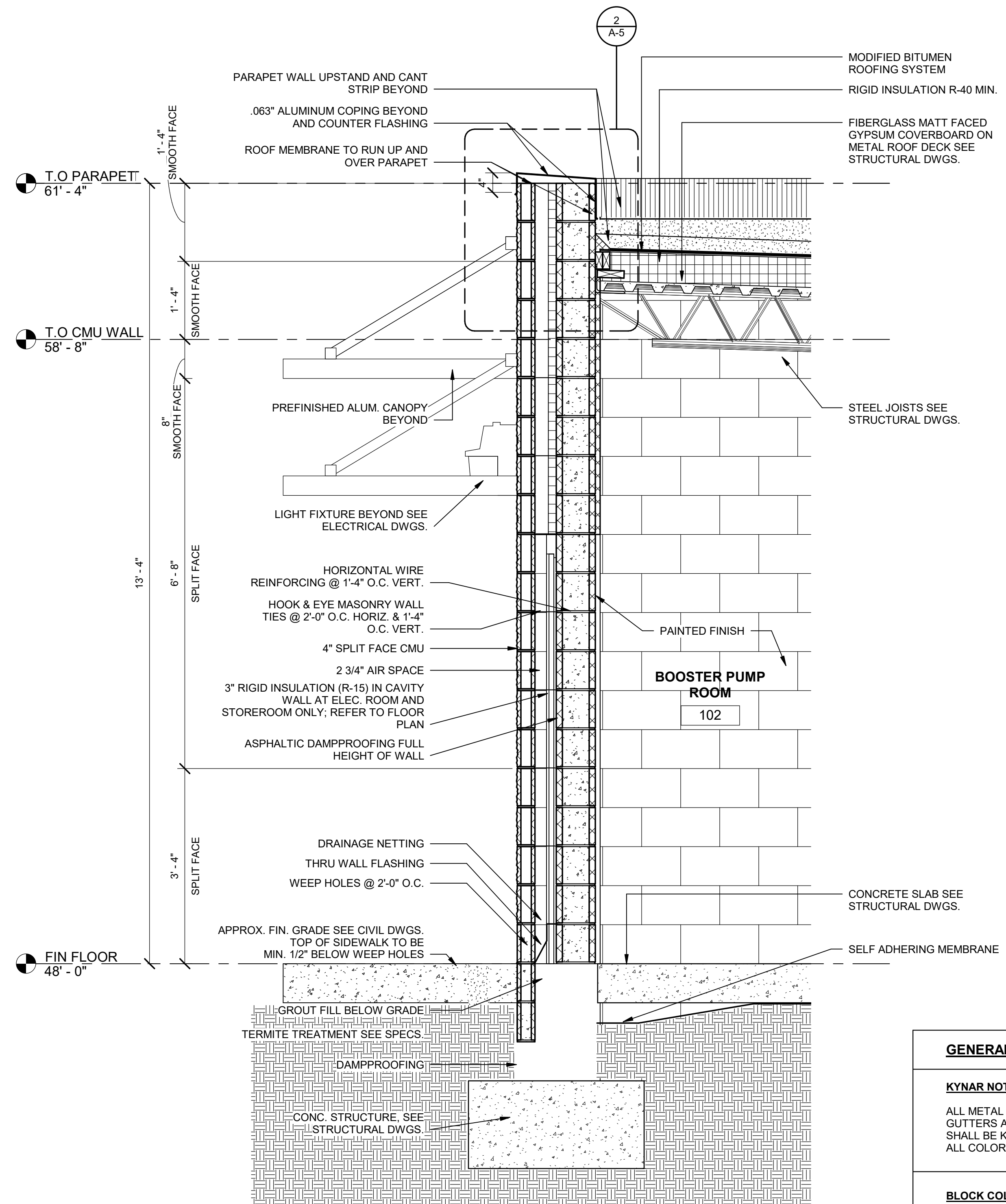
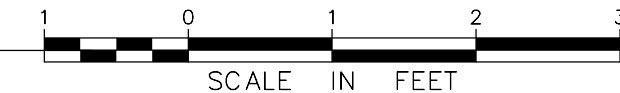
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

REFLECTED CEILING PLAN

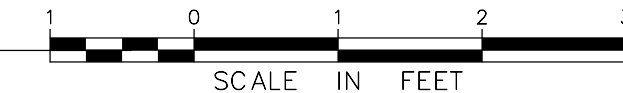
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25
DWG NO.
A-6
ELECTRICAL
BID PACKAGE



1 NORTH WALL SECTION
3/4" = 1'-0"



2 WEST, EAST AND SOUTH WALL SECTION WITH PARAPET
3/4" = 1'-0"



GENERAL NOTES

KYNAR NOTE:

ALL METAL ROOF TRIMS, FASCIA'S, FLASHINGS, GUTTERS AND DOWNSPOUTS, AND CANOPIES SHALL BE KYNAR 500 FINISH TYP. ALL COLORS TO MATCH

BLOCK COLOR NOTE:

FIELD COLOR ARGOS "BISCUIT"
MORTAR COLOR ARGOS "SAVANNAH IVORY"

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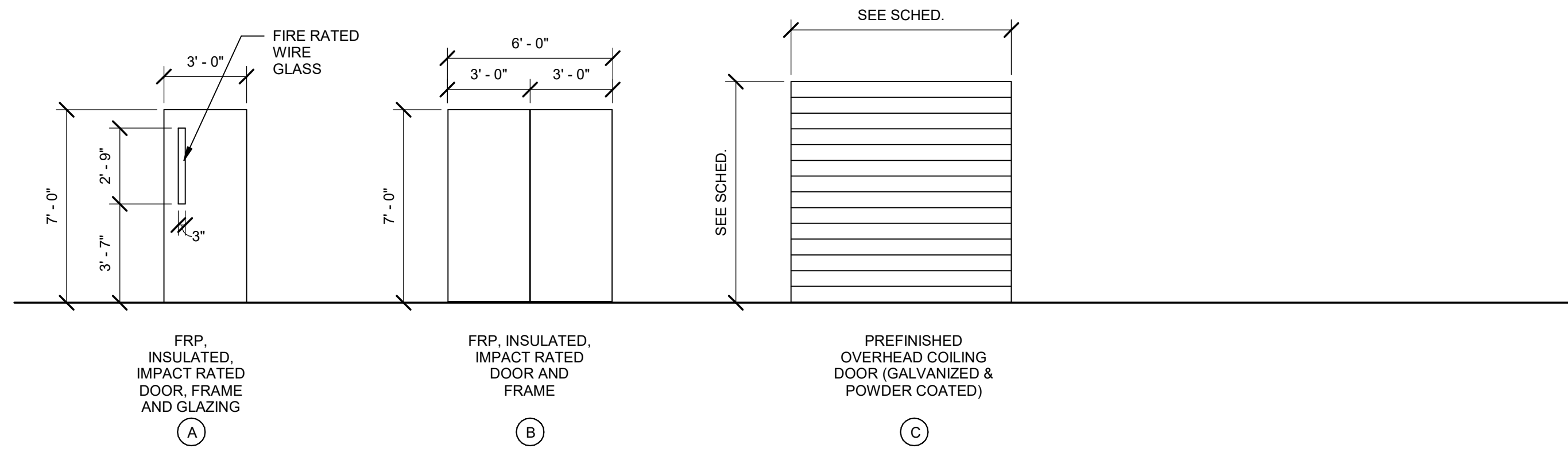


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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

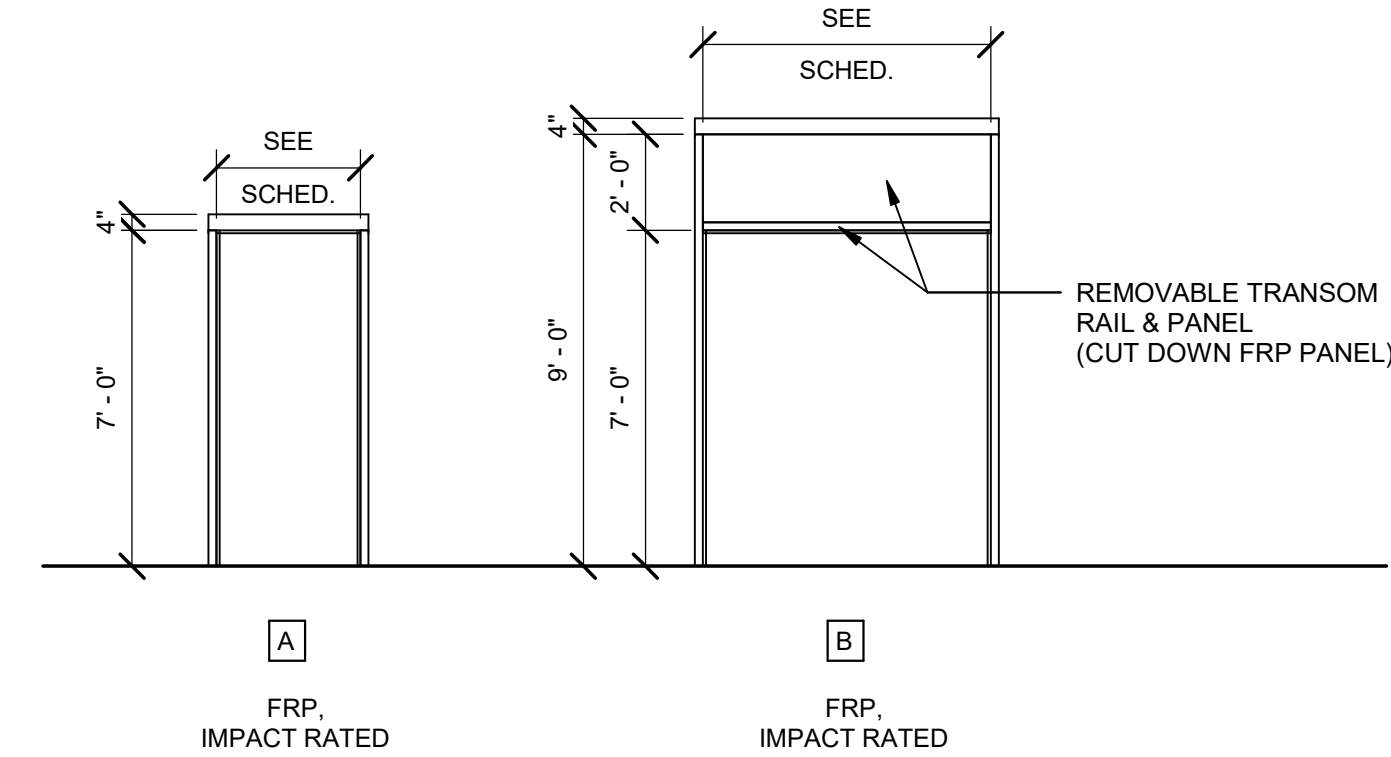
WALL SECTIONS

SHEET NO.
26
DWG NO.
A-7
ELECTRICAL
BID PACKAGE



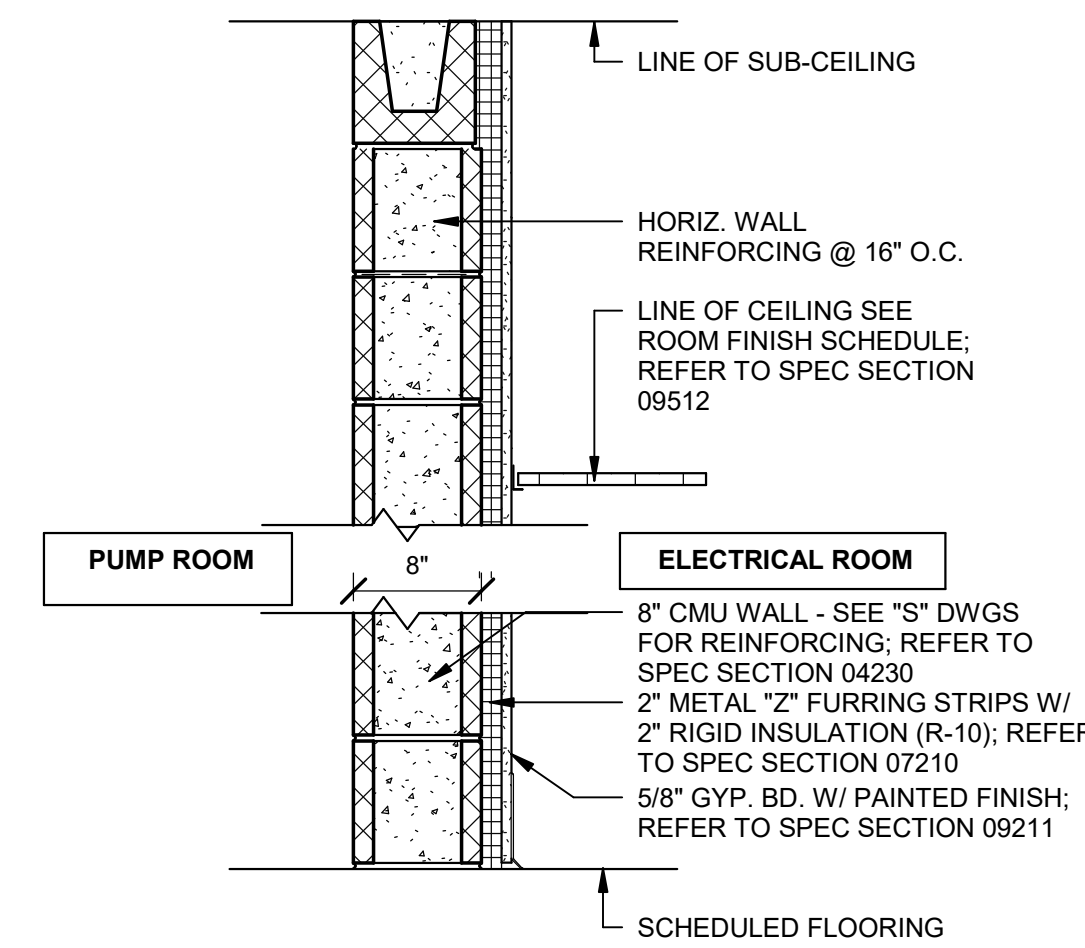
GRAPHIC DOOR TYPE ELEVATION SCHEDULE

SCALE: 1/4" = 1'-0"



GRAPHIC DOOR FRAME ELEVATIONS

SCALE: 1/4" = 1'-0"



INTERIOR PARTITION TYPE NOTES:

1. REFER TO WALL SECTION SHEETS FOR EXTERIOR WALL DETAILS.
2. REFER TO STRUCTURAL DRAWINGS FOR WALL REINFORCING INFORMATION

1 INTERIOR PARTITION TYPE
1" = 1'-0"

SCALE IN FEET

ROOM FINISH SCHEDULE					
NUMBER	NAME	FINISHES			
		FLOOR	BASE	WALL	CEILING
101	ELECTRICAL ROOM	SEALED CONC.	PAINT	PAINT	ACT. 1
102	BOOSTER PUMP ROOM	SEALED CONC.	PAINT	PAINT	PTD. EXPOSED STRUCTURE

DOOR SCHEDULE															
NO.	To Room: Name	DOOR					FRAME			HARDWARE	HEAD	JAMB	THRES.	ROOM	COMMENTS
		SIZE	DR MATERIAL	DR ELEV.	DR FINISH	FRAME ELEV.	FINISH	MATERIAL							
D-101	ELECTRICAL ROOM	6'-0" x 7'-0" x 1 3/4"	FRP	B	MFG.	B	MFG.	FRP	1	A/A-9	B/A-9	H/A-9	101	DOUBLE DOORS WITH REMOVABLE OVERHEAD TRANSOM PANEL.	
D-102A	BOOSTER PUMP ROOM	3'-0" x 7'-0" x 1 3/4"	FRP	A	MFG.	A	MFG.	FRP	2	A/A-9	B/A-9	H/A-9	102		
D-102B	BOOSTER PUMP ROOM	8' W x 8' H	GAL	C	MFG.	-	MFG.	-	3	E/A-9	G/A-9	F/A-9	102	OVERHEAD ROLL-UP DOOR	
D-102C	ELECTRICAL ROOM	3'-0" x 7'-0" x 1 3/4" INTER.	FRP	A	MFG.	A	MFG.	FRP	4	C/A-9	D/A-9	--	101		

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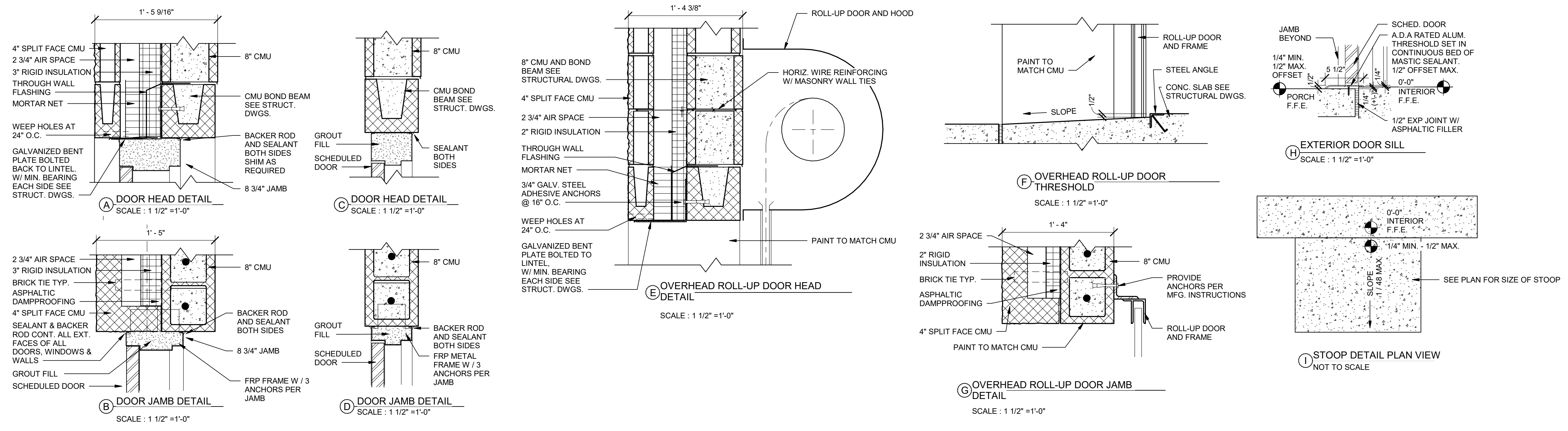


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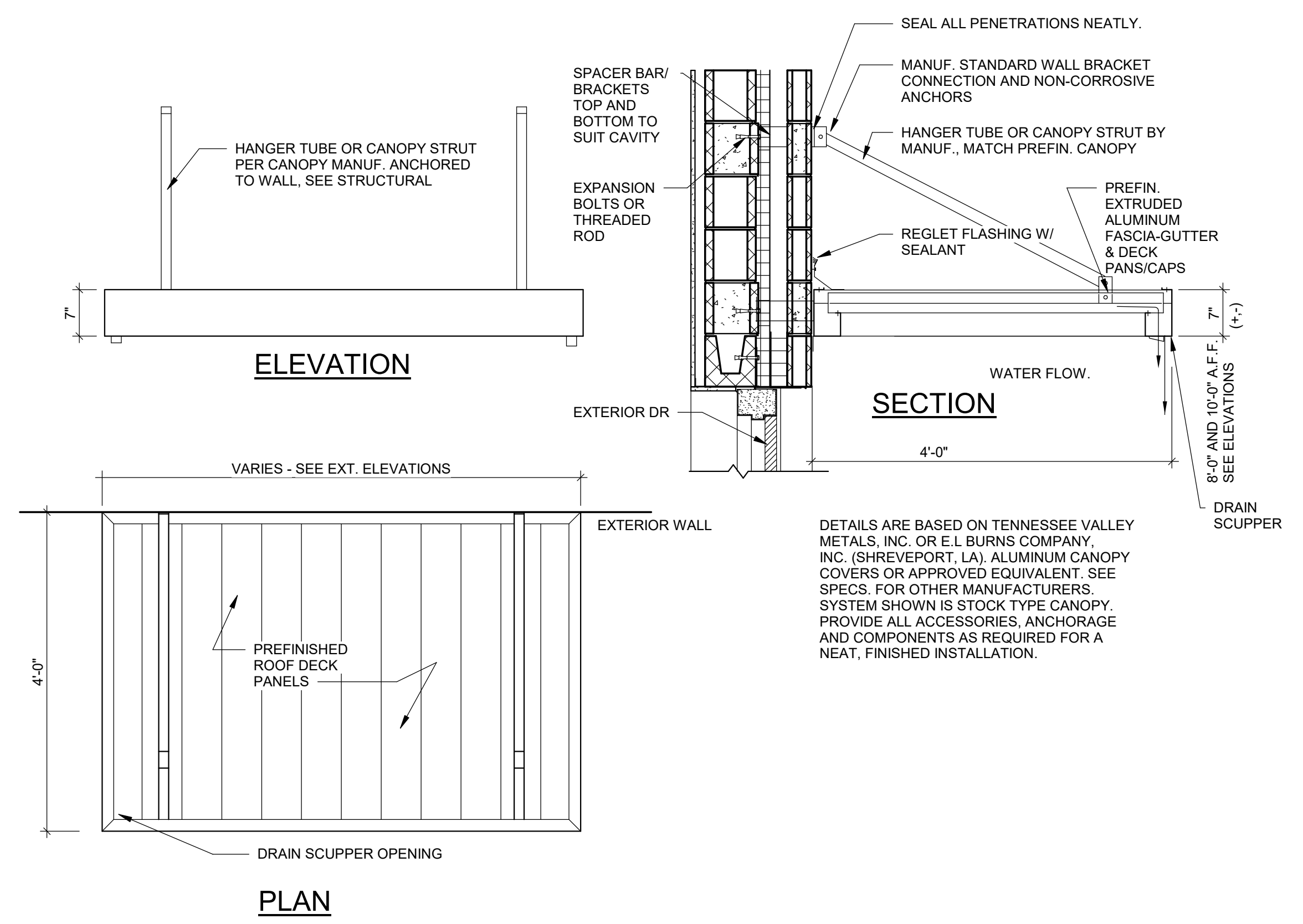
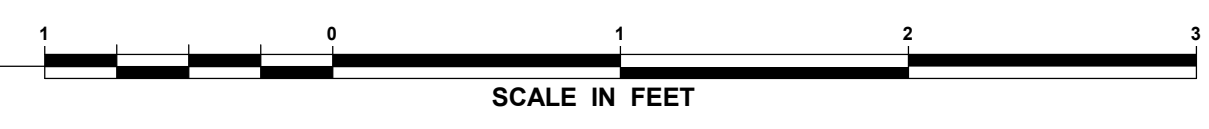
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

DOOR AND WINDOW SCHEDULE AND
DETAILS

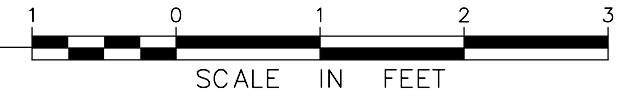
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27
DWG NO.
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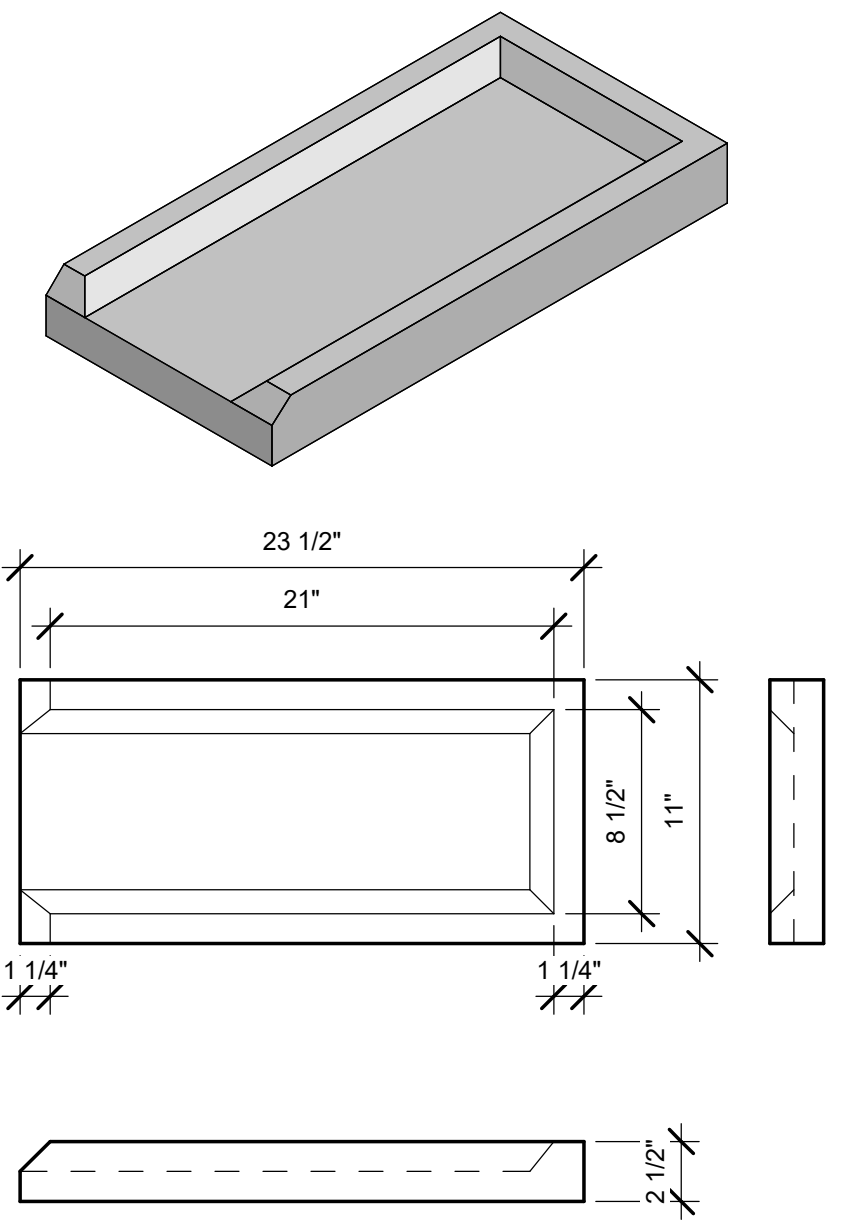
DOOR DETAILS
SCALE: 1 1/2" = 1'-0"



J DOOR CANOPY DETAILS
3/4" = 1'-0"



BASED ON 24" CONC SPLASH BLOCK BY PARKING BUMPER COMPANY NEWTON GROVE NC



K SPLASH BLOCK DETAILS
1 1/2" = 1'-0"



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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

ARCHITECTURAL MISC. DETAILS

SHEET NO.
28
DWG NO.
A.9
ELECTRICAL
BID PACKAGE

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GENERAL

- TO THE BEST OF OUR KNOWLEDGE, THE STRUCTURAL PLANS AND SPECIFICATIONS COMPLY WITH THE APPLICABLE REQUIREMENTS OF THE 7TH EDITION FLORIDA BUILDING CODE (2020).
- THE STRUCTURAL DOCUMENTS ARE TO BE USED IN CONJUNCTION WITH THE ARCHITECTURAL, ELECTRICAL AND MECHANICAL DOCUMENTS. USE THESE NOTES IN CONJUNCTION WITH THE SPECIFICATIONS. IF A CONFLICT EXISTS, THE MORE STRINGENT GOVERNS.
- COMPLY WITH REQUIREMENTS OF THE FLORIDA BUILDING CODE, OSHA, AND ALL OTHER APPLICABLE FEDERAL, STATE AND LOCAL CODES, STANDARDS, REGULATIONS AND LAWS.
- ALL REFERENCED STANDARDS REFER TO THE EDITION IN FORCE AT THE TIME THESE PLANS AND SPECIFICATIONS ARE ISSUED FOR BIDDING.
- REVIEW ALL CONTRACT DOCUMENTS, DIMENSIONS AND SITE CONDITIONS AND COORDINATE WITH FIELD DIMENSIONS AND PROJECT SHOP DRAWINGS PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES IN WRITING TO ARCHITECT/ENGINEER. DO NOT CHANGE SIZE OR DIMENSIONS OF STRUCTURAL MEMBERS WITHOUT WRITTEN INSTRUCTIONS FROM THE STRUCTURAL ENGINEER OF RECORD.
- ANY DISCREPANCIES, OMISSIONS OR VARIATIONS NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS DISCOVERED DURING THE BIDDING PERIOD SHALL BE IMMEDIATELY COMMUNICATED IN WRITING TO THE ARCHITECT / ENGINEER.
- PROTECT EXISTING FACILITIES, STRUCTURES AND UTILITY LINES FROM ALL DAMAGE. EACH CONTRACTOR SHALL PROTECT HIS WORK, ADJACENT PROPERTY AND THE PUBLIC. EACH CONTRACTOR IS SOLELY RESPONSIBLE FOR DAMAGE OR INJURY DUE TO HIS ACT OR NEGLIGENCE.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR JOB SAFETY AND CONSTRUCTION PROCEDURES.
- DO NOT SCALE DRAWINGS; USE DIMENSIONS.
- REFER TO ARCHITECTURAL, ELECTRICAL AND HVAC/PLUMBING DRAWINGS FOR SIZE AND LOCATION OF OPENINGS IN STRUCTURE NOT SHOWN ON STRUCTURAL DRAWINGS.
- DETAILS LABELED "TYPICAL DETAILS" OR "TYP" ON THE DRAWINGS APPLY TO ALL SITUATIONS THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. SUCH DETAILS APPLY WHETHER OR NOT THEY ARE KEYED IN AT EACH LOCATION. QUESTIONS REGARDING APPLICABILITY OF TYPICAL DETAILS SHALL BE RESOLVED BY THE ARCHITECT / ENGINEER.
- BUILDING DESIGN LOADS AND CRITERIA:

A. MINIMUM FLOOR LIVE LOADS	
- GROUND FLOOR	300 PSF
B. ROOF	
-LIVE LOAD	
BOOSTER PUMP STATION (BPS)	20 PSF
-WIND UPLIFT	REFER TO UPLIFT PLAN
C. WIND CRITERIA (FBC),	
REFER TO GENERAL NOTE 13, BELOW	
-BASIC WIND SPEED	142 MPH
-EXPOSURE	C
-RISK CATEGORY	III
-ENCLOSURE CLASSIFICATION	ENCLOSED*
*TO ACHIEVE ENCLOSED CLASSIFICATION, ALL GLAZED OPENINGS SHALL BE IMPACT RESISTEANT. ALL GLAZED OPENINGS WITHIN 30 FEET OF GRADE SHALL MEET THE REQUIREMENTS OF LARGE MISSILE TEST OF ASTM E1996. ALL GLAZED OPENINGS LOCATED MORE THAN 30 FEET ABOVE GRADE SHALL MEET THE PROVISIONS OF THE SMALL MISSILE TEST OF ASTM E1996. ALL SECTIONAL DOORS, ROLLING DOORS, AND FLEXIBLE DOORS SHALL MEET THE REQUIREMENTS OF ANSIDASMA 115. ALL LOUVERS LOCATED WITHIN 30 FEET OF GRADE SHALL MEET THE REQUIREMENTS OF AMCA 540.	
D. STEEL BAR JOISTS LOADS:	
-MAX BOTTOM CHORD DL	15 PSF
-MAX TOP CHORD DL	15 PSF
-TOP CHORD LL	20 PSF
-MIN BOTTOM CHORD DL:	3 PSF
-MIN TOP CHORD DL:	6 PSF
-SEE ROOF PLAN FOR ADDITIONAL LOADS	
E. SEISMIC CRITERIA	
-IMPORTANCE FACTOR:	1.25
-SPECTRAL RESPONSE ACCELERATIONS (Ss, S1):	0.09, 0.047
-SITE CLASS:	D
-SPECTRAL RESPONSE COEFFICIENTS (Sds, Sd1):	0.096, 0.075
-SEISMIC DESIGN CATEGORY:	B
-SEISMIC - FORCE - RESISTING SYSTEM:	ORDINARY REINF CMU SHEAR WALLS
RESPONSE MODIFICATION FACTOR, R:	2.4
-SEISMIC RESPONSE COEFFICIENT:	
BOOSTER PUMP STATION (BPS) (Cs)	0.05
-ANALYSIS PROCEDURE:	EQUIVALENT LATERAL FORCE
- ALL WIND FORCES SHALL BE DETERMINED ACCORDING TO THE PROVISIONS OF THE FBC USING THE MINIMUM WIND CRITERIA STATED IN NOTE 12. ABOVE. INCLUDE ALL APPROPRIATE SHAPE, HEIGHT, AND GUST FACTORS FOR THE MAIN WIND FORCE RESISTING SYSTEM AND COMPONENTS AND CLADDING. TO CALCULATE THE MAXIMUM NET UPLIFT, USE 60% OF THE SUPERIMPOSED DEAD LOADS.
- CONTRACTOR SHALL PROVIDE ALL CODE REQUIRED PRODUCT APPROVAL NUMBERS TO THE GOVERNING BUILDING AGENCY. REFER TO WIND UPLIFT DIAGRAM & WIND LOADING CRITERIA FOR REQUIRED WIND LOADS. SIGNED & SEALED CALCULATIONS SHALL BE SUBMITTED FOR ALL PRODUCTS AS REQUIRED BY THE PRODUCT APPROVAL DOCUMENTATION.
- "REF" IS THE ABBREVIATION FOR REFERENCE. WHEN PLACED NEXT TO A DIMENSION OR ELEVATION IT INDICATES THAT THE DIMENSION OR ELEVATION HAS BEEN DETERMINED FROM OTHER SOURCES SUCH AS EXISTING DRAWINGS. THE CORRECTNESS OF REFERENCE DATA IS NOT VERIFIED. THE CONTRACTOR SHALL VERIFY THE CORRECTNESS OF ALL REFERENCED DATA INDEPENDENTLY.

SHOP DRAWING REQUIRING ENGINEERING INPUT BY SPECIALTY ENGINEER

- SPECIALTY ENGINEER:
 - DEFINITION - A FLORIDA REGISTERED PROFESSIONAL ENGINEER WHO SPECIALIZES IN AND WHO UNDERTAKES THE DESIGN OF STRUCTURAL COMPONENTS OR STRUCTURAL SYSTEMS INCLUDED IN A SPECIFIC SUBMITTAL PREPARED FOR THIS PROJECT.
 - SHALL BE:
 - AN EMPLOYEE OR OFFICER OF A FABRICATOR.
 - AN EMPLOYEE OR OFFICER OF AN ENTITY SUPPLYING COMPONENTS TO A FABRICATOR.
 - AN INDEPENDENT CONSULTANT RETAINED BY THE FABRICATOR OR HIS SUPPLIER.
- THE FOLLOWING SYSTEMS AND COMPONENTS AS A MINIMUM REQUIRE FABRICATION AND ERECTION DRAWINGS WITH INPUT BY A SPECIALTY ENGINEER, BUT ARE NOT LIMITED TO: JOISTS, WINDOWS, ROOF SYSTEMS, GLAZED OPENINGS, LOUVERS, DOORS AND ANY EXTERIOR ANCILLARY STRUCTURES.
- THE SPECIALTY ENGINEER OR MANUFACTURER SHALL DESIGN, PROVIDE, AND INSTALL THEIR COMPONENTS AND THE COMPONENT CONNECTIONS TO THE PRIMARY STRUCTURE PER THE WIND CRITERIA STATED IN THESE NOTES OR THE CURRENT GOVERNING BUILDING CODES, WHICHEVER IS MORE STRINGENT.
- SUBMITTALS SHALL CLEARLY IDENTIFY THE SPECIFIC PROJECT AND APPLICABLE CODES. LIST THE DESIGN CRITERIA, AND SHOW ALL DETAILS AND PLANS NECESSARY FOR PROPER FABRICATION AND INSTALLATION. CALCULATIONS AND SHOP DRAWINGS SHALL IDENTIFY SPECIFIC PRODUCT UTILIZED. GENERIC PRODUCTS WILL NOT BE ACCEPTED.
- SHOP DRAWINGS AND CALCULATIONS MUST BE PREPARED UNDER THE DIRECT SUPERVISION AND CONTROL OF THE SPECIALTY ENGINEER.
- CATALOG INFORMATION ON STANDARD PRODUCTS DOES NOT REQUIRE THE SEAL OF A SPECIALTY ENGINEER.
- REVIEW OF THE SUBMITTAL BY THE STRUCTURAL ENGINEER OF RECORD OF IS LIMITED TO VERIFYING THE FOLLOWING:
 - THAT THE SPECIFIED STRUCTURAL SUBMITTALS HAVE BEEN FURNISHED.
 - THAT THE STRUCTURAL SUBMITTALS HAVE BEEN SIGNED AND SEALED BY THE SPECIALTY ENGINEER.
 - THAT THE SPECIALTY ENGINEER HAS UNDERSTOOD THE DESIGN INTENT AND HAS USED THE SPECIFIED STRUCTURAL CRITERIA. (NO DETAILED CHECK OF CALCULATIONS WILL BE MADE.)
 - THAT THE CONFIGURATION SET FORTH IN THE STRUCTURAL SUBMITTALS IS CONSISTENT WITH THE CONTRACT DOCUMENTS. (NO DETAILED CHECK OF DIMENSIONS OR QUANTITIES WILL BE MADE.)
- SUBMITTALS NOT MEETING THE ABOVE CRITERIA WILL NOT BE REVIEWED AND WILL BE RETURNED TO CONTRACTOR MARKED REVISE AND RESUBMIT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DELAYS WHICH MAY RESULT.

SOIL PREPARATION AND COMPACTION

- THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER OF RECORD SHALL BE FOLLOWED. GEOTECHNICAL ENGINEER OF RECORD REPORT: MESKEL & ASSOCIATES ENGINEERING (MAE) PROJECT NO. 0103-0026, DATED 07/15, 2022.
- SOIL COMPACTION SHALL BE FIELD CONTROLLED BY A SOILS ENGINEER OR TESTING LABORATORY.
- EXCAVATE EXISTING SOIL TO BOTTOM OF FOOTINGS. ALL DELETERIOUS MATERIAL MUST BE COMPLETELY REMOVED.
- ALL EXISTING UTILITIES & ORGANICS (INCLUDING STUMPS AND ROOTS) SHALL BE COMPLETELY REMOVED PRIOR TO FILL OPERATIONS.
- SOIL COMPACTION, FILL, AND ITS REPLACEMENT SHALL BE FIELD CONTROLLED BY THE TESTING AGENCY OR GEOTECHNICAL ENGINEER OF RECORD. THE TESTING AGENCY SHALL RANDOMLY SELECT ALL TEST LOCATIONS.
- THE CONTRACTOR SHALL DETERMINE WHETHER DE-WATERING WILL BE REQUIRED BASED ON ACTUAL GROUND WATER CONDITIONS AT THE TIME OF CONSTRUCTION.

SHALLOW FOUNDATIONS

- THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER OF RECORD SHALL BE FOLLOWED. GEOTECHNICAL ENGINEER OF RECORD REPORT: MESKEL & ASSOCIATES ENGINEERING (MAE) PROJECT NO. 0103-0026, DATED JULY 15, 2022.
- DO NOT EXCAVATE FOR ANY PURPOSE WITHIN ONE FOOT OF THE ANGLE OF REPOSE OF ANY SOIL BEARING FOOTING OR FOUNDATION UNLESS SUCH FOOTING OR FOUNDATION IS FIRST PROPERLY PROTECTED AGAINST SETTLEMENT.
- CENTER FOOTINGS UNDER THE SUPPORTED COLUMNS OR WALLS UNLESS OTHERWISE NOTED ON PLANS.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL EXCAVATION PROCEDURES INCLUDING LAGGING, SHORING, AND PROTECTION OF ADJACENT PROPERTY, STRUCTURES, STREETS AND UTILITIES IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL BUILDING DEPARTMENT.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DISPOSAL OF ACCUMULATED WATER FROM EXCAVATION AND DEWATERING OPERATIONS IN SUCH A WAY AS NOT TO CAUSE INCONVENIENCE TO THE WORK AND DAMAGE TO THE STRUCTURAL ELEMENTS. THE CONTRACTOR SHALL FIELD VERIFY GROUND WATER DEPTHS PRIOR TO CONSTRUCTION.
- THE MAXIMUM NET ALLOWABLE SOIL BEARING PRESSURE FOR THE BOOSTER PUMP STATION SHALL BE 2,500 PSI AND THE MAXIMUM NET ALLOWABLE SOIL BEARING PRESSURE FOR THE GROUND STORAGE TANK SHALL BE 2,000 PSI.

SLABS ON GRADE

- PREPARE SUBGRADE AS PER THE RECOMMENDATION OUTLINED IN THE GEOTECHNICAL REPORT INCLUDED IN THE SPECIFICATIONS.
- CHAIR WIRE FABRIC DURING CONCRETE PLACEMENT TO INSURE PROPER POSITION IN SLAB.
- USE 20 MIL. POLYETHYLENE SHEETING BETWEEN SOIL AND CONCRETE SLAB, UNLESS OTHERWISE NOTED. REFER TO 07265 FOR SHEETING REQUIREMENTS.
- PLACE CRACK CONTROL JOINTS AS INDICATED IN THE STANDARD DETAILS IN ALL FLOATING SLABS ON GRADE. DO NOT EXCEED A 2 TO 1 WIDTH TO LENGTH RATIO. CONTRACTOR SHALL SUBMIT A CONTROL JOINT LAYOUT FOR ENGINEER'S REVIEW UPON REQUEST.

REINFORCED CONCRETE

- USE STRUCTURAL CONCRETE AND CONCRETING PRACTICES CONFORMING TO ACI-316 AND 301 AND PROPORTION CONCRETE IN ACCORDANCE WITH ACI-318 CH. 4 AND MEETING A MIN. ULTIMATE COMPRESSIVE STRENGTH IN 28 DAYS AS FOLLOWS:

<u>BOOSTER PUMP STATION:</u>	
-FOOTINGS:	4000 PSI
-SLABS:	4000 PSI
-CMU FILL:	3000 PSI
-ALL OTHER CONCRETE:	4000 PSI

* PROVIDE CURRENT (MAXIMUM 1 YEAR OLD) STATISTICAL DATA FOR EACH CONCRETE MIX DESIGN SUBMITTED.
 - WHERE CONCENTRATION OF REINFORCING STEEL HINDERS PROPER CONSOLIDATION OF CONCRETE, USE CONCRETE CONTAINING A SUPERPLASTICIZER (N.R.W.R.) ADMIXTURE, ASTM C494 TYPE F. SLUMP AFTER ADDITION OF SUPERPLASTICIZER SHALL BE 7" ±1".
 - IF CONCRETE IS PUMPED, SLUMP MAY BE INCREASED TO 6" AT THE TRUCK. USE A MINIMUM 4-INCH PUMP, UNLESS PRE-APPROVED BY ENGINEER. TAKE CONCRETE SAMPLES FOR SLUMP AT TRUCK AND AT DISCHARGE END. TAKE CONCRETE SAMPLES FOR CYLINDER TESTING AT DISCHARGE END OF THE PUMP HOSE.
 - PROVIDE CONSTRUCTION JOINTS IN ACCORDANCE WITH ACI 318 CH. 6.4 AND SUBMIT SHOP DRAWINGS SHOWING LOCATIONS AND DIRECTION OF CONCRETE JOINTS FOR STRUCTURAL ENGINEER'S REVIEW. PROVIDE KEYWAYS AND ADEQUATE DOWELS IN ALL CONSTRUCTION JOINTS.
 - PROVIDE REINFORCING STEEL ERECTOR WITH A SET OF STRUCTURAL PLANS FOR FIELD USE. INSPECT REINFORCING STEEL PLACING FROM STRUCTURAL PLANS.
 - USE ASTM A-615 GR. 60 FOR ALL REINFORCING STEEL, CONFORM TO ACI-301, ACI-315, ACI-318, AND CRSI "MANUAL OF STANDARD PRACTICE". ALL REINFORCING SHALL BE ACCURATELY PLACED, RIGIDLY SUPPORTED AND FIRMLY TIED IN PLACE WITH BAR SUPPORTS AND SPACERS IN ACCORDANCE WITH THE ABOVE REQUIREMENTS. PROVIDE CLASS "B" LAP SPLICE FOR CONTINUOUS BARS, UNLESS OTHERWISE NOTED. LAP BOTTOM STEEL OVER SUPPORTS AND TOP STEEL AT MID SPAN UNLESS OTHERWISE SPECIFIED. HOOK DISCONTINUOUS ENDS OF ALL TOP BARS AND ALL BARS IN WALLS, UNLESS OTHERWISE NOTED.
 - PLACE REINFORCING STEEL SUCH THAT BARS ADJACENT TO CONCRETE SURFACES & COLD JOINTS MEET MIN CLEAR COVER REQUIREMENTS, BUT DO NOT EXCEED THOSE REQUIREMENTS. USE THE FOLLOWING MINIMUM CLEAR COVER OVER REINFORCING:

	BOTTOM	TOP	SIDES
FOOTINGS & PIPE ENCASEMENTS	3"	3"	3"
INTERIOR SLABS ON GRADE	2"	1 1/2"	2"
EXTERIOR SLABS ON GRADE	3"	2"	2"
PUMP FOUNDATION	3"	1 1/2"	2"
 - HORIZONTAL BARS SHALL BE MADE CONTINUOUS WITH HOOKS AROUND CORNERS.
 - USE PLAIN, COLD-DRAWN ELECTRICALLY-WELDED STEEL WIRE FABRIC CONFORMING TO ASTM A185. SUPPLY IN FLAT SHEETS ONLY. LAP SPLICES SHALL BE MEASURED BETWEEN OUTERMOST CROSS WIRES OF EACH FABRIC SHEET AND SHALL BE NOT LESS THAN TWICE THE SPACING OF THE CROSS WIRES PLUS TWO (2) INCHES.
 - SLEEVE ALL PIPES THROUGH SLABS INDIVIDUALLY, UNLESS APPROVED BY ENGINEER.
 - SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATING REINFORCING STEEL. DO NOT REPRODUCE THE STRUCTURAL DRAWINGS FOR USE AS SHOP DRAWINGS.
 - PROVIDE CLASS "B" LAP SPLICE AT SUPPORTS AND HOOK DISCONTINUOUS ENDS AT THE FAR FACE OF SUPPORTS FOR ALL BEAMS UNLESS OTHERWISE NOTED.
 - REINFORCING PLACED IN LOCATIONS WHERE PROPER COVER CANNOT BE ACHIEVED SHALL BE HOT DIPPED GALVANIZED ACCORDING TO ASTM A767 WITH 2 OUNCES OF ZINC COATING PER SQUARE FOOT OF SURFACE AREA MINIMUM.
 - ALL EXPOSED CONCRETE AND GROUT EDGES SHALL HAVE 3/4", 45° CHAMFER, UNLESS OTHERWISE NOTED.
- ANCHORS AND REINFORCING STEEL
- SUBSTITUTION OF ANCHORS SPECIFIED BELOW FOR CAST-IN-PLACE EMBEDDED ANCHORS SHALL BE PROHIBITED WITHOUT PRIOR WRITTEN APPROVAL FROM THE ENGINEER OF RECORD.
 - ANCHORS FOR PUMP BASES SHALL BE CAST IN PLACE.
 - ALLOWABLE WORKING LOADS SHALL NOT EXCEED MANUFACTURER'S RECOMMENDATIONS, BUT NOT MORE THAN ACCEPTED BY APPROVING AGENCY. NO INCREASE FOR WIND OR SEISMIC LOADS IS PERMITTED.
 - PROVIDE A MINIMUM OF TWO FASTENERS PER CONNECTION.
 - INSTALL AND MAINTAIN A MINIMUM EMBEDMENT IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS, OR AS SPECIFIED ON DRAWING, WHICHEVER IS GREATER, BUT WITH AN EMBEDMENT OF NOT LESS THAN 6 BOLT-DIAMETERS.
 - UNLESS NOTED, ANCHOR SPACING AND ANCHOR EDGE DISTANCE SHALL BE ACCORDING TO THE MANUFACTURER'S MOST CURRENT PUBLICATION IN ORDER TO DEVELOP MAXIMUM WORKING LOADS.
 - DO NOT EXCEED MANUFACTURER'S MAXIMUM RECOMMENDED TIGHTENING TORQUE.
 - ALL ANCHORS SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS AND UNDER MANUFACTURER CERTIFIED SUPERVISION IN ORDER TO DEVELOP THE MOST CURRENT PUBLISHED WORKING LOADS.
 - EXPANSION ANCHORS: USE STAINLESS STEEL WEDGE-TYPE EXPANSION ANCHORS SUCH AS HILTI KWIK BOLT III OR ENGINEERED APPROVED EQUIVALENT.
 - ADHESIVE ANCHORING SYSTEMS:
 - USE STAINLESS STEEL THREADED RODS OR BOLTS FOR ADHESIVE ANCHORING SYSTEM.
 - USE AN EPOXY OR POLYESTER RESIN ADHESIVE SUCH AS HILTI RE 500, SIMPSON SET OR ACCEPTED ALTERNATE.
 - DIAMETER OF HOLE SHALL BE AS RECOMMENDED BY MANUFACTURER FOR THE PARTICULAR PRODUCT SPECIFIED IN THE DRAWINGS.
 - ALL EPOXIED ANCHORING SHALL BE OBSERVED BY A MANUFACTURER'S AUTHORIZED REPRESENTATIVE OR SHALL BE TESTED AFTER INSTALLATION AT CONTRACTOR'S EXPENSE. A MINIMUM OF 10% OF EACH DAY'S APPLICATIONS AND NO LESS THAN 2 SHALL BE TESTED BY APPLYING A TENSION LOAD OF 3000 POUNDS TO THE EMBEDDED ANCHOR. IF A TEST APPLICATION FAILS, ALL APPLICATIONS FOR THAT DAY SHALL BE TESTED. TESTING PROCEDURES AND RESULTS SHALL BE SUBMITTED TO APPROVED BY ENGINEER.
 - POWDER ACTUATED FASTENERS: USE GALVANIZED OR STAINLESS STEEL POWDER ACTUATED FASTENING SYSTEMS SUCH AS HILTI, RED HEAD, RAMSET, OR AN ACCEPTED ALTERNATE HAVING ICBO, OR SBCCI APPROVAL. INSTALL IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS, BUT NOT LESS THAN 1 1/8" INCHES IN CONCRETE, UNLESS OTHERWISE NOTED.

METAL DECK

- USE VULCRAFT OR ENGINEER APPROVED EQUIVALENT GALVANIZED STEEL DECK UNITS FORMED OF GAGE STEEL SHEETS AS SPECIFIED ON THE DRAWINGS AND CONFORMING TO THE SPECIFICATIONS UNLESS OTHERWISE NOTED.
 - STEEL DECK SHALL SPAN A MINIMUM OF THREE (3) SPANS.
 - DECK SHALL BE PLACED AT THE PERIMETER WITH COMPLETE RIB BEARING ON THE SUPPORTS PROVIDED.
 - ALL ROOF DECK FASTENERS SHALL BE MINIMUM BUILDEX TRAXX 5/16" HEX WASHER HEAD (HWH) OR EQUIVALENT. REFER TO PLAN FOR FASTENER SIZE.
 - CONNECT DECK TO THE PRIMARY STRUCTURE AS SPECIFIED ON THE DRAWINGS.
 - CEILING, DUCTS, AND LIGHT FIXTURES MAY BE HUNG FROM THE DECK. DO NOT HANG ANY OTHER ITEMS FROM THE ROOF DECK. NO SINGLE CONNECTION LOAD SHALL EXCEED 60 POUNDS AND NO UNIFORM LOAD SHALL EXCEED 10 PSF.
 - METAL DECK CLOSURE, EDGE, OR TRANSITION PLATES SHALL BE PROVIDED AT ALL OPENINGS, EDGES, CHANGES IN DECK SLOPES, AND CHANGES IN DECK DIRECTION.
 - METAL DECK AND ATTACHED PLATES SHALL BE GALVANIZED WITH A MINIMUM G-90 ZINC FINISH, 0.9 OUNCE/SF.
 - USE A GALVANIZED METAL DECK WITH A MINIMUM YIELD STRENGTH OF 80,000 PSI.
- SEALANTS
- HORIZONTAL JOINT SEALANT SHALL BE A TRAFFIC BEARING, TWO COMPONENT, POLYURETHANE BASED, SELF LEVELING ELASTOMERIC SEALANT SUCH AS SIKAFLEX-2C SL OR APPROVED EQUIVALENT. SEALANT SHALL BE GRAY IN COLOR TO MATCH TOPPING UNLESS OTHERWISE NOTED.
 - VERTICAL JOINT SEALANT SHALL BE A TWO COMPONENT, POLYURETHANE BASED, NON SAGGING ELASTOMERIC SEALANT SUCH AS SIKAFLEX-2C NS OR APPROVED EQUIVALENT. PROVIDE SEALANT COLOR AS REQUIRED BY ARCHITECT.

TEMPORARY BRACING

- THE CONTRACTOR SHALL PROVIDE TEMPORARY BRACING AS REQUIRED DURING CONSTRUCTION.
- THE CONTRACTOR SHALL RETAIN AT THE CONTRACTOR'S EXPENSE A REGISTERED STRUCTURAL ENGINEER LICENSED IN THE STATE OF THE PROJECT TO DESIGN AND INSPECT ALL TEMPORARY SHORING AND BRACING. SIGNED, SEALED AND DATED DESIGN CALCULATIONS SHALL BE SUBMITTED FOR REVIEW WHEN REQUESTED.

CONCRETE MASONRY UNITS

- ALL MASONRY DESIGN SHALL CONFORM TO TMS 402/406-16.
- REINFORCED MASONRY WALL DESIGN IS BASED ON INSPECTED MASONRY AS REQUIRED BY TMS 402/406-16 SPECIFICATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A QUALITY CONTROL AND INSPECTION PROGRAM TO INSURE THAT ALL MASONRY WALL CONSTRUCTION IS IN COMPLIANCE WITH THE CONTRACT DOCUMENTS. REFER TO SPECIFICATION FOR THE MINIMUM REQUIREMENTS FOR THIS PROGRAM.
- ALL MASONRY CONSTRUCTION AND MATERIALS SHALL CONFORM TO ALL REQUIREMENTS OF "BUILDING CODE REQUIREMENTS AND SPECIFICATIONS FOR MASONRY STRUCTURES (TMS 402/406)" PUBLISHED BY THE MASONRY SOCIETY, EXCEPT AS MODIFIED BY THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
- CONSTRUCT REINFORCED AND UNREINFORCED MASONRY AS NOTED ON THE PLANS AND DETAILS AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE "REINFORCED UNIT MASONRY" SPECIFICATION.
- USE CONCRETE MASONRY UNITS CONFORMING TO ASTM C90. PROVIDE FM OF 2000 PSI (UNIT STRENGTH 2000 PSI) FOR ALL REINFORCED MASONRY WALLS. PERFORM COMPRESSIVE STRENGTH COMPLIANCE BY PRISM TEST METHOD. USE ONLY MASONRY UNITS THAT ARE A MIN. OF 50% SOLID. REFER TO THE SPECIFICATIONS FOR TESTING FREQUENCIES.
- USE TYPE "S" MORTAR IN ACCORDANCE WITH ASTM C270. USE FULL-BEDDED JOINTS FOR ALL MASONRY UNITS. REMOVE MORTAR PROTRUDING INTO CELL CAVITIES THAT ARE TO BE REINFORCED AND GROUTED. ALLOW A MIN. OF 24 HOURS FOR MORTAR TO CURE BEFORE PLACING GROUT. REFER TO THE SPECIFICATIONS FOR TESTING REQUIREMENTS.
- USE ALL GROUT CONFIRMING TO ASTM C476 WITH A MIN. COMPRESSIVE STRENGTH OF 3000 PSI IN 28 DAYS, TESTED IN ACCORDANCE WITH ASTM C1019, AGGREGATE TO CONFORM TO ASTM C404 FOR FINE GROUT, AND SLUMP OF 8" TO 11" AT POINT OF DISCHARGE. TEST SAMPLES FOR COMPRESSIVE STRENGTH. REFER TO THE SPECIFICATION FOR TESTING REQUIREMENTS.
- REFER TO THE MASONRY DETAILS FOR REINFORCING REQUIREMENTS.
- FOR UNREINFORCED WALLS USE STANDARD TRUSS-TYPE MASONRY HORIZONTAL REINFORCING IN EVERY OTHER COURSE OF MASONRY; EXTEND INTO THE COLUMNS.
- USE ASTM A615 GRADE 60 REINFORCING STEEL.
- IN HIGH-LIFT GROUTING USE A MAXIMUM LIFT OF 5'-4" WITH MIN. HALF HOUR MAX. ONE HOUR BETWEEN LIFTS. VIBRATE EACH LIFT AND RECONSOLIDATE PREVIOUS LIFT AFTER PLACING NEXT LIFT.
- WHERE ANCHOR BOLTS ARE SET IN MASONRY WALL, FILL BLOCK CELLS WITH GROUT FOR BOLTED COURSE, ONE COURSE ABOVE AND TWO COURSES BELOW ANCHOR ELEVATION.
- USE PRESSURE-TREATED WOOD FOR ALL WOOD IN CONTACT WITH MASONRY.
- UNLESS OTHERWISE NOTED, PROVIDE LINTELS OR HEADERS OVER ALL MASONRY OPENINGS NOT FLUSH WITH STRUCTURAL FRAME. LINTELS OR HEADERS TO BEAR MIN. 16 INCHES EACH SIDE OF OPENING. REFER TO TYPICAL DETAILS.
- COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MASONRY LAYOUT & LOCATIONS OF OPENINGS NOT SHOWN ON THE STRUCTURAL DRAWINGS.

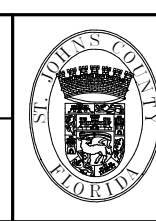
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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

STRUCTURAL GENERAL NOTES

SHEET NO.
29
DWG NO.
S-1
ELECTRICAL
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STEEL JOISTS AND JOISTS GIRDERS

- THE ENGINEER OF RECORD DELEGATES DESIGN RESPONSIBILITY FOR THE PREPARATION, FABRICATION, AND ERECTION DRAWINGS TO A SPECIALTY ENGINEER. SUBMIT STEEL JOISTS SHOP DRAWING TO THE ENGINEER OF RECORD FOR REVIEW PRIOR TO FABRICATION. ALL SHOP DRAWINGS SHALL BE SIGNED, DATED, AND SEALED BY A SPECIALTY ENGINEER LICENSED IN THE STATE OF FLORIDA PRIOR TO SUBMITTING FOR REVIEW.
- ALL JOISTS SHALL BE DESIGNED AND FABRICATED BY THE MANUFACTURER, AND ERECTED IN ACCORDANCE WITH STEEL JOIST INSTITUTE, LATEST REVISION.
- STEEL JOIST MANUFACTURER SHALL SUBMIT ERECTION AND SHOP DRAWINGS SHOWING JOIST LOCATIONS, BRIDGING, CONNECTIONS AND DETAILS, JOIST TO JOIST CONNECTIONS, SPECIAL & EXTENDED ENDS, SLOPED SEATS & ACCESSORIES REQUIRED FOR THE INSTALLATION OF JOISTS.
- JOISTS SHALL BE STORED ON WOOD SLEEPERS ON DRY, LEVEL GROUND. PERMANENTLY DEFORMED OR OTHERWISE DAMAGED JOISTS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR SHALL SUPPLY THE STEEL JOIST FABRICATOR SPRINKLER DRAWINGS. THE STEEL JOIST FABRICATOR SHALL DESIGN THEIR PRODUCTS FOR THE LOADING IMPOSED BY SPRINKLER MAIN SUPPLY LINES AND BRANCHES. THE STEEL JOIST FABRICATOR SHALL BE SOLELY RESPONSIBLE FOR THE ADEQUACY OF THE JOIST DESIGN TO ACCOMMODATE SUCH IMPOSED LOADS. IF SPRINKLER DRAWINGS ARE NOT AVAILABLE, THE JOIST FABRICATOR SHALL USE A DESIGN LOAD OF 3 PSF APPLIED AS A UNIFORM OR CONCENTRATED LOADS WHICH CAN BE SUPPORTED BY THEIR SYSTEMS.
- LH-SERIES JOIST STRUCTURAL STEEL SHALL BE ASTM A572, GRADE 50 (FY = 50,000 PSI) UNLESS NOTED OTHERWISE.
- ALL JOIST SHALL BE COATED AS PER SPECIFICATION 09900.
- THE STEEL JOIST MANUFACTURER SHALL INVESTIGATE THE JOISTS FOR A MINIMUM NET UPLIFT IN ACCORDANCE WITH THE STRUCTURAL NOTES AND FURNISH THE BRIDGING AND ATTACHMENTS NECESSARY TO ENSURE PROPER JOIST PERFORMANCE UNDER UPLIFT FORCES AND FORCES DUE TO ERECTION PER SJI SPECIFICATIONS AND OSHA REQUIREMENTS.
- THE JOIST SPECIALTY ENGINEER SHALL COORDINATE REQUIRED CAMBER TO ACCOUNT FOR POSSIBLE INCREASED SECTION PROPERTIES DUE TO THE WIND UPLIFT DESIGN.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A STRAIGHT AND UNIFORM ROOF SYSTEM. PROVIDE SMOOTH TRANSITIONS BETWEEN ADJACENT JOISTS AND BETWEEN JOIST AND ADJACENT WALLS. WALLS THAT EXTEND TO THE ROOF DECK SHALL BE CONSTRUCTED AND COORDINATED TO MATCH FINAL IN-PLACE JOIST PROFILES OR SHIM AS REQUIRED.
- STEEL JOIST BEARING AT EXTERIOR WALLS SHALL BE DESIGNED TO RESIST 2,500 POUNDS LATERAL FORCE PERPENDICULAR TO LONG SPAN JOISTS APPLIED AT THE TOP OF THE JOIST.
- UNLESS OTHERWISE NOTED OR AS REQUIRED BY DESIGN OF JOIST MANUFACTURER, JOISTS SHALL BE CONNECTED TO STEEL BY 1/4" WELD, 4" LONG EACH SIDE.
- HORIZONTAL BRIDGING SHALL BE AN ANGLE AT TOP AND BOTTOM. DESIGNED FOR L/R LESS THAN OR EQUAL TO 300. A SINGLE LINE OF BOTTOM CHORD BRIDGING MUST BE PROVIDED AT THE ENDS OF STEEL ROOF JOISTS NEAR THE FIRST BOTTOM CHORD PANEL POINT FOR WIND UPLIFT.
- DIAGONAL BRIDGING SHALL BE AN ANGLE DESIGNED FOR L/R LESS THAN OR EQUAL TO 200.
- UNLESS NOTED, 2ND AND 3RD JOIST SPACES FROM WALLS AND 1ST AND 2ND JOIST SPACES FROM DISCONTINUOUS TRANSITIONS SHALL HAVE CROSS BRIDGING (TO BE ALIGNED WITH HORIZONTAL BRIDGING).
- JOIST BRIDGING SHALL NOT BE USED TO SUPPORT EQUIPMENT, PIPING, CONDUITS, DUCTWORK, ETC.
- WHERE FIELD WELDING IS REQUIRED AT TOP OR BOTTOM CHORDS OF JOISTS, TEMPORARILY SHORE AT EACH SIDE OF WELDING LOCATION.
- MECHANICAL/ELECTRICAL SUPPORTS:
 - COORDINATE ALL SUPPORTS WITH MECHANICAL DRAWINGS AND COMPLY WITH MECHANICAL SPECIFICATIONS.
 - LOCATE ALL ATTACHMENTS AS CLOSE TO PANEL POINTS AS POSSIBLE.
 - DISTRIBUTE LOADS UNIFORMLY ALONG JOISTS.
 - ALL SUPPORTS SHALL BE ATTACHED SO AS TO APPLY CONCENTRIC LOADS TO THE JOISTS AND JOIST MEMBERS. NO ECCENTRIC LOADS SHALL BE APPLIED WHICH MAY CAUSE THE JOISTS OR INDIVIDUAL MEMBERS TO ROTATE AND BUCKLE.
 - DO NOT ALTER ANY PART OF ANY JOIST WITHOUT WRITTEN APPROVAL FROM THE SPECIALTY ENGINEER. CUTTING, DRILLING, OR NOTCHING ANY MEMBER OF THE JOIST IS PROHIBITED WITHOUT WRITTEN PRIOR APPROVAL. IN NO WAY SHALL THE INTEGRITY OF THE JOISTS BE ADVERSELY ALTERED BY ATTACHING PIPE SUPPORTS OR ANY OTHER ATTACHMENTS.

STRUCTURAL STEEL

- ALL STEEL WORK (INCLUDING FABRICATION AND ERECTION) SHALL CONFORM TO THE AISC "MANUAL OF STEEL CONSTRUCTION, ALLOWABLE STRESS DESIGN" 15TH EDITION AND PROJECT SPECIFICATIONS, USE THE FOLLOWING:
 - STRUCTURAL STEEL WIDE FLANGE AND WT SECTIONS: ASTM A992 Fy=50 KSI
 - CHANNELS, ANGLES, PLATES, AND MISCELLANEOUS STEEL: ASTM A36, Fy=36 KSI
 - STRUCTURAL STEEL TUBING: ASTM A500 GRADE B, Fy=46 KSI (RECTANGULAR) & Fy=42 KSI (ROUND)
 - STEEL PIPE: ASTM A53, TYPE E OR S GRADE B, Fy=35 KSI
- THE CONNECTIONS FOR ANY PORTION OF THE STRUCTURE NOT INDICATED ON THE DRAWINGS SHALL BE DESIGNED AND DETAILED BY THE FABRICATOR'S SPECIALTY ENGINEER. THESE CONNECTIONS SHALL BE DESIGNED FOR THE FORCES INDICATED ON THE STRUCTURAL DRAWINGS. WHERE FORCES ARE NOT SHOWN ON THE DRAWINGS, EACH END CONNECTION SHALL BE DESIGNED FOR ONE-HALF THE TOTAL LOAD SHOWN IN THE APPROPRIATE AISC "ALLOWABLE LOADS ON BEAMS" TABLES.
- USE STRUCTURAL STEEL THAT IS FULLY WELDABLE WITHIN GRADES AND FROM ANY GRADE TO ANY OTHER GRADE. WELD ALL SHOP CONNECTIONS, UNLESS OTHERWISE NOTED.
- ALL SHOP AND FIELD WELDING SHALL CONFORM TO THE STRUCTURAL WELDING CODE AWS D1.1, LATEST EDITION, PUBLISHED BY THE AMERICAN WELDING SOCIETY (AWS). USE ELECTRODES CONFORMING TO AWS D1.1, E70 SERIES, UNLESS OTHERWISE NOTED. SHOW ALL SHOP WELDS ON THE FABRICATION DRAWINGS AND ALL FIELD WELDS ON THE ERECTION DRAWINGS.
- ALL SHOP AND FIELD WELDERS, WELDING OPERATORS, AND TACKERS SHALL BE CERTIFIED ACCORDING TO AWS PROCEDURE FOR THE WELDING PROCESS AND WELDING POSITION USED. ALL RECORDS OF SUCH CERTIFICATION SHALL BE FILED AT THE JOBSITE AND MADE AVAILABLE TO THE ENGINEER UPON REQUEST.
- ALL JOINT WELDING PROCEDURES TO BE USED SHALL BE PREPARED BY THE FABRICATOR OR CONTRACTOR AS WRITTEN PROCEDURE SPECIFICATIONS. ALL RECORDS SHALL BE FILED AT THE JOB SITE & MADE AVAILABLE TO THE ENGINEER UPON REQUEST. ALL JOINT WELDING PROCEDURES SHALL BE QUALIFIED PRIOR TO USE ACCORDING TO AWS PROCEDURES.
- CUT, DRILL, OR PUNCH HOLES PERPENDICULAR TO METAL SURFACES. DO NOT FLAME CUT HOLES OR ENLARGE HOLES BY BURNING.
- SPLICING OF STRUCTURAL STEEL MEMBERS IN THE FIELD OR IN THE SHOP IS PROHIBITED EXCEPT WHERE INCLUDED ON THE DRAWINGS.
- DO NOT PAINT STEEL SURFACES IN CONTACT WITH CONCRETE. DO NOT APPLY FINISH COAT AND LIMIT PRIME COAT TO 2 MILS AT FAYING SURFACES OF SLIP CRITICAL BOLTED CONNECTIONS, SURFACES TO BE WELDED AND TOP SURFACES OF BEAMS AND TRUSSES TO RECEIVE STEEL STUDS AND/OR SUPPORTING METAL FLOOR AND ROOF DECKING. USE PRIMER WHICH HAS A MINIMUM CLASS A SLIP COEFFICIENT (0.33).
- REFER TO ARCHITECTURAL PLANS FOR FIREPROOFING OF STRUCTURAL STEEL MEMBERS. REFER TO SPECIFICATIONS FOR PAINTING OF STRUCTURAL STEEL.
- SUBMIT STRUCTURAL STEEL SHOP DRAWINGS TO ENGINEER FOR REVIEW BEFORE FABRICATION. ALL STRUCTURAL STEEL SHOP DRAWINGS, REQUIRING INPUT FROM A SPECIALTY ENGINEER, SHALL BE SIGNED AND SEALED PRIOR TO SUBMITTAL. DO NOT REPRODUCE THE STRUCTURAL DRAWINGS FOR USE AS SHOP DRAWINGS.
- PROVIDE TEMPORARY BRACING AS NECESSARY TO INSURE A STABLE STRUCTURE DURING CONSTRUCTION.
- NO CUTTING OF SECTIONS, FLANGES, WEBS, OR ANGLES SHALL BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE ENGINEER OF RECORD.
- FABRICATE AND ERECT STRUCTURAL STEEL IN ACCORDANCE WITH AISC SPECIFICATIONS AND "CODE OF STANDARD PRACTICE".
- IMMEDIATELY AFTER ERECTION ALL FRAMING MEMBERS AND WELDS SHALL BE TOUCHED UP WITH A PAINT COMPATIBLE WITH THE SHOP PAINT OR COATING.
- ALL EXPOSED STEEL SHALL EITHER BE PAINTED PER SPEC 09900 OR HOT DIPPED GALVANIZED.

MISCELLANEOUS STEEL

- FOR MISCELLANEOUS STEEL NOT SHOWN ON STRUCTURAL DRAWINGS, REFER TO ARCHITECTURAL AND MECHANICAL DRAWINGS.
 - EDGE ANGLES, CLIP ANGLES, PLATES, BARS, AND OTHER MISCELLANEOUS ROLLED SHAPES SHALL BE ASTM A-36 STRUCTURAL STEEL, UNLESS OTHERWISE NOTED.
 - THE PROVISIONS OF THE ABOVE STRUCTURAL STEEL SECTION SHALL ALSO APPLY TO MISCELLANEOUS STEEL.
- ALUMINIUM**
- ALL ALUMINIUM ITEMS SHALL BE ALLOY 6061-T6 WITH TEMPER T6 CONFORMING TO ASTM B209 AND B308. REFER TO ARCHITECTURAL FOR FINISH.
 - WELDING OF ALUMINIUM SHALL USE GAS TUNGSTEN ARC OR GAS METAL ARC WELDING WITH NO POSTWELD HEAT TREATMENT. THE FILLER WIRE SHALL BE 5556.
 - ALUMINIUM IN CONTACT WITH CONCRETE, GROUT, OR DISSIMILAR METALS SHALL BE COATED WITH A CHROMATE CONVERSION COATING.
 - STEEL FASTENERS OR HARDWARE IN CONTACT WITH ALUMINIUM SHALL BE AISI 316 STAINLESS STEEL.

PIPING, PIPELINE APPURTENANCES, VALVE, SUPPORTS, HANGERS, STRUTS, BLOCKING AND ANCHORAGE NOTES

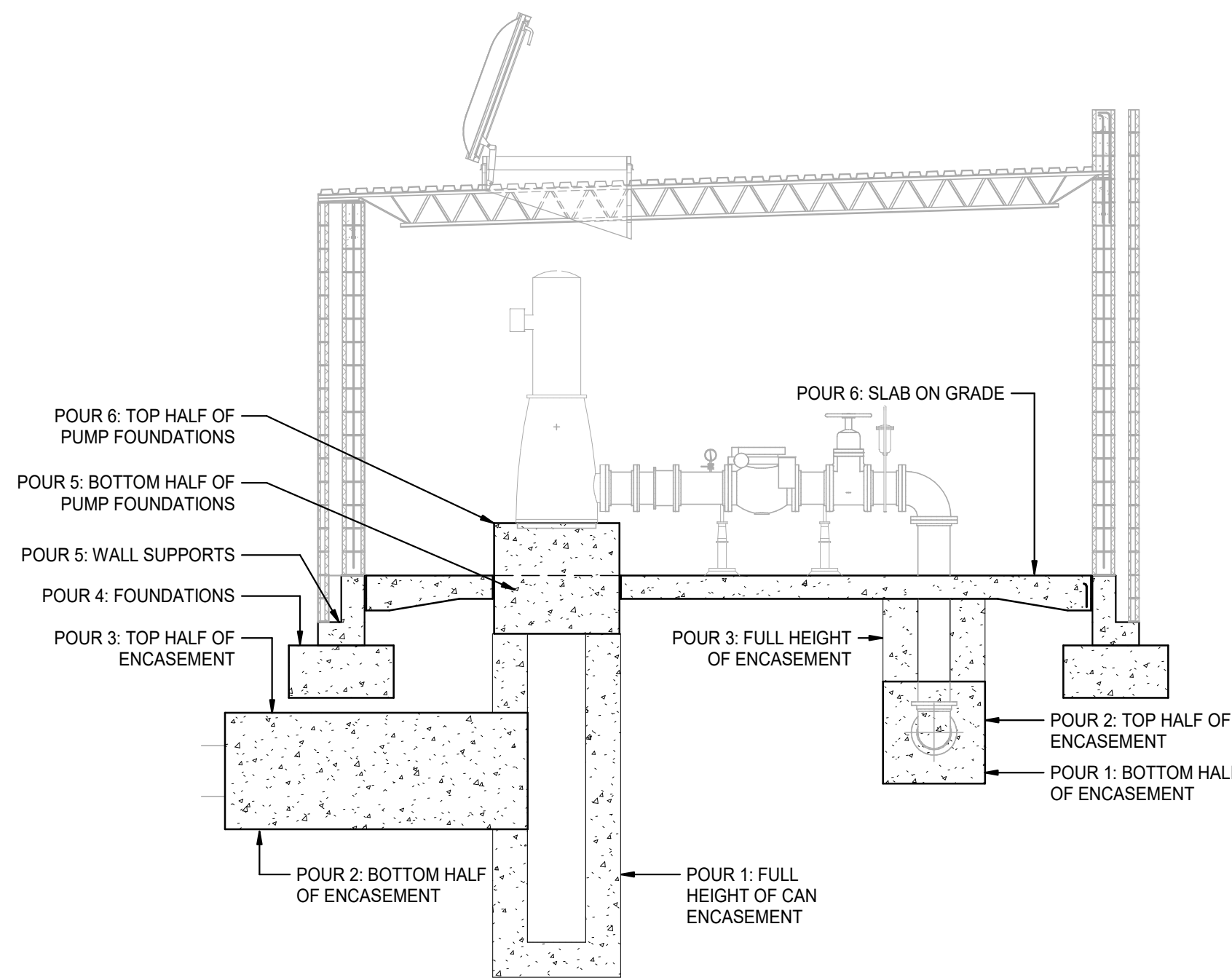
- CONTRACTOR SHALL REFER TO THE APPLICABLE DIVISIONS OF THE SPECIFICATIONS FOR SUPPORTS, BLOCKING, ANCHORAGE, AND RESTRAINING OF ALL PIPE, VALVES AND PIPING APPURTENANCES.
- CONTRACTOR SHALL REVIEW WITH THE ENGINEER ALL LOCATION AND ARRANGEMENT OF PIPING OPENINGS, PIPE SLEEVES, TRENCHES, AS REQUIRED TO COMPLETE HIS WORK AND SHALL NOT PROCEED WITH INSTALLATION OF SAME UNTIL SUCH HAS BEEN REVIEWED AND WILL NOT IMPAIR THE STRUCTURAL INTEGRITY OF THE CONCRETE MEMBERS.
- CONTRACTOR SHALL PROVIDE AND COORDINATE THE INSTALLATION OF ALL ITEMS TO BE EMBEDDED IN THE CONCRETE SYSTEM AND SHALL COOPERATE SO AS NOT TO DELAY THE CONSTRUCTION WORK. SUCH ITEMS SHALL INCLUDE PIPES, SLEEVES, BOLTS, STRUTS, HANGERS AND FITTINGS, ETC., THAT ARE TO BE EMBEDDED IN THE CONCRETE SYSTEM.

REFERENCE DATUM AND FLOOD DATA

- ELEVATIONS INDICATED ON BOOSTER STATION BUILDING PLANS AND DETAILS ARE NAVD ELEVATIONS. COORDINATE ADDITIONAL ELEVATIONS WITH CIVIL DRAWINGS.
- PROJECT IS LOCATED IN FLOOD ZONE X.

STANDARD STRUCTURAL ABBREVIATIONS

AB	ANCHOR BOLT	PC	PRECAST
ADD	ADDITIVE	PREFAB	PREFABRICATED
ADD'L	ADDITIONAL	PROJ	PROJECTION
ALT	ALTERNATE/ALTERNATIVE	REF	REFERENCE
ALUM	ALUMINUM	REINF	REINFORCING
ACI	AMERICAN CONCRETE INSTITUTE	REQ'D	REQUIRED
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION	RW	RETAINING WALL
AISI	AMERICAN IRON AND STEEL INSTITUTE	RD	ROOF DRAIN
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS	REV	REVISION
AWS	AMERICAN WELDING SOCIETY	SCHED	SCHEDULE
ARCH	ARCHITECTURAL	SP, SP'S	SPACE/SPACES
BP	BASE PLATE	SPECS	SPECIFICATIONS
BM	BEAM	SLV	SHORT LEG VERTICAL
BRG	BEARING	SIM	SIMILAR
BLK	BLOCK	STD	STANDARD
B/	BOTTOM OF	STIFF	STIFFENER
BLDG	BUILDING	STRUCT	STRUCTURAL
BTWN	BETWEEN	SYM	SYMMETRICAL
BOT	BOTTOM	THD	THREAD/THREADED
CIP	CAST IN PLACE	THK	THICK
C TO C	CENTER TO CENTER	T/	TOP OF
CLR	CLEAR/CLEARANCE	TD	TURNDOWN SLAB
COL	COLUMN	T&B	TOP AND BOTTOM
CONC	CONCRETE	TS	THICKENED SLAB
CB	CONCRETE BEAM	TYP	TYPICAL
CMU	CONCRETE MASONRY UNIT	UON	UNLESS OTHERWISE NOTED
CONT	CONTINUOUS	VERT	VERTICAL
CONN	CONNECTION	VIF	VERIFY IN FIELD
CJ	CONSTRUCTION JOINT	WWF	WELDED WIRE FABRIC
DET	DETAIL	W	WIDE FLANGE
DIM	DIMENSION	w/	WITH
DWG	DRAWING	w/O	WITHOUT
EA	EACH	WP	WORK POINT
EE	EACH END	@	AT
EF	EACH FACE	C	CHANNEL
ES	EACH SIDE	K	KIP (1,000 LBS)
EW	EACH WAY	Sx	SECTION MODULUS
ELEC	ELECTRICAL	Ix	MOMENT OF INERTIA
ENGR	ENGINEER	±	PLUS OR MINUS
EQ SP	EQUAL SPACED	Q, CL	CENTERLINE
EL	ELEVATION	DIA	DIAMETER
EJ	EXPANSION JOINT	⊕	ELEVATION
EXIST	EXISTING	⊞	MASONRY CONTROL JOINT
EXP	EXPANSION	⊞	(REFER TO PLAN FOR LOCATIONS)
EXT	EXTERIOR	PL, PL	PLATE
FD	FLOOR DRAIN		
FDN	FOUNDATION		
FF	FINISH FLOOR		
FIN FL	FINISH FLOOR		
FS	FAR SIDE		
FTG	FOOTING		
GA	GAGE/GAUGE		
GALV	GALVANIZE		
GL	GRID LINE		
HORIZ	HORIZONTAL		
HP	HIGH POINT		
HT	HEIGHT		
ID	INSIDE DIAMETER		
IF	INSIDE FACE		
JT	JOINT		
JST	JOIST		
KWY	KEYWAY		
LDG	LANDING		
LT	LIGHT		
LT WT	LIGHT WEIGHT		
LLH	LONG LEG HORIZONTAL		
LLV	LONG LEG VERTICAL		
LP	LOW POINT		
MAX	MAXIMUM		
MID	MIDDLE		
MANUF	MANUFACTURER		
MIN	MINIMUM		
MISC	MISCELLANEOUS		
M.O.	MASONRY OPENING		
MATL	MATERIAL		
MECH	MECHANICAL		
MPH	MILES PER HOUR		
MTL	METAL		
NS	NEAR SIDE		
NIC	NOT IN CONTACT		
NTS	NOT TO SCALE		
NO., #	NUMBER		
OC	ON CENTER		
OD	OUTSIDE DIAMETER		
OF	OUTSIDE FACE		
O/O	OUT TO OUT		
OPNG	OPENING		
PLY	PLYWOOD		



SUGGESTED CONCRETE POUR SEQUENCE

1/4" = 1'-0"

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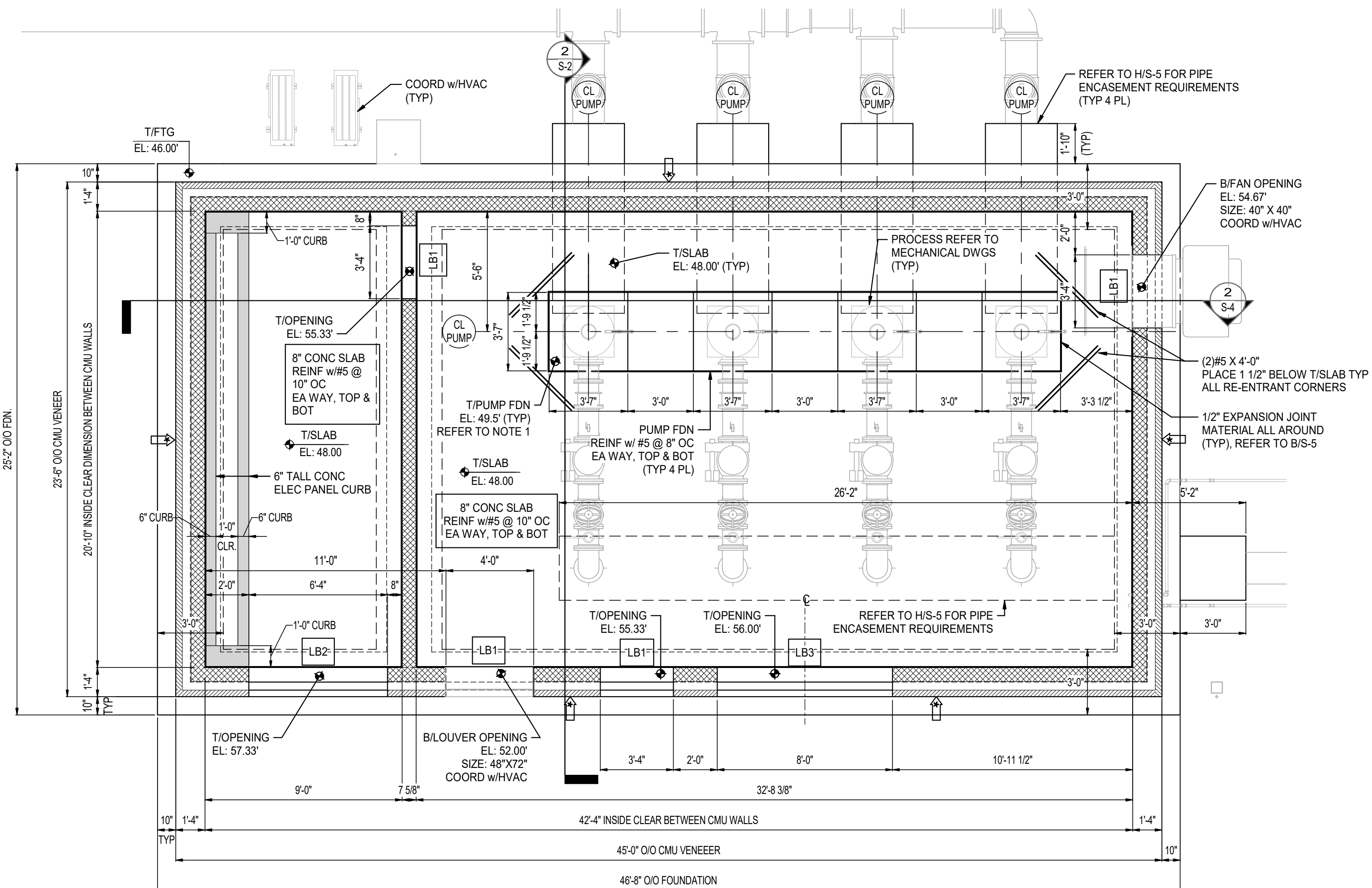
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Utility Department
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PHONE: (904) 209-2626 FAX: (904) 209-2627

CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

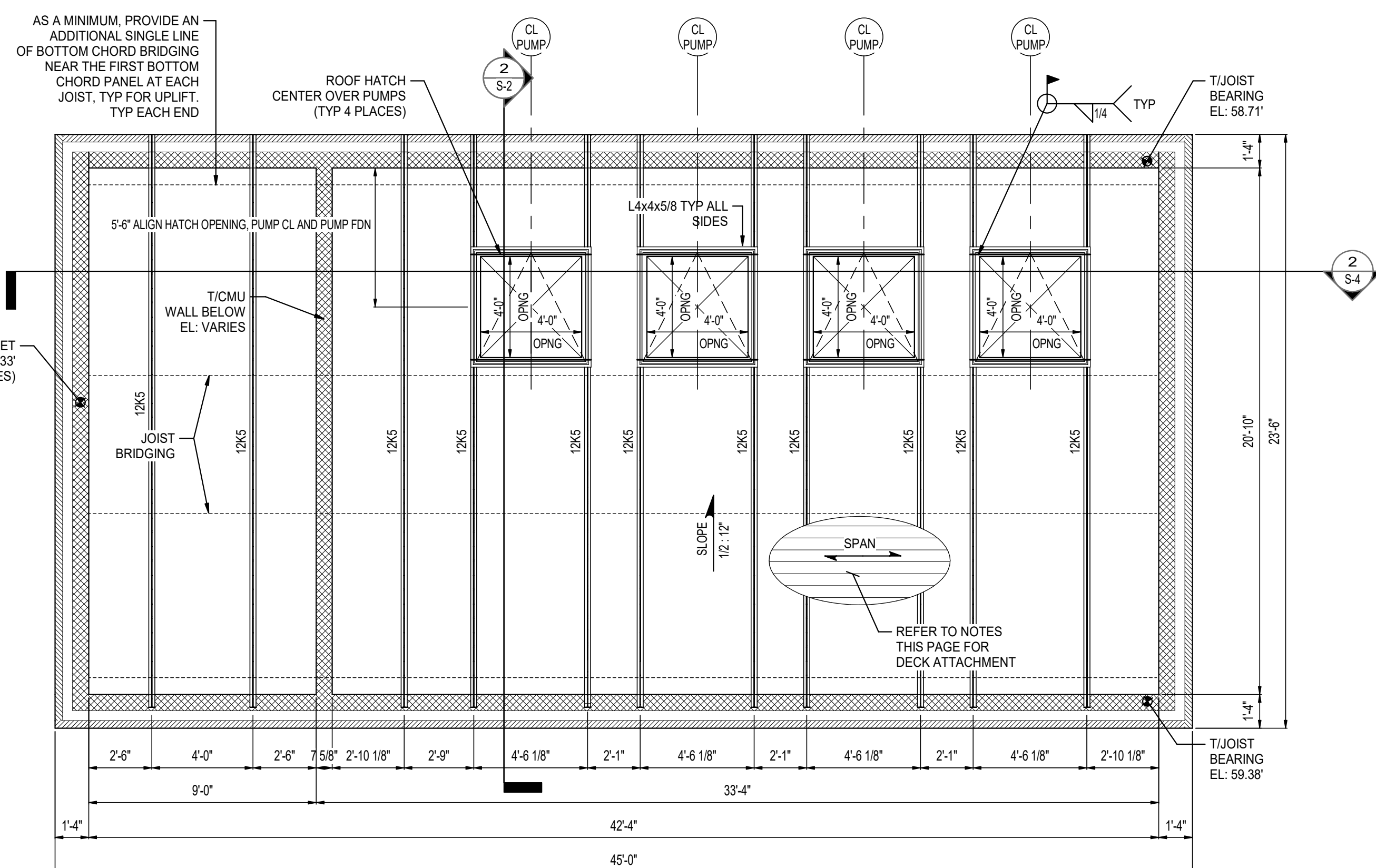
STRUCTURAL GENERAL NOTES

SHEET NO. 30
DWG NO. S-2
ELECTRICAL BID PACKAGE

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FOUNDATION AND SLAB ON GRADE PLAN
1/4" = 1'-0"



ROOF FRAMING PLAN
1/4" = 1'-0"

NOTES:

1. THE TOP OF THE PUMP FOUNDATIONS SHALL BE COORDINATED WITH THE PUMP MANUFACTURER SO THAT THE CENTERLINE OF THE DISCHARGE PIPES ARE AS SHOWN ON THE MECHANICAL DRAWINGS.
2. REFER TO SECTIONS FOR FOUNDATION AND WALL SIZES AND REINFORCING.
3. REFER TO S-5 FOR ADDITIONAL REQUIREMENTS.

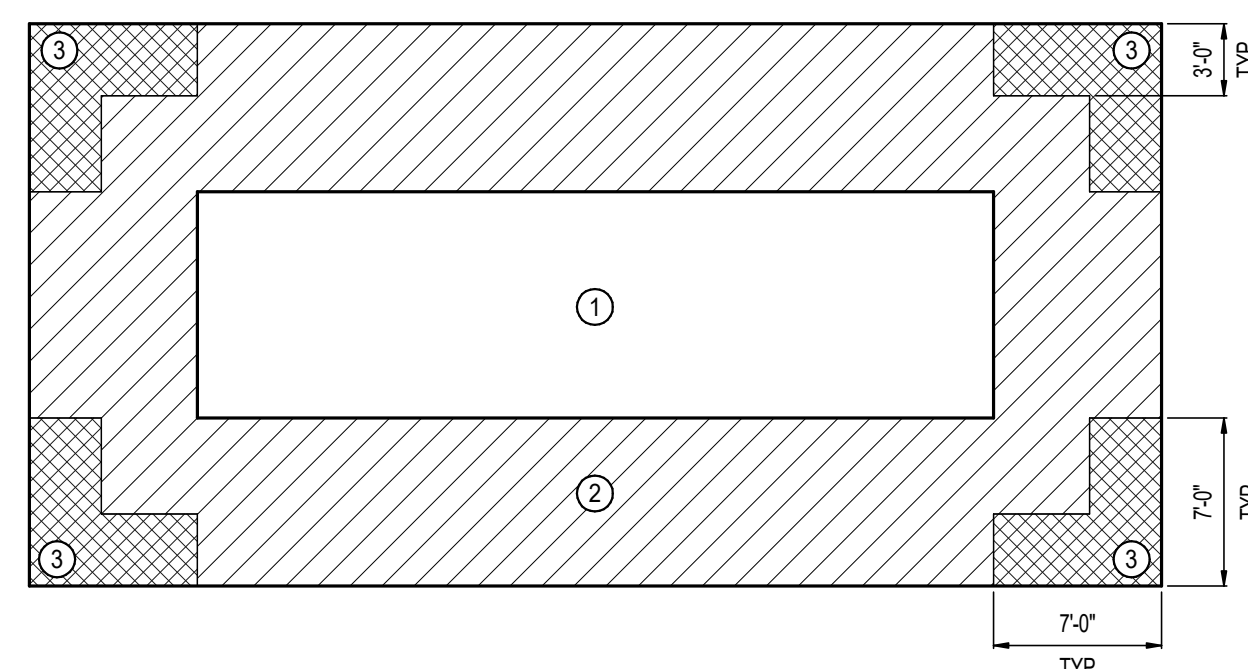
NOTES:

1. T/8" CMU PARAPET WALL EL: 61.33'
2. JOIST BEARING EL: VARIES.
3. MAXIMUM JOISTS SPACING SHALL BE 5'-0" ON CENTER.
4. FRAME ALL OPENINGS LARGER THAN 12" WITH L4x4x5/8"
5. BRIDGING SHOWN IS A MINIMUM REQUIRED. ADDITIONAL BRIDGING MAY BE REQUIRED BY JOIST MANUFACTURER.
6. ROOF DECK SYSTEM:
 - i. DECK 1.5B18 GALVANIZED WIDE RIB BY VULCRAFT OR APPROVED EQUAL.
 - ii. SUPPORT FASTENERS: 3/8" #12 TEK FASTENERS AT ALL SUPPORTED EDGES.
 - iii. SIDELAP FASTENERS: (6) - #10 SIDELAP FASTENERS BETWEEN SUPPORTS AT DECK EDGES.
7. JOIST SEAT AT HIGH END: 3 1/2" (JOIST BRNG @ CL WALL)
JOIST SEAT AT LOW END: 3 7/8" (JOIST BRNG @ CL WALL)

ZONE	EFFECTIVE AREA (FT ²)	PRESSURE (PSF)		
		POSITIVE	NEGATIVE	ROOF OVERHANG
1	10	10.7	-26.4	N/A
	20	10.1	-25.7	N/A
	50	10.0	-24.8	N/A
	100	10.0	-24.2	N/A
2	10	10.7	-44.3	N/A
	20	10.1	-39.6	N/A
	50	10.0	-33.4	N/A
	100	10.0	-28.6	N/A
3	10	10.7	-66.7	N/A
	20	10.1	-55.3	N/A
	50	10.0	-40.1	N/A
	100	10.0	-28.6	N/A

ZONE	EFFECTIVE AREA (FT ²)	PRESSURE (PSF)	
		POSITIVE	NEGATIVE
4	10	24.2	-26.2
	50	21.7	-23.7
	200	19.6	-21.5
	>500	18.1	-20.2
5	10	24.2	-32.2
	50	21.7	-27.2
	200	19.6	-23.0
	>500	18.1	-20.2

ZONE	EFFECTIVE AREA (FT ²)	PRESSURE (PSF)	
		WINDWARD	LEEWARD
4	10	24.2	-66.7
	50	21.7	-40.1
	200	19.6	-28.6
	>500	18.1	-28.6
5	10	24.2	-66.7
	50	21.7	-40.1
	200	19.6	-28.6
	>500	18.1	-28.6



B ROOF UPLIFT DIAGRAM
NO SCALE

LEGEND

- EXTERIOR 8" CMU WALL WITH 4" SPLIT FACE CMU VENEER
- INTERIOR 8" CMU WALL
- INDICATES SPOT ELEVATION
- DENOTES LINTEL REFER TO I/S-6
- CMU CONTROL JOINT, FULL HEIGHT OF WALL REFER TO G/S-6
- EDGE OF FOOTING (BEYOND)
- TURNDOWN SLAB EDGE REFER TO A/S-5

- NOTES:
1. WALL SECTION 5 EXTENDS FROM THE BUILDING CORNERS A DISTANCE OF 3'-0". WALL SECTION 4 IS THE REMAINDER OF THE WALL.
 2. THE JOIST MANUFACTURER MAY REDUCE NEGATIVE PRESSURE BY 5 PSF TO PRODUCE NET UPLIFT PRESSURE.
 3. COMPONENT AND CLADDING PRESSURES SHOWN ARE FOR ALLOWABLE STRESS DESIGN. NO FURTHER REDUCTIONS CAN BE TAKEN.

A ROOF COMPONENT AND CLADDING
NO SCALE

NO.	BY	DATE	SYMBOL	REVISIONS
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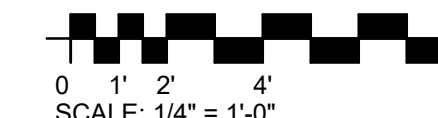


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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

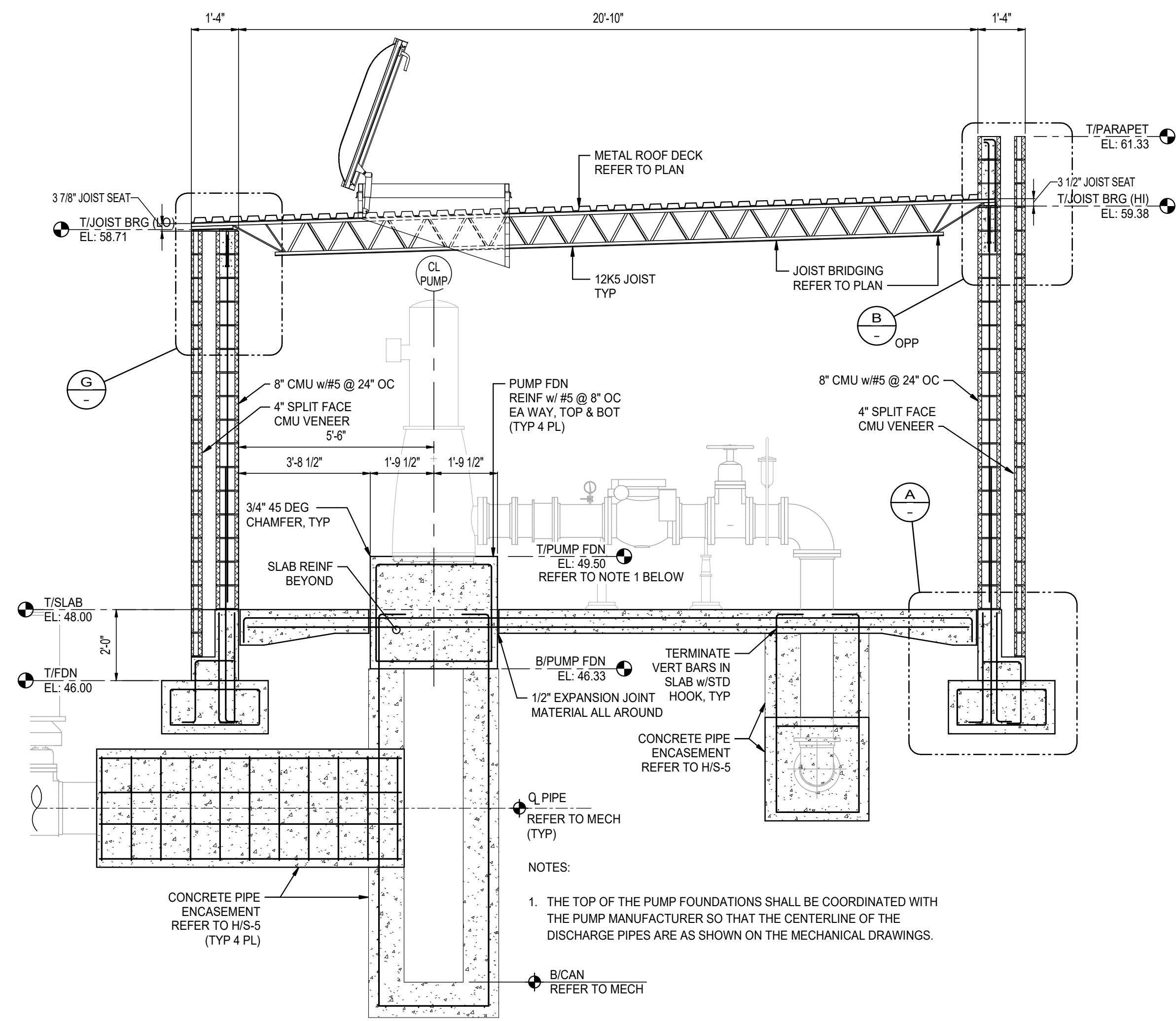
BOOSTER PUMP STATION BUILDING
PLANS

SHEET NO. 31
DWG NO. S-3
ELECTRICAL BID PACKAGE

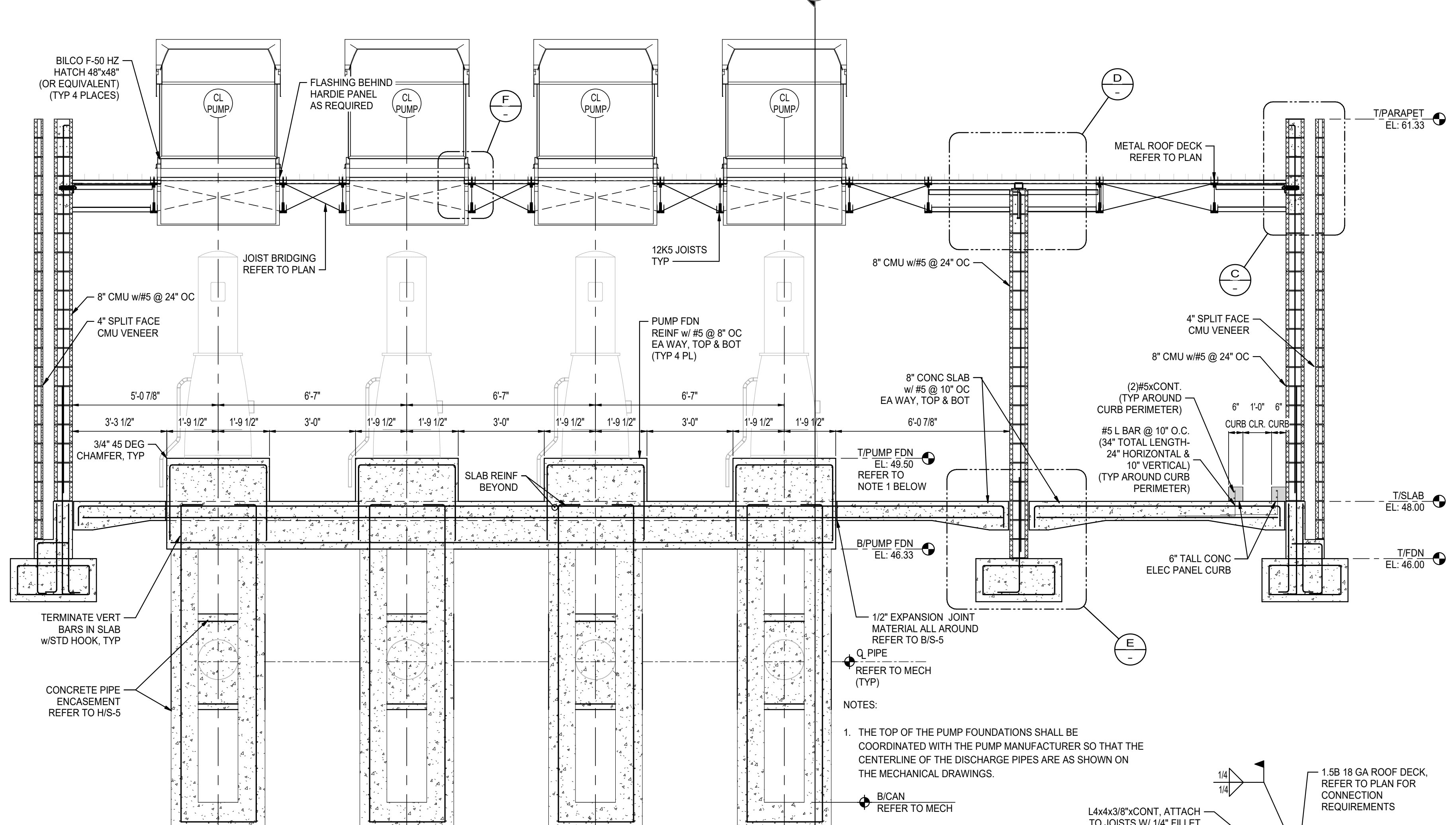


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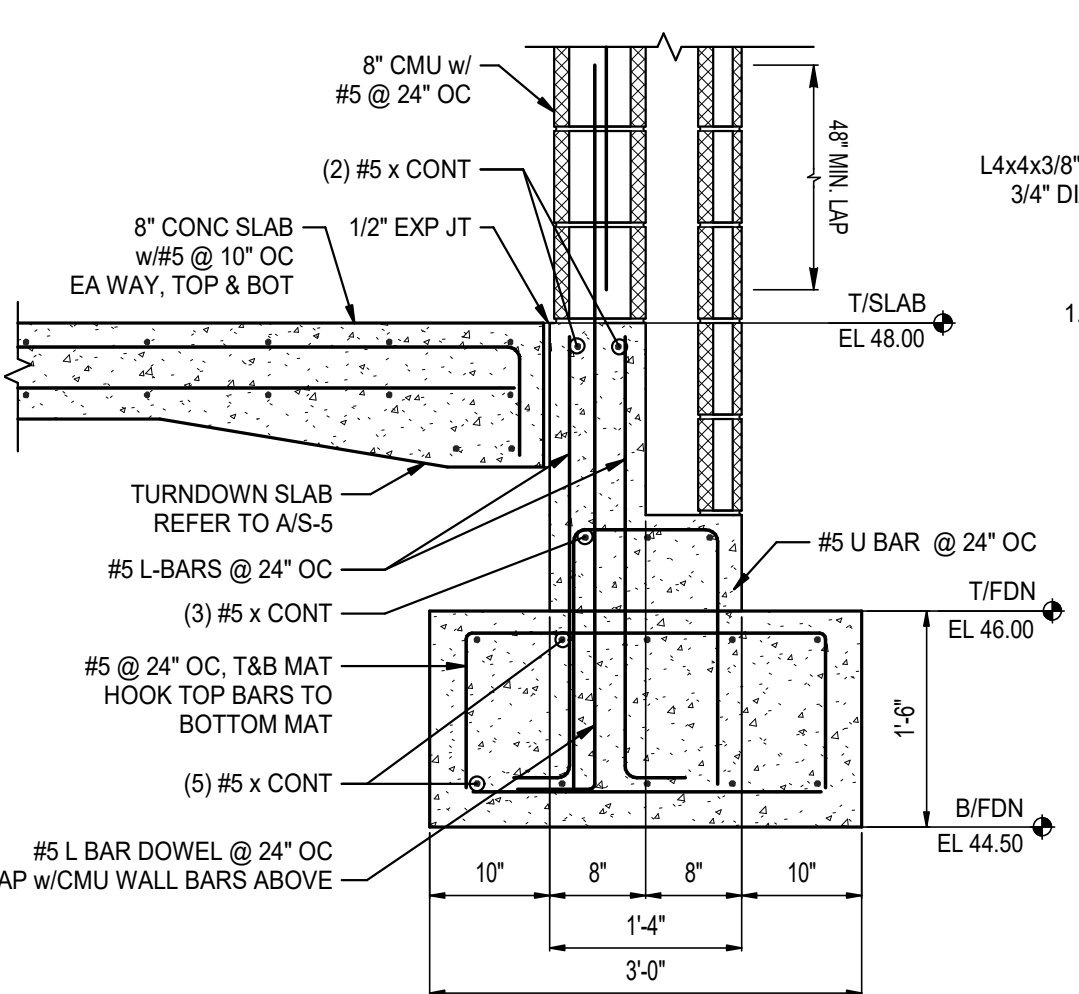
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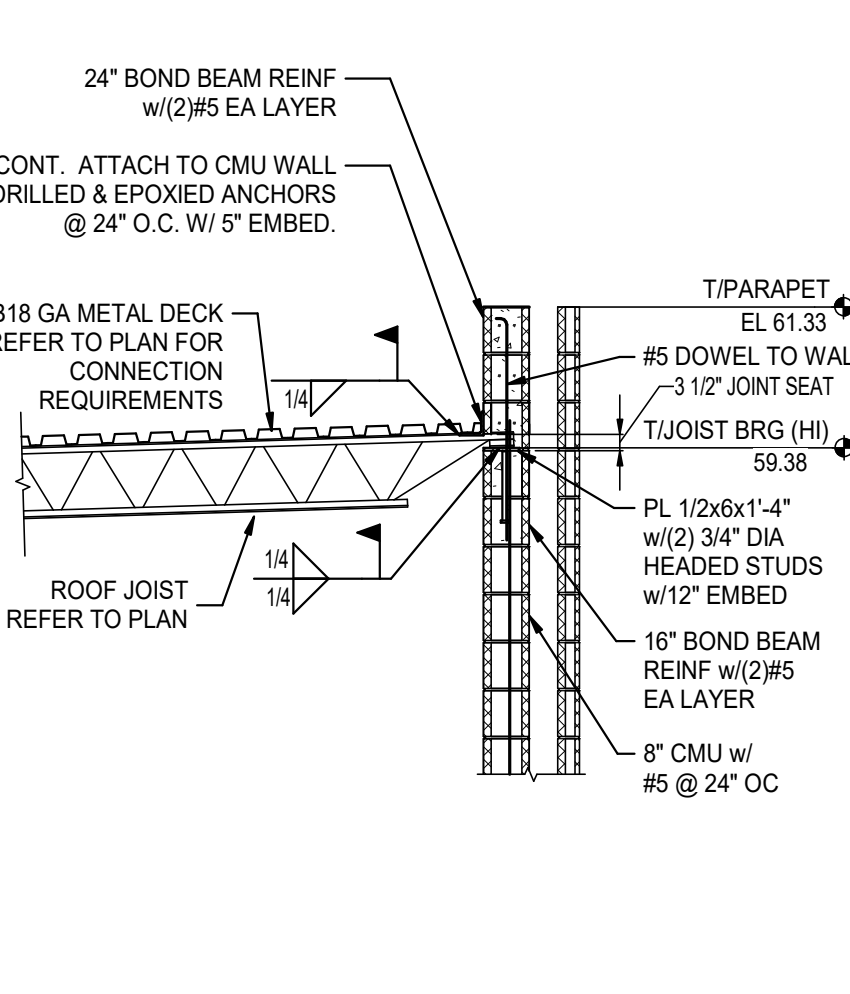
1 SECTION
S-3 3/8" = 1'-0"



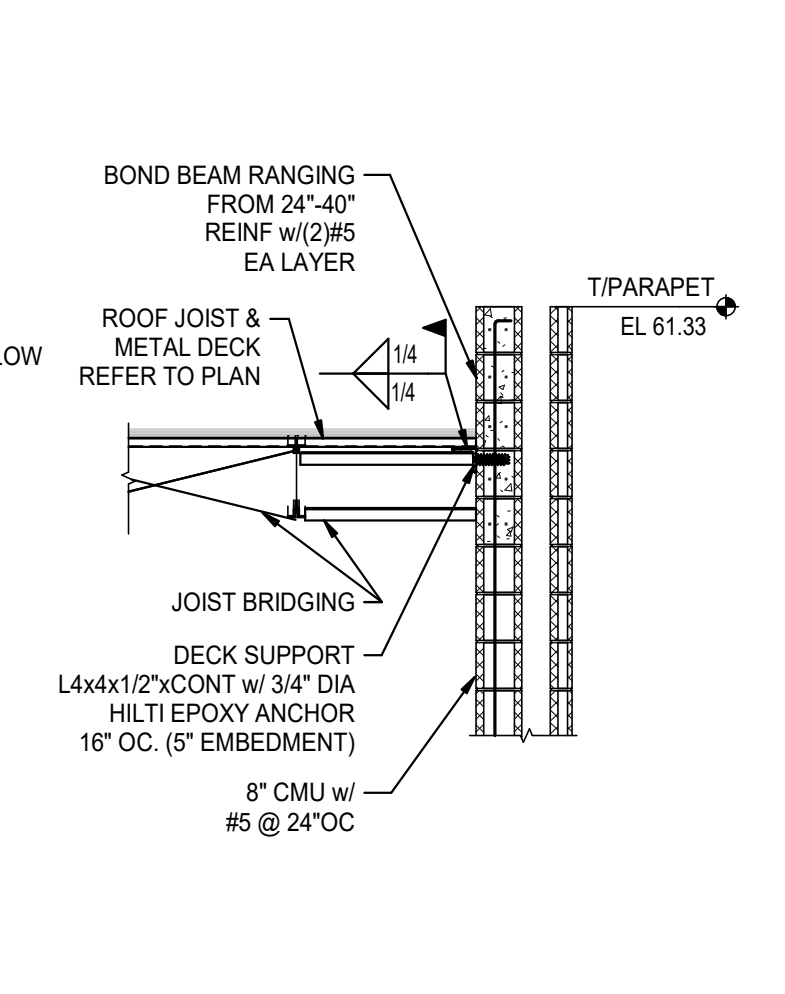
2 SECTION
S-3 3/8" = 1'-0"



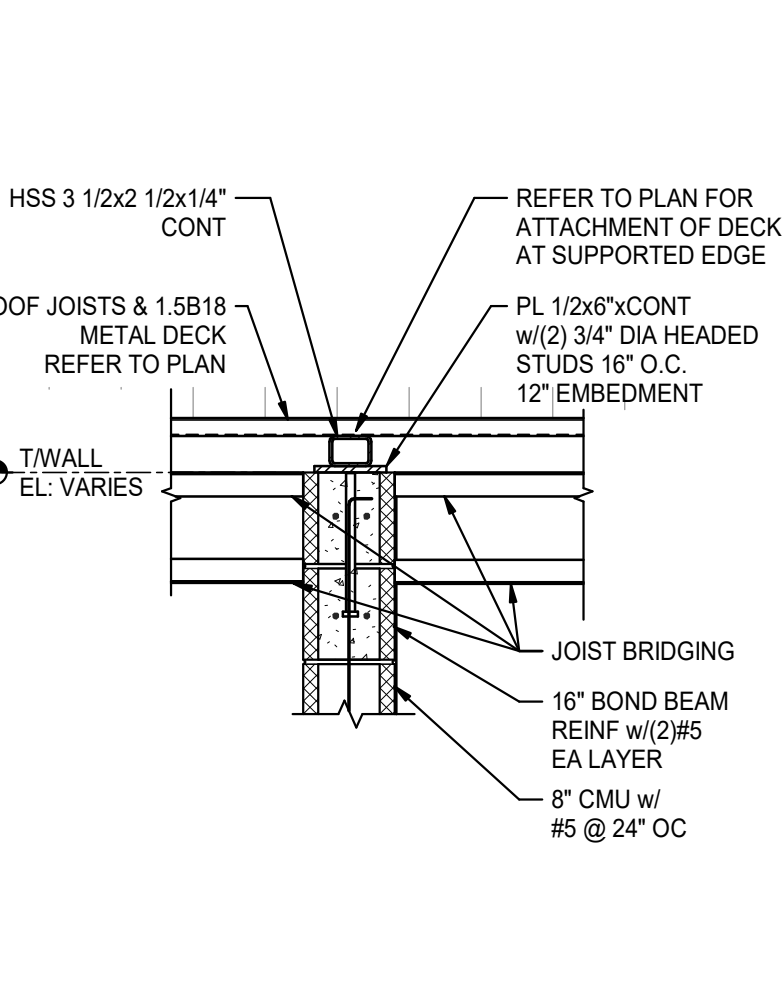
A EXTERIOR CMU WALL FOOTING
3/4" = 1'-0"



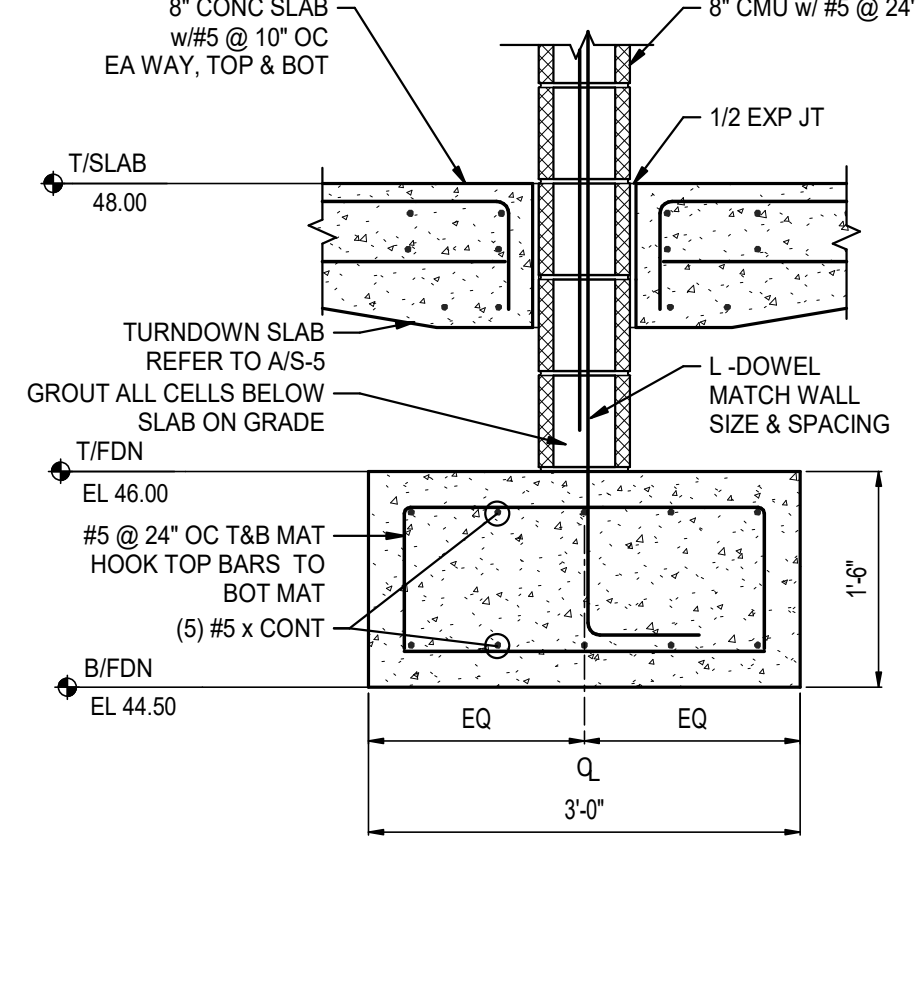
B JOIST BEARING @ HIGH END
3/8" = 1'-0"



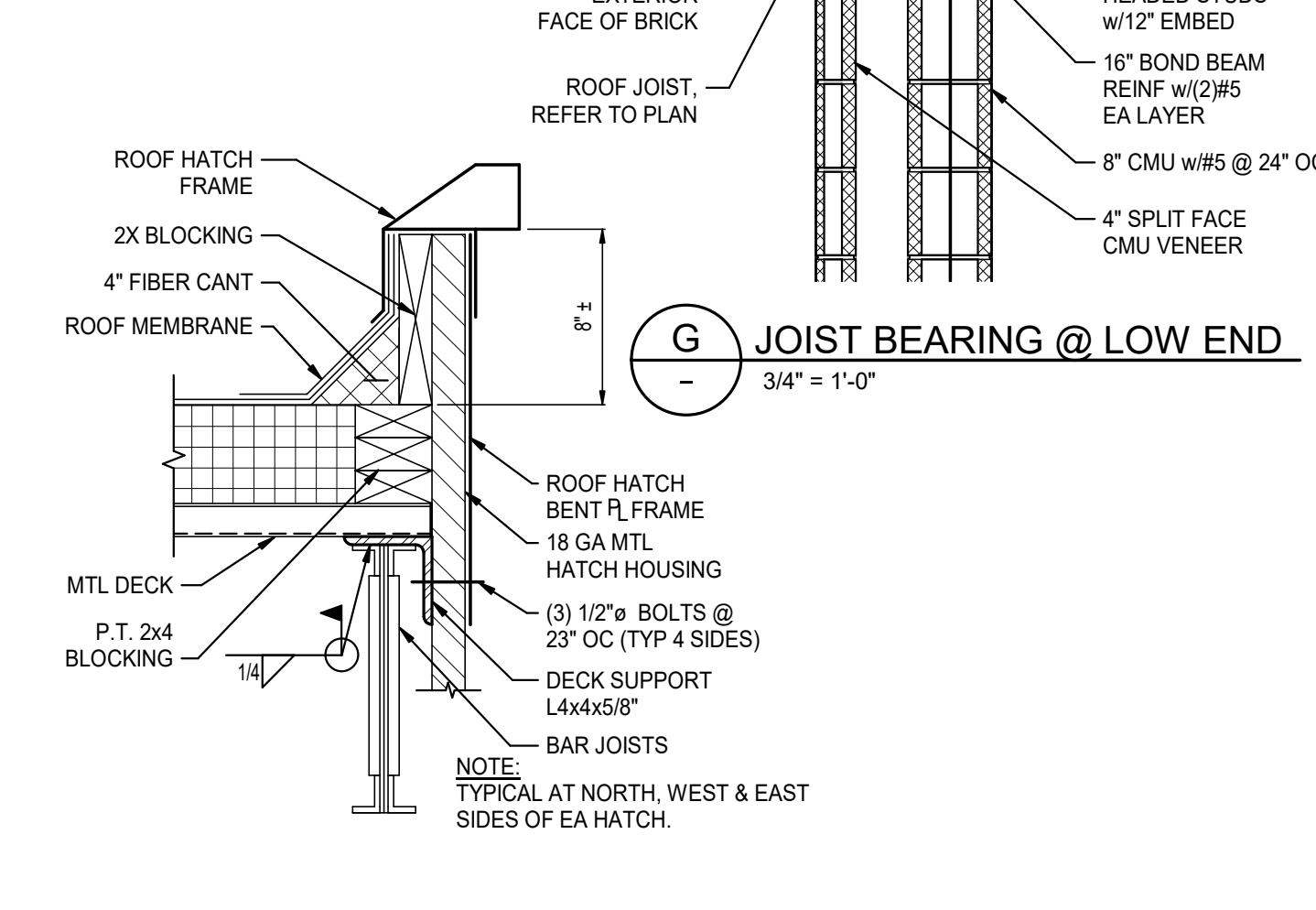
C DECK BEARING @ EXT WALL
3/8" = 1'-0"



D DECK BEARING @ MID WALL
3/4" = 1'-0"

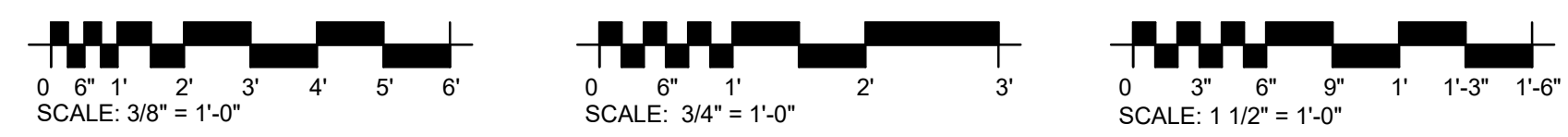


E INTERIOR FOOTING
3/4" = 1'-0"



F HATCH PENETRATION DETAIL
1 1/2" = 1'-0"

G JOIST BEARING @ LOW END
3/4" = 1'-0"



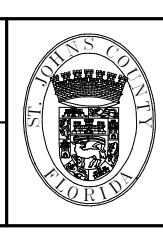
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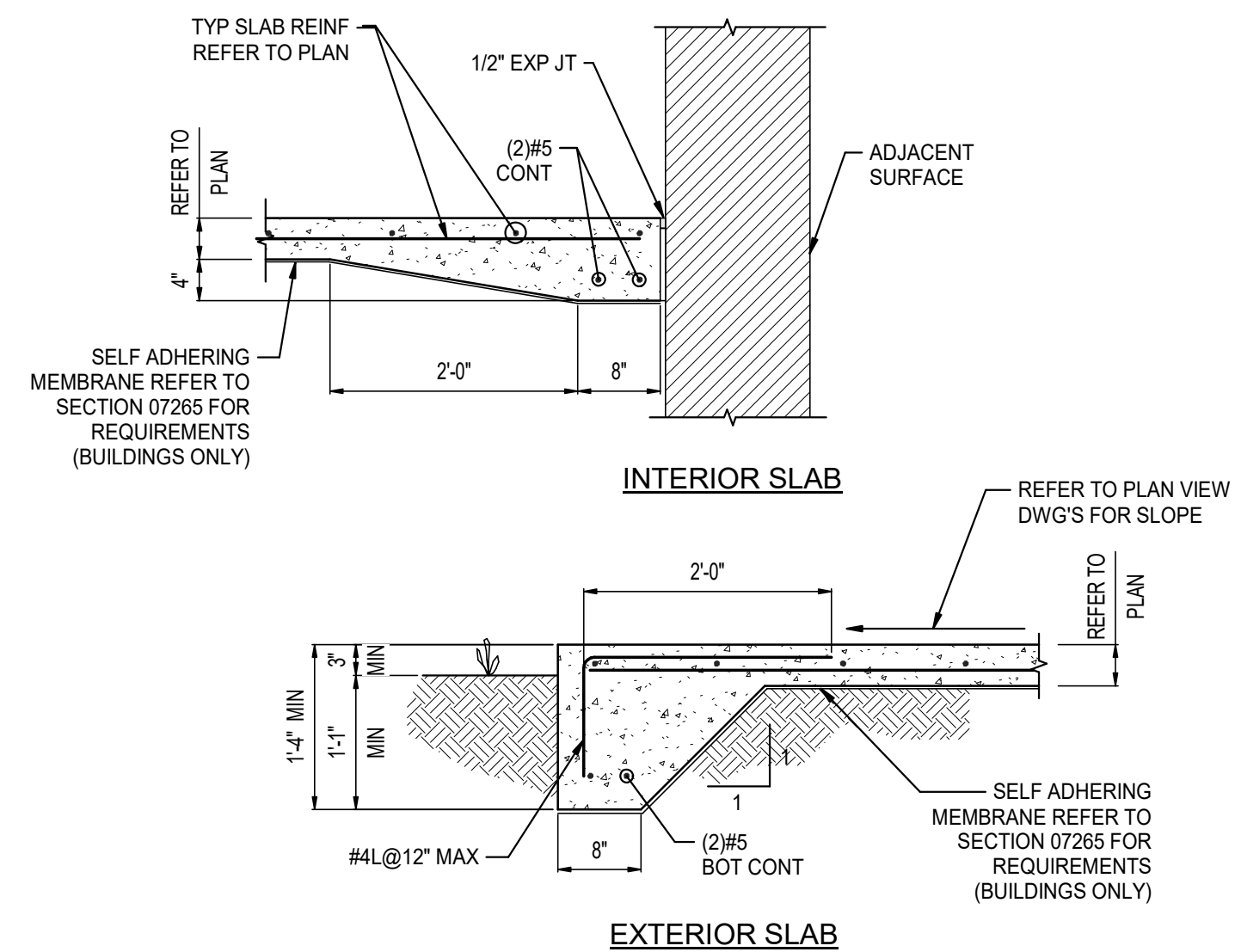
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

BOOSTER PUMP STATION BUILDING
SECTIONS & DETAILS

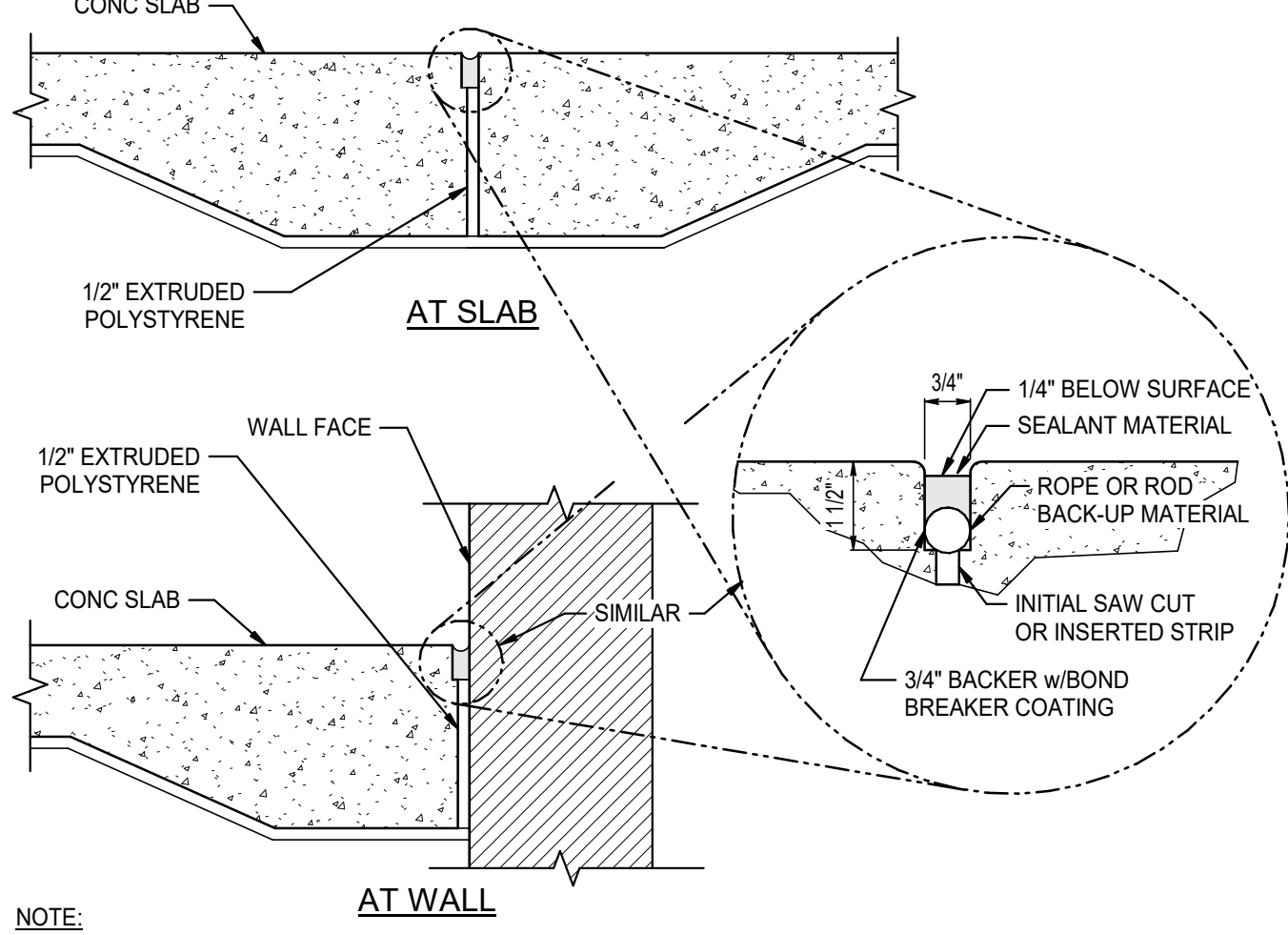
SHEET NO. 32
DWG NO. S-4
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A TURNDOWN AT SLAB EDGE
3/4" = 1'-0"

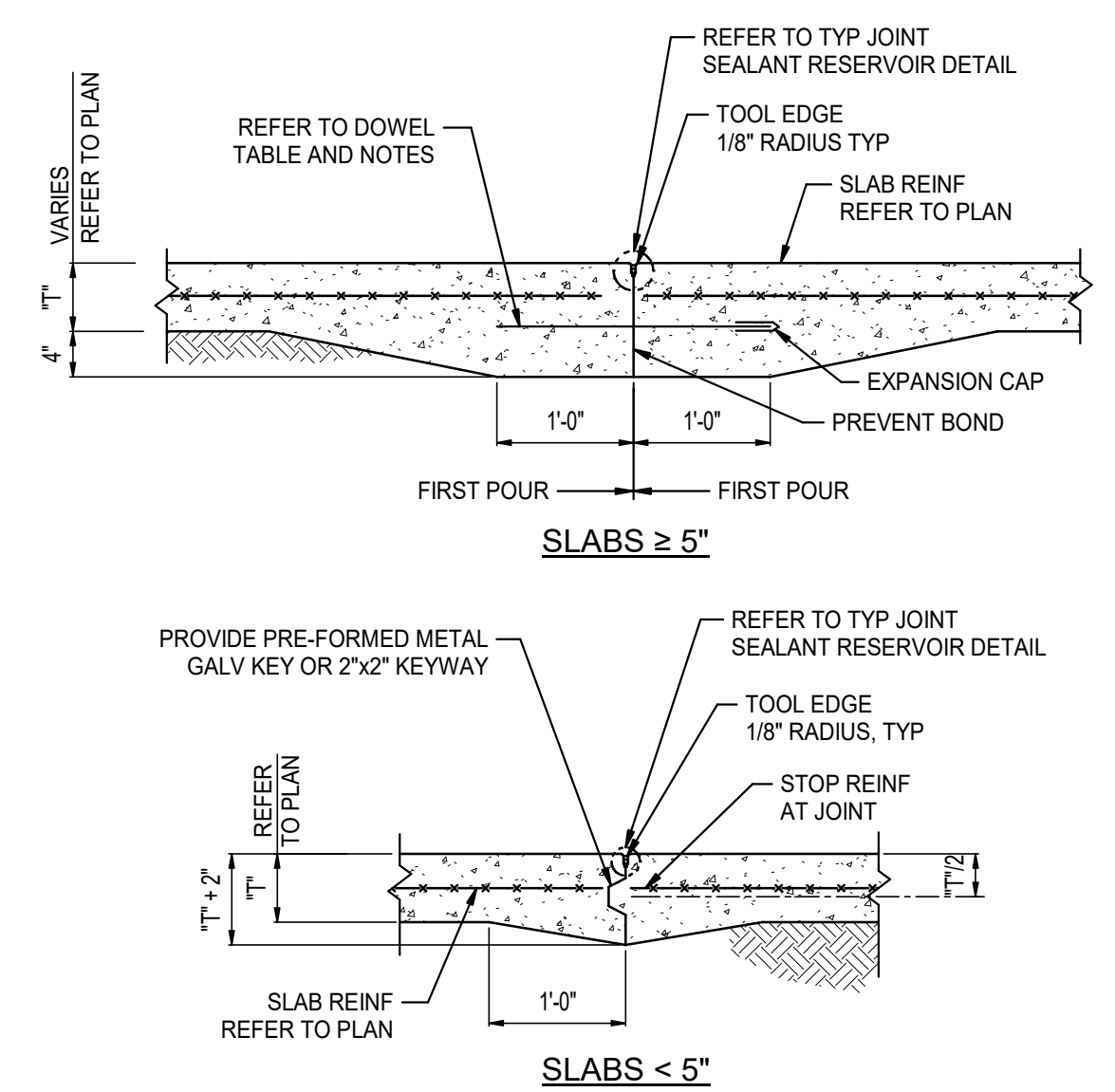


B TYPICAL SLAB 1/2" EXPANSION JOINT (EJ)
1 1/2" = 1'-0"

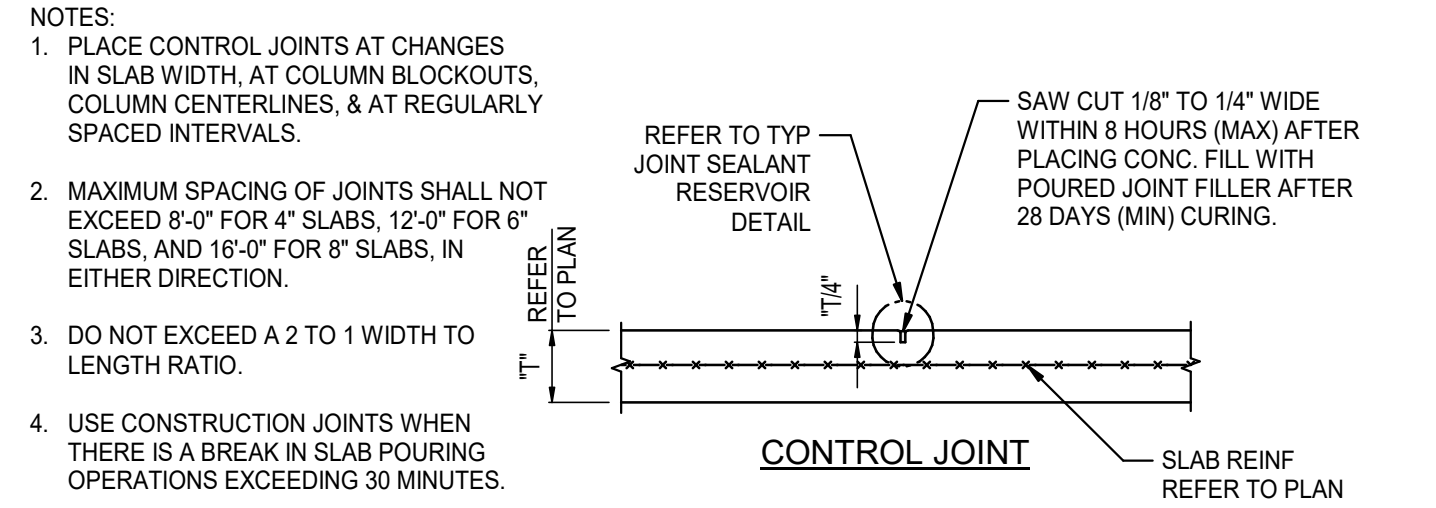
DOWEL TABLE			
"T" SLAB DEPTH (INCHES)	DIAMETER (INCHES)	TOTAL LENGTH (INCHES)	CENTER TO CENTER SPACING (IN)
5	5/8	12	12
6	3/4	14	12
7	7/8	14	12
8	1	14	12
9	1 1/8	16	12
10	1 1/4	18	12
11	1 3/8	18	12
12	1 1/2	20	12

DOWEL NOTES:
 1. DOWELS SHALL BE PLAIN ROUND BARS EQUIVALENT TO ASTM A615 WITH A CORROSION RESISTANT COATING.
 2. ONE-HALF (1/2) OF EACH BAR SHALL BE COVERED WITH ONE COAT TAR. PLACE EXPANSION CAP ON COATED SIDE.
 3. DOWELS SHALL BE PLACED PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. TOLERANCE OF THE PLACEMENT SHALL BE ±1/4".

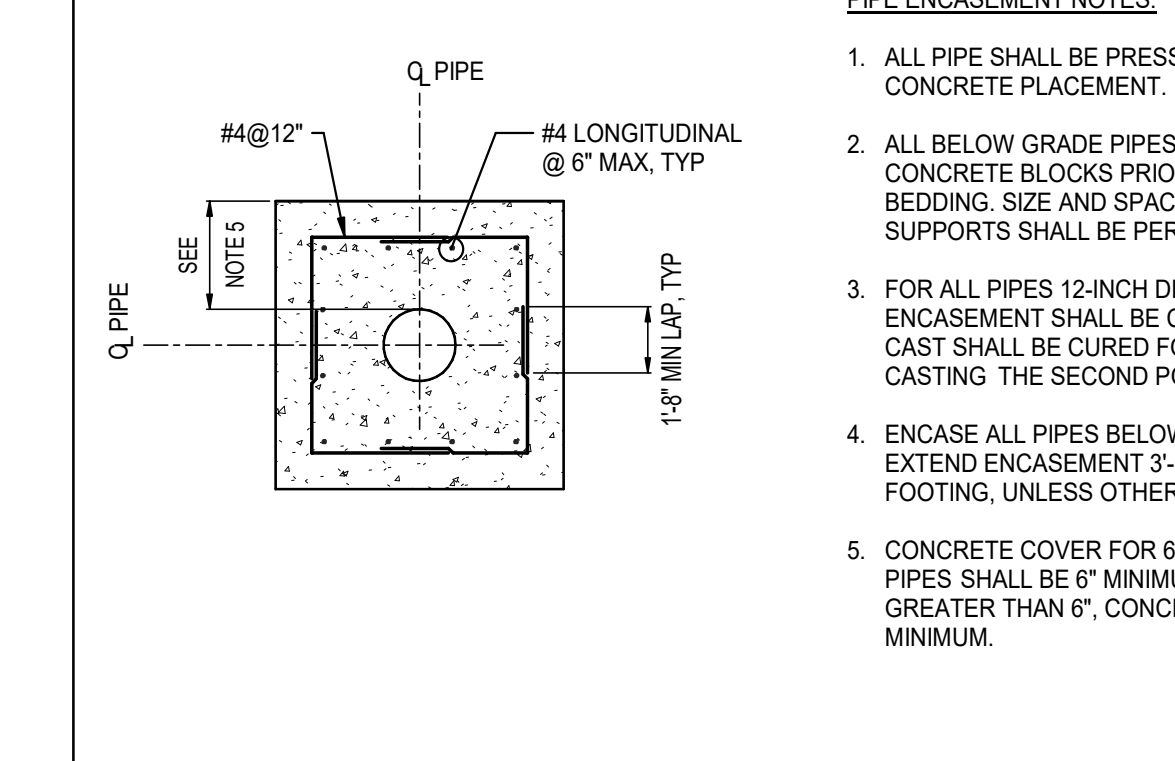
C TYPICAL SLAB ON GRADE CONSTRUCTION JOINT
3/4" = 1'-0"



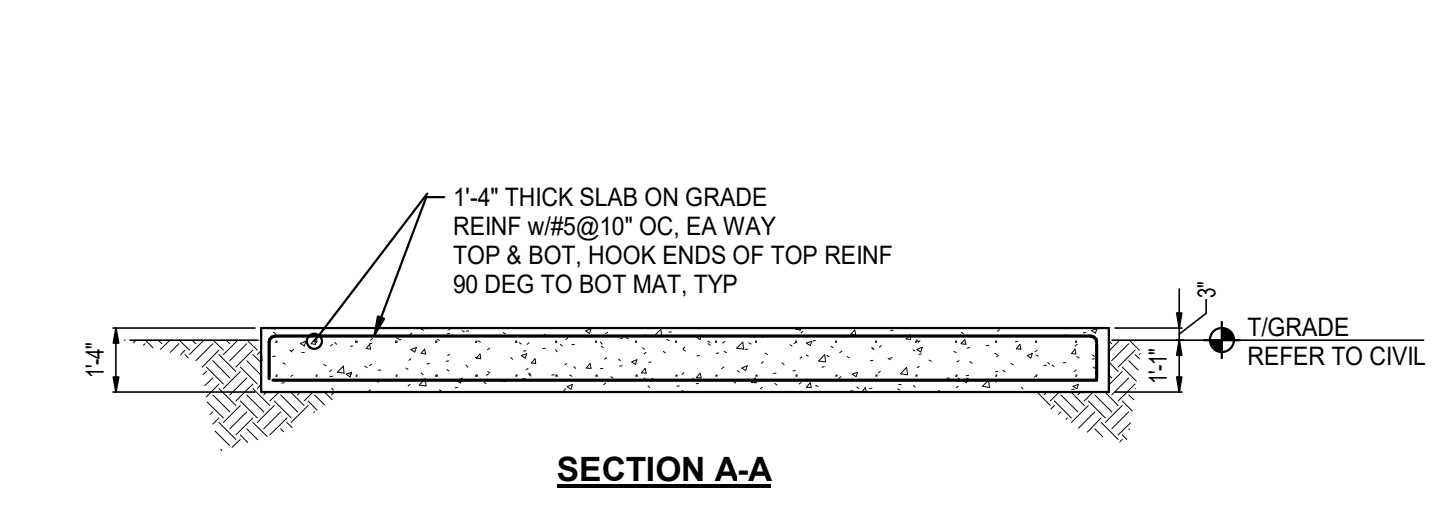
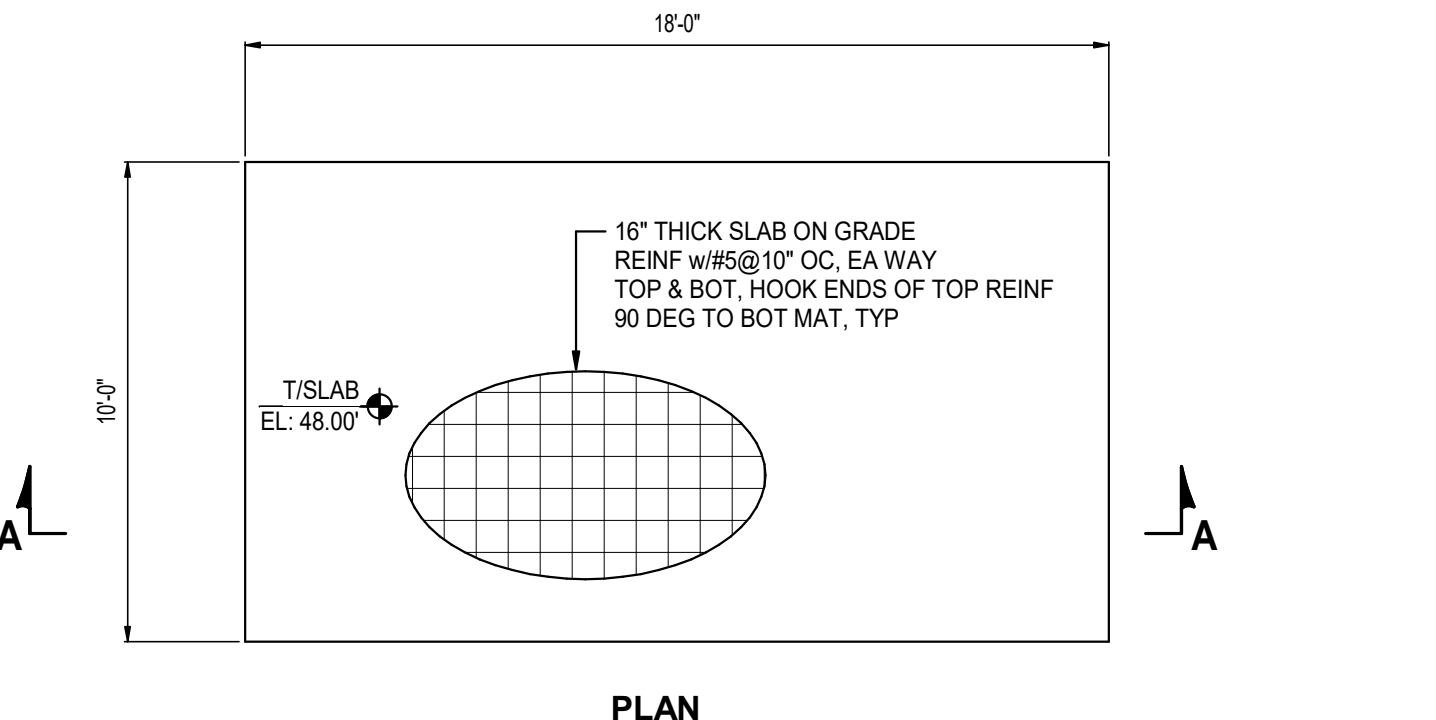
H CONCRETE PIPE ENCASEMENT
3/4" = 1'-0"



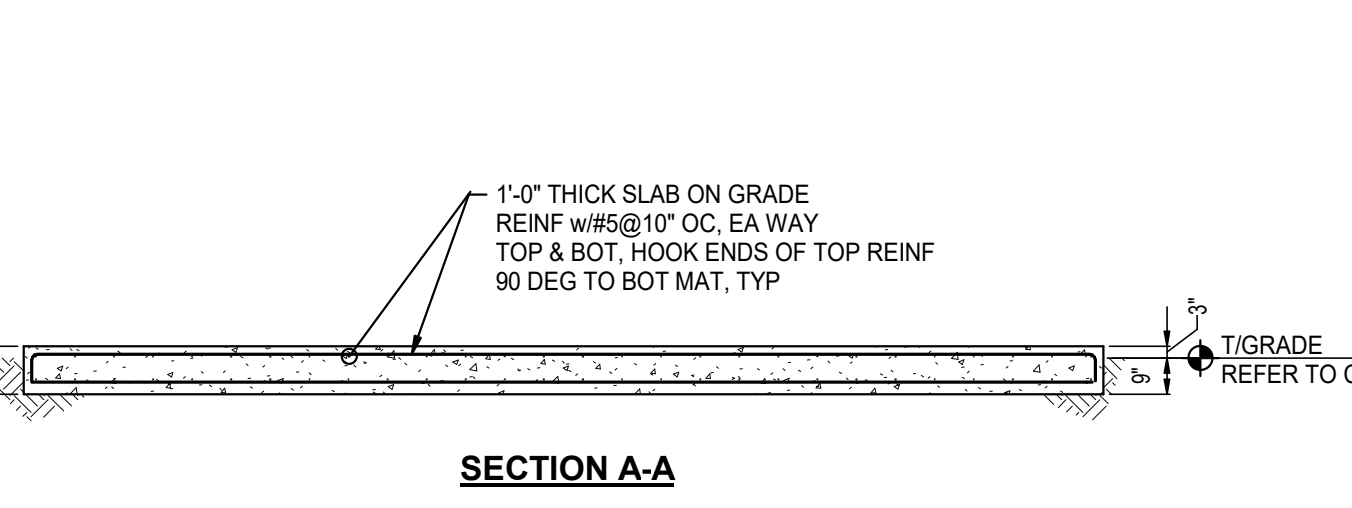
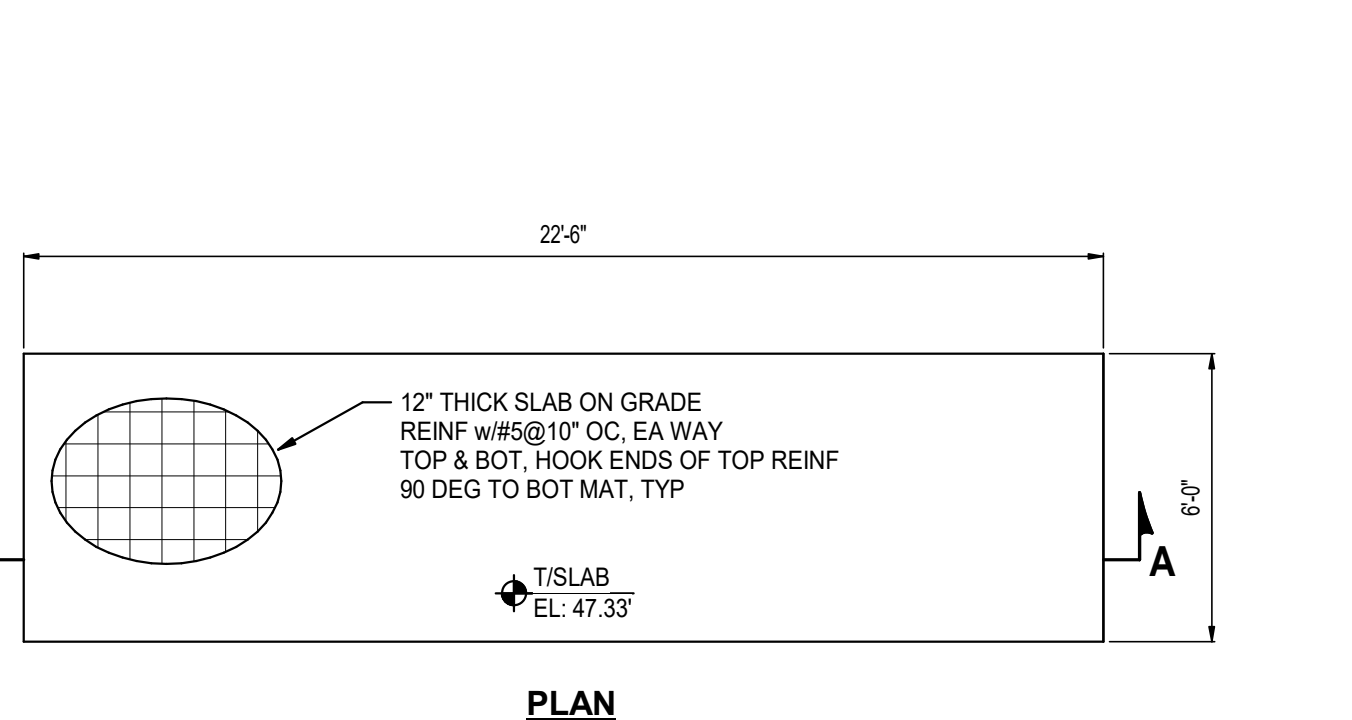
D TYPICAL SLAB ON GRADE CONTROL JOINT (CJ)
3/4" = 1'-0"



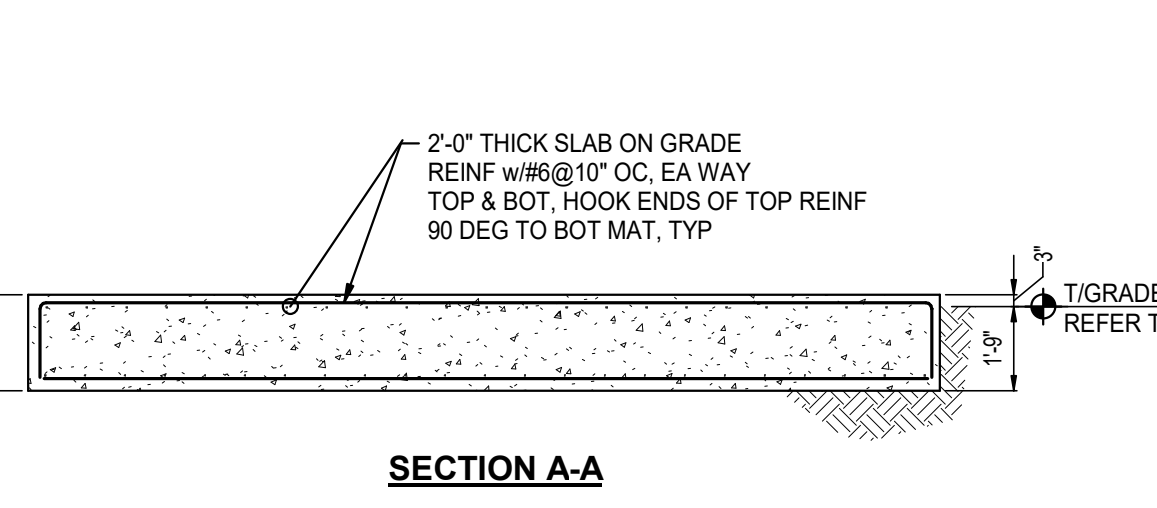
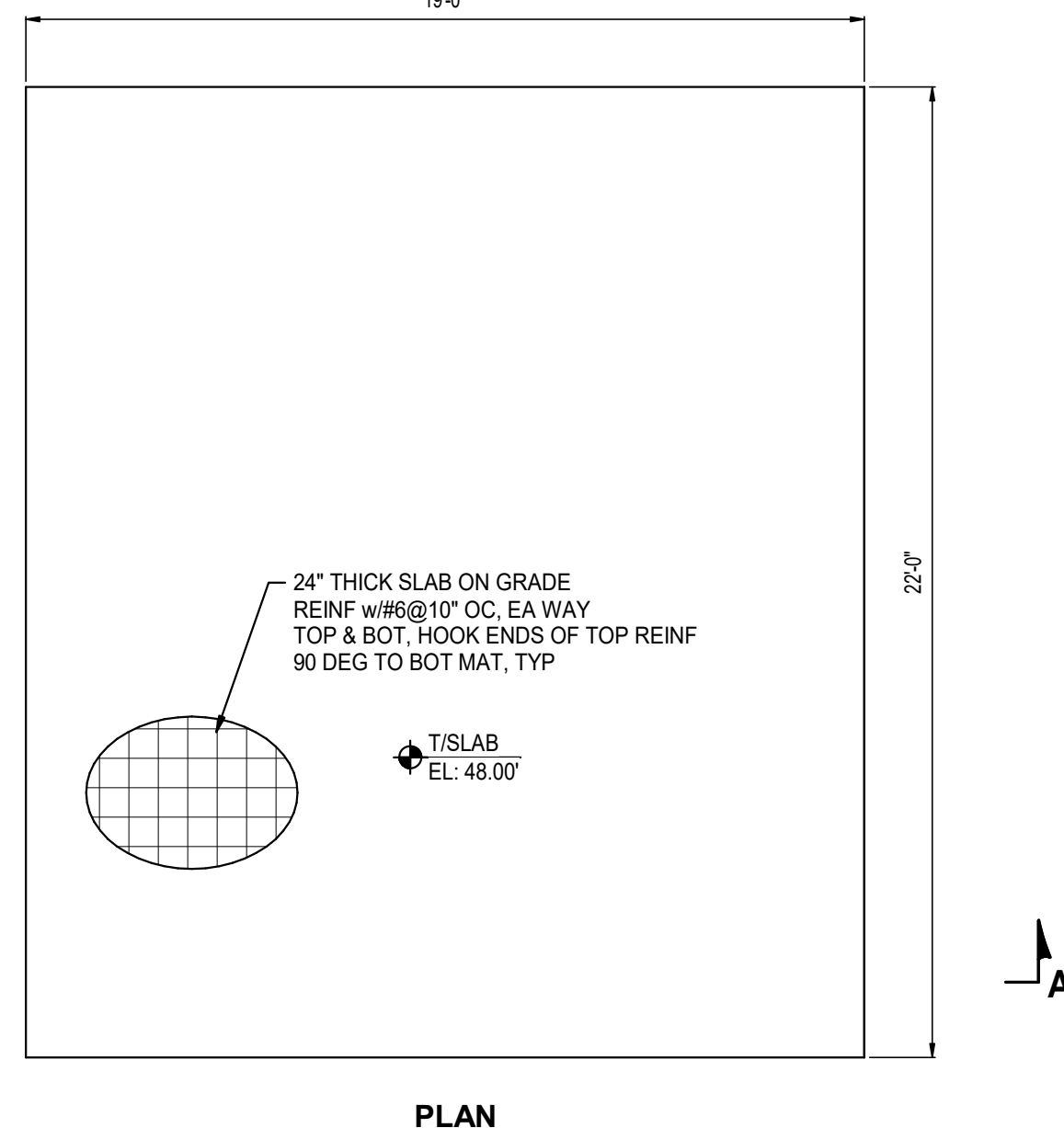
I TYPICAL JOINT SEALANT RESERVOIR
3/4" = 1'-0"



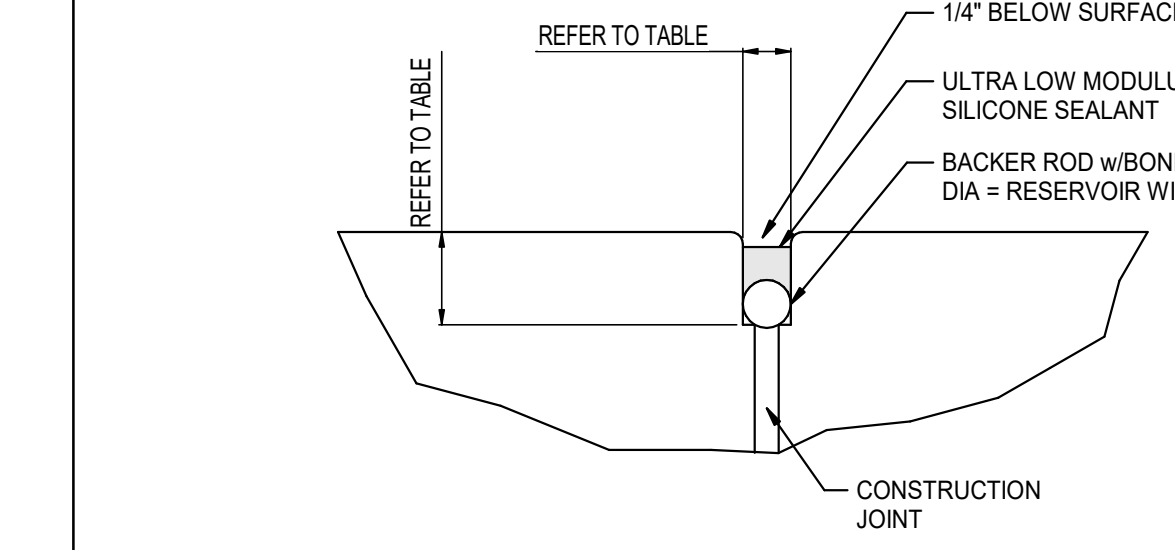
E DISCHARGE FLOW METER AND BYPASS PAD
1/4" = 1'-0"



F FILL VALVE PAD
1/4" = 1'-0"

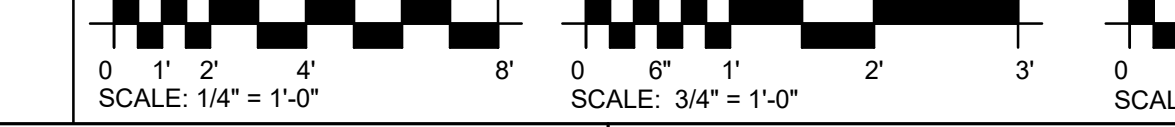


G GENERATOR PAD PLAN
1/4" = 1'-0"



JOINT SPACING	SEALANT RESERVOIR SHAPE	
	WIDTH	DEPTH
15'-0" OR LESS	5/8"	3/4"
20'-0"	5/8"	3/4"
30'-0"	5/8"	3/4"
40'-0"	5/8"	1"

NOTE:
 1. SEALANT MATERIAL SHALL BE A FIELD MOLDED SEALANT OF ONE OF THE FOLLOWING TYPES:
 2. HOT APPLIED THERMOPLASTIC ASPHALT - RUBBER COMPOUNDS MEETING ASTM D1190.
 3. HOT Poured ELASTOMERIC TYPE SEALANTS - MEETING ASTM D3406.
 4. COLD APPLIED, MASTIC SINGLE OR MULTIPLE - COMPONENT SEALANTS MEETING ASTM D1850.



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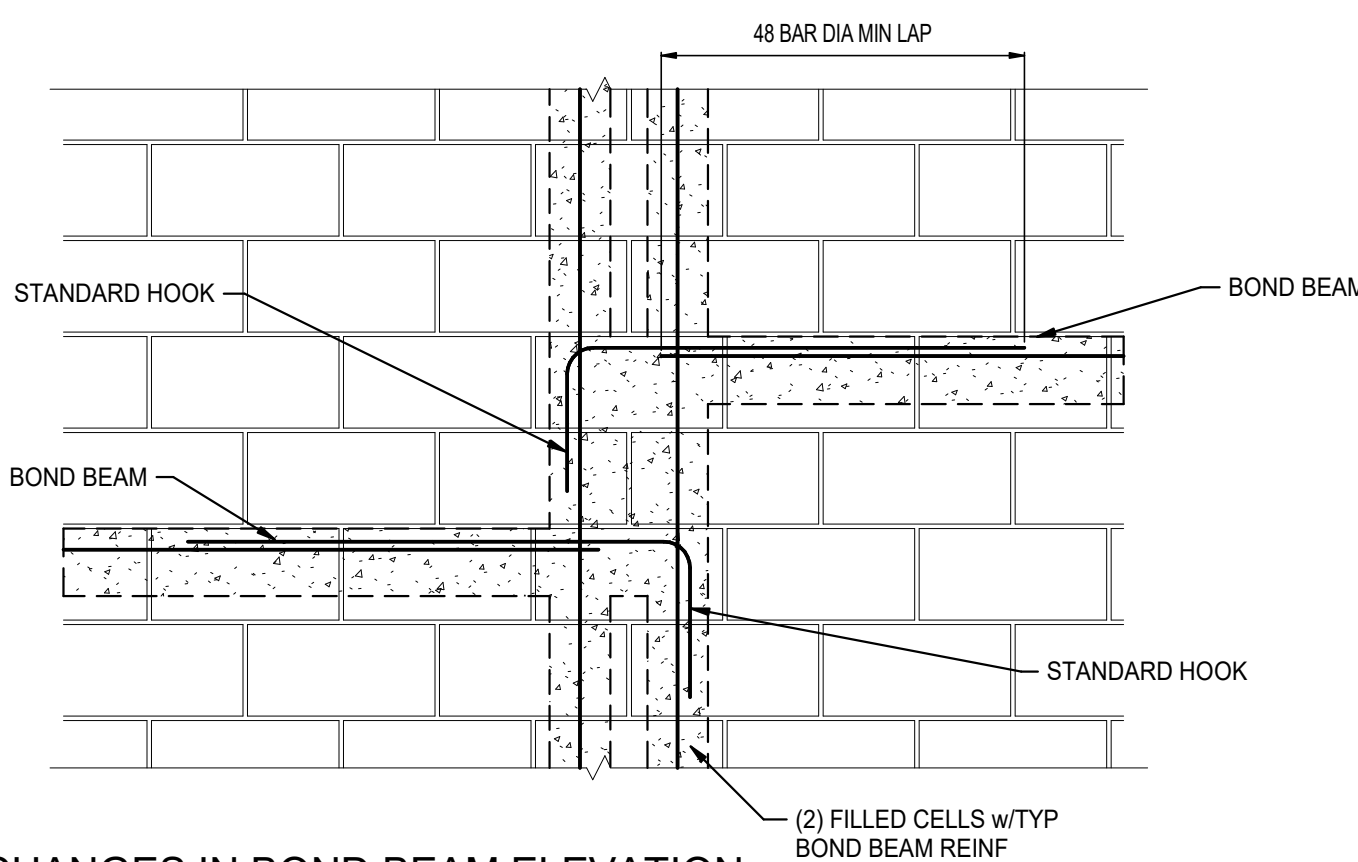
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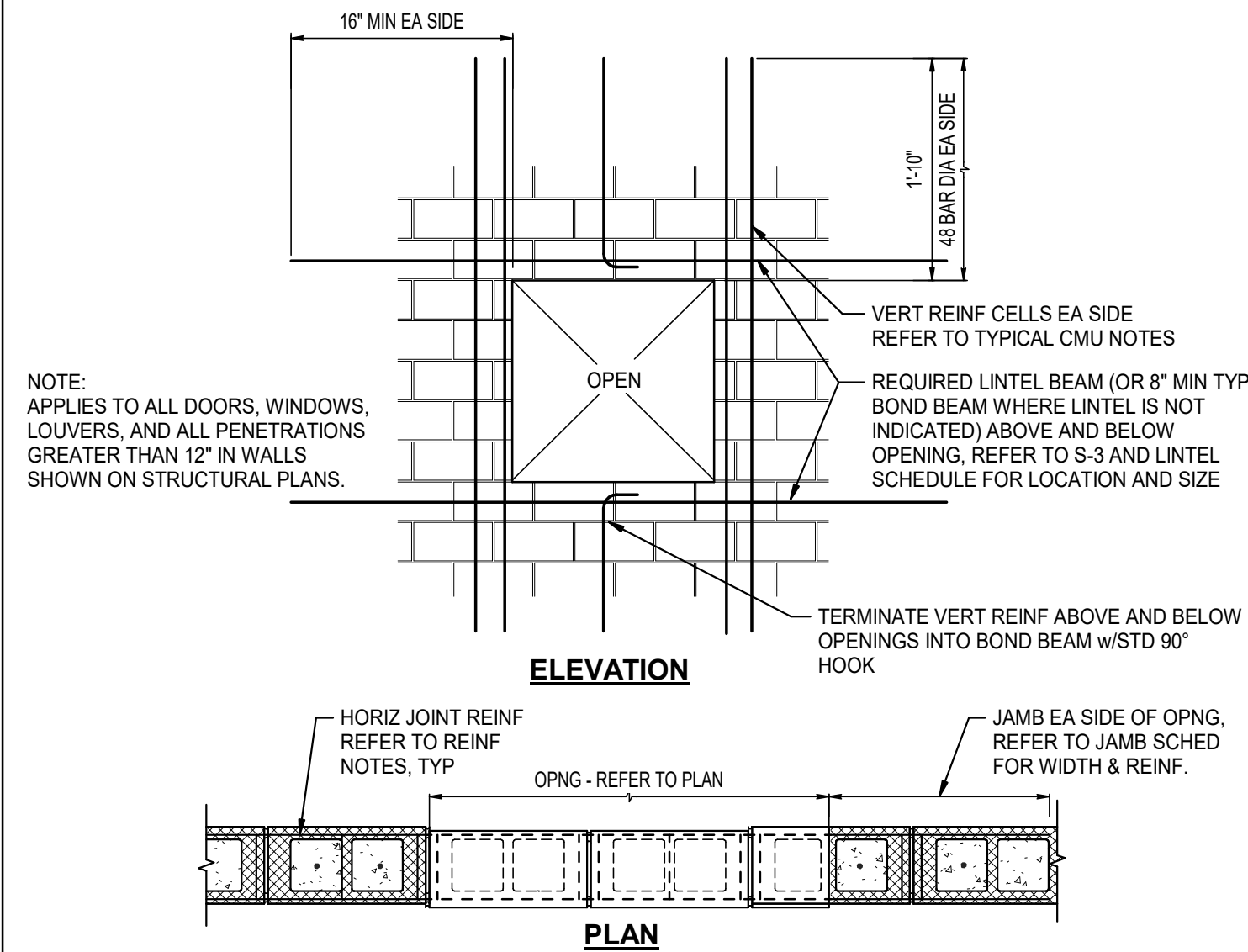
CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION
 SLAB AND FOUNDATION DETAILS
 SHEET NO. 33
 DWG NO. S-5
 ELECTRICAL BID PACKAGE

- REFER TO SHEET S-1 FOR ADDITIONAL NOTES.
- DOWEL ALL CMU REINF IN FOOTINGS AND EXTEND INTO UPPERMOST BOND BEAM WITH 90° HOOKS.
- FILL ALL CELLS CONTAINING REINF & ADDITIONAL CELLS AS INDICATED WITH 3,000 PSI PEA GRAVEL CONCRETE.
- PROVIDE FOUR (4) FILLED CELLS OF TYPICAL WALL REINFORCING AT INTERSECTIONS, (3) FILLED CELLS OF TYPICAL WALL REINFORCING AT CORNERS, AND TWO (2) FILLED CELLS OF TYPICAL WALL REINFORCING AT EACH SIDE OF OPENINGS AND ENDS OF WALLS. PROVIDE (5) FILLED CELLS OF TYPICAL WALL REINFORCING AT CORNERS OF STAIRWELL AND ELEVATOR WALLS, UNLESS NOTED OTHERWISE.
- FOR REINFORCEMENT ADJACENT TO INTERIOR CMU WALL OPENINGS, COORDINATE WITH JAMB SCHEDULE ON THIS SHEET.
- ALL CONCRETE MASONRY UNITS SHALL BE PLACED IN RUNNING BOND.
- GROUT FILL SOLID ALL CELLS BELOW GRADE.
- TYPICAL 8" CMU WALL REINF:
 - REINF WITH #5 BARS VERTICAL @ 24" WITH ADDITIONAL REINF AS INDICATED IN NOTE 4.
 - PROVIDE 16" CMU BOND BEAM WITH (2) #5 CONT @ TOP OF ALL WALLS, UON.
 - PLACE THE REINF IN THE CENTER OF THE WALL, UON.
- HORIZ JOINT REINF IN ALL BLOCK WALLS SHALL BE STANDARD (9 GA. SIDE AND CROSS RODS) LADDER TYPE WALL REINF @ 16". ALL WALLS PERPENDICULAR TO EXTERIOR WALLS SHALL HAVE ADDITIONAL PREFABRICATED "T" OR "L" JOINT REINF AS INDICATED IN TYPICAL CMU DETAILS.
- GROUT STOP SHALL BE A FIBERGLASS MESH CONFORMING TO ASTM STANDARD D1668-73, TYPE 207.
- SPLICE ALL BARS 48 BAR DIA UNLESS OTHERWISE NOTED.
- USE (1) TOP & BOT CORNER BAR (MATCH TYP REINF) WITH 48 BAR DIA LONG LEGS EACH WAY IN ALL BOND BEAM CORNERS & INTERSECTIONS. PLACE AT EXTERIOR FACE UON.
- THE LOWEST VERT BAR IN ALL BLOCK WALLS SHALL HOOK 90° INTO THE FOOTING OR SLAB WITH A MIN 8" LEG UNLESS THE VERT REINF PASSES THRU THE SLAB TO A CONT WALL ABOVE.
- THE HIGHEST VERT BAR IN ALL BLOCK WALLS SHALL HOOK 90° INTO THE UPPERMOST BOND BEAM WITH A MIN 8" LEG UNLESS THE VERT REINF PASSES THRU THE SLAB TO A CONT WALL ABOVE. IF THE WALL IS CAPPED WITH A SLAB, EXTEND 90° HOOKS INTO THE SLAB AND LAP WITH THE VERT WALL REINF.
- REFER TO DETAILS B & C FOR ADDITIONAL REINF AT WALL OPENINGS. OPENINGS LESS THAN 8" x 8" OR 8" DIA SHALL BE EXEMPT FROM THIS REQUIREMENT PROVIDED THAT ANY PORTION OF OPENING IS NOT LOCATED WITHIN A REINFORCED CELL.
- CONDUIT PLACED IN REINFORCED CELLS SHALL BE LIMITED TO (1) CONDUIT PER REINFORCED CELL. MAX CONDUIT SIZE SHALL NOT EXCEED 1" O.D.

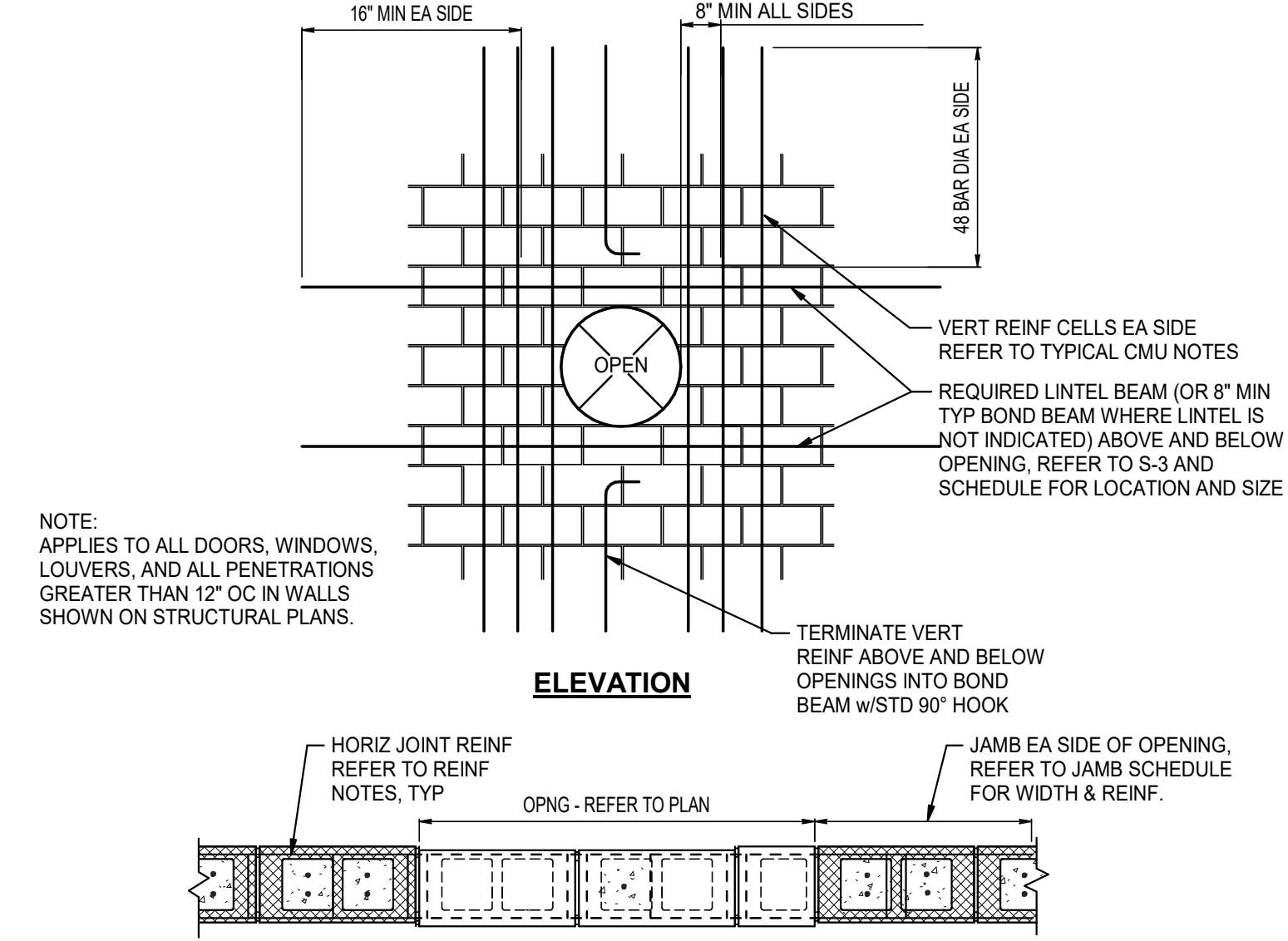
A TYPICAL CMU NOTES
NO SCALE



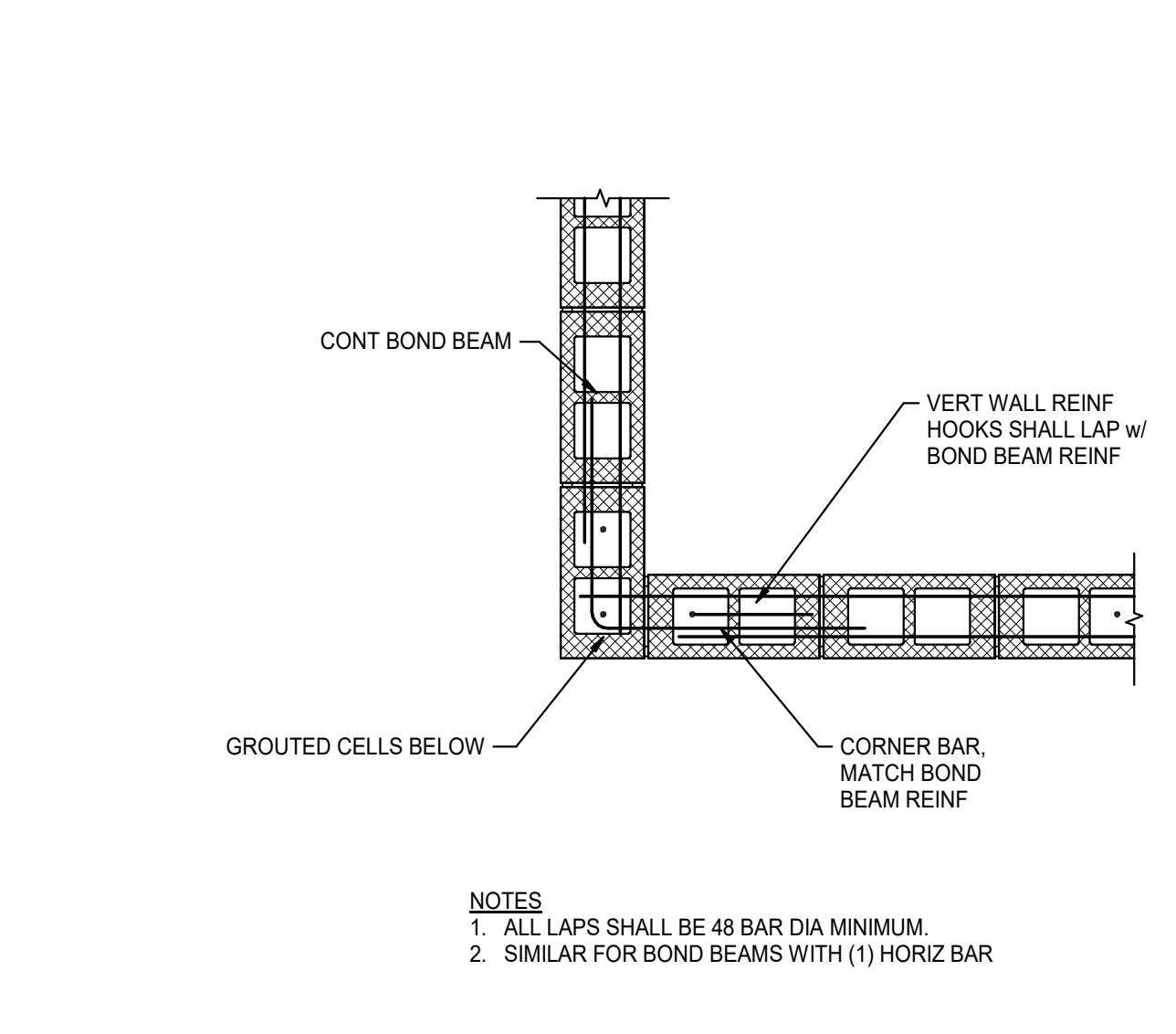
E CHANGES IN BOND BEAM ELEVATION
3/4" = 1'-0"



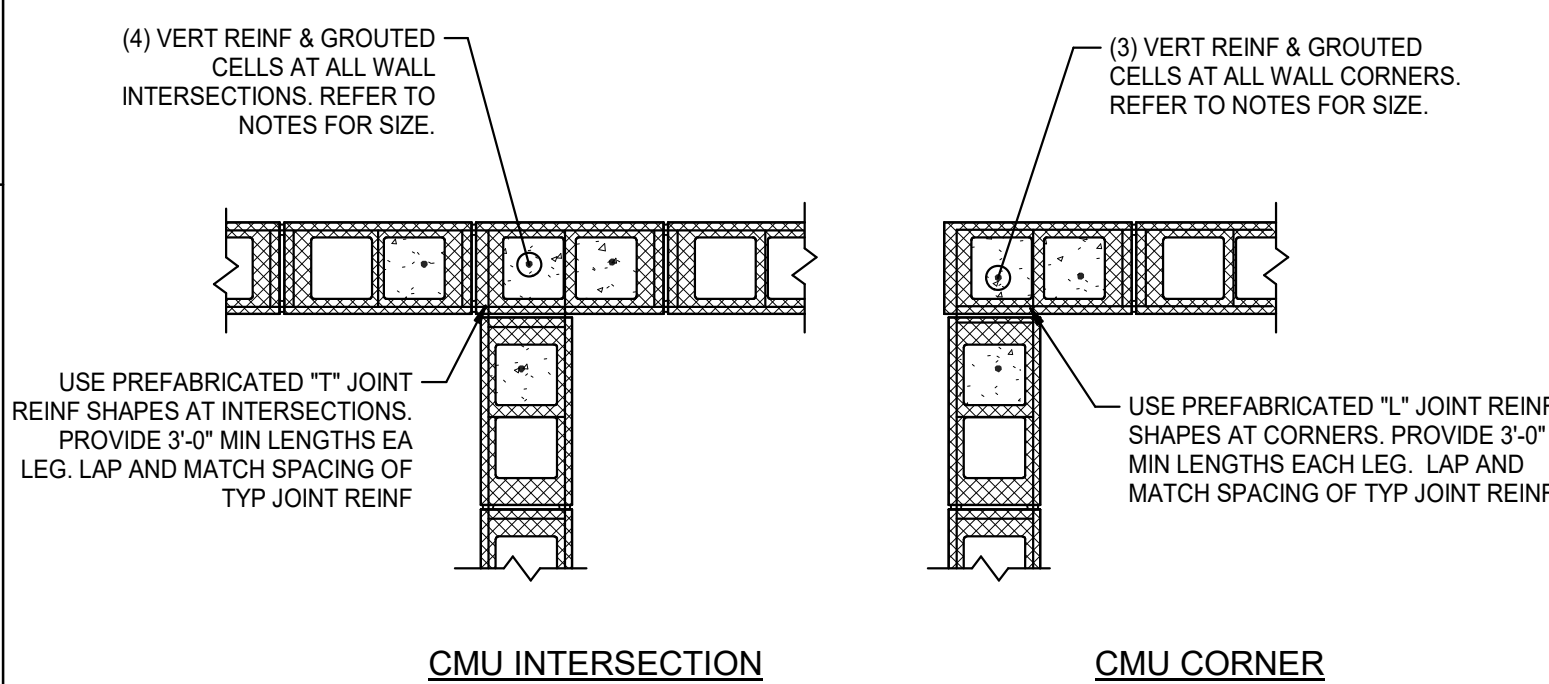
B SQUARE OPENING IN MASONRY WALL
3/4" = 1'-0"



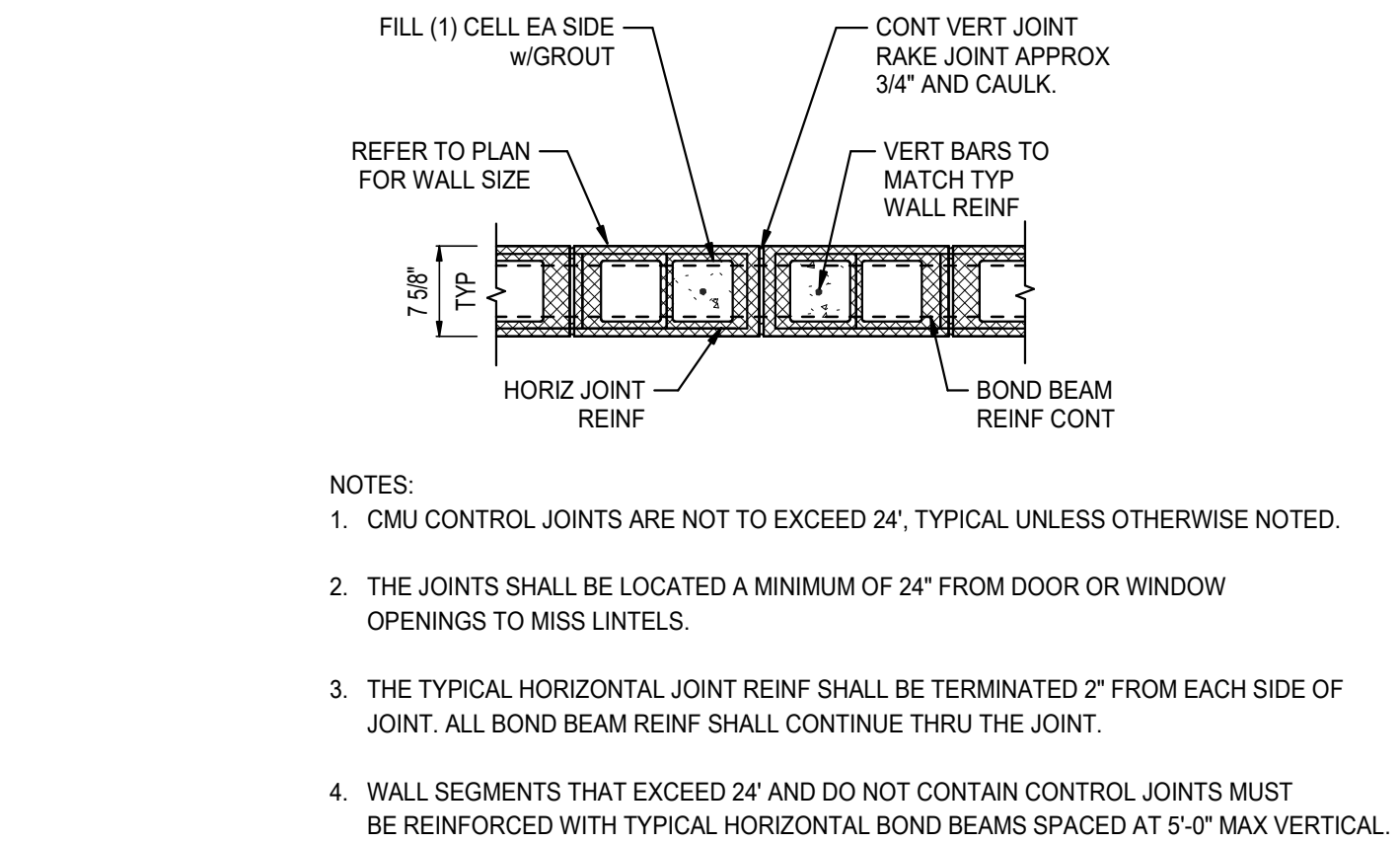
C CIRCULAR OPENING IN MASONRY WALL
3/4" = 1'-0"



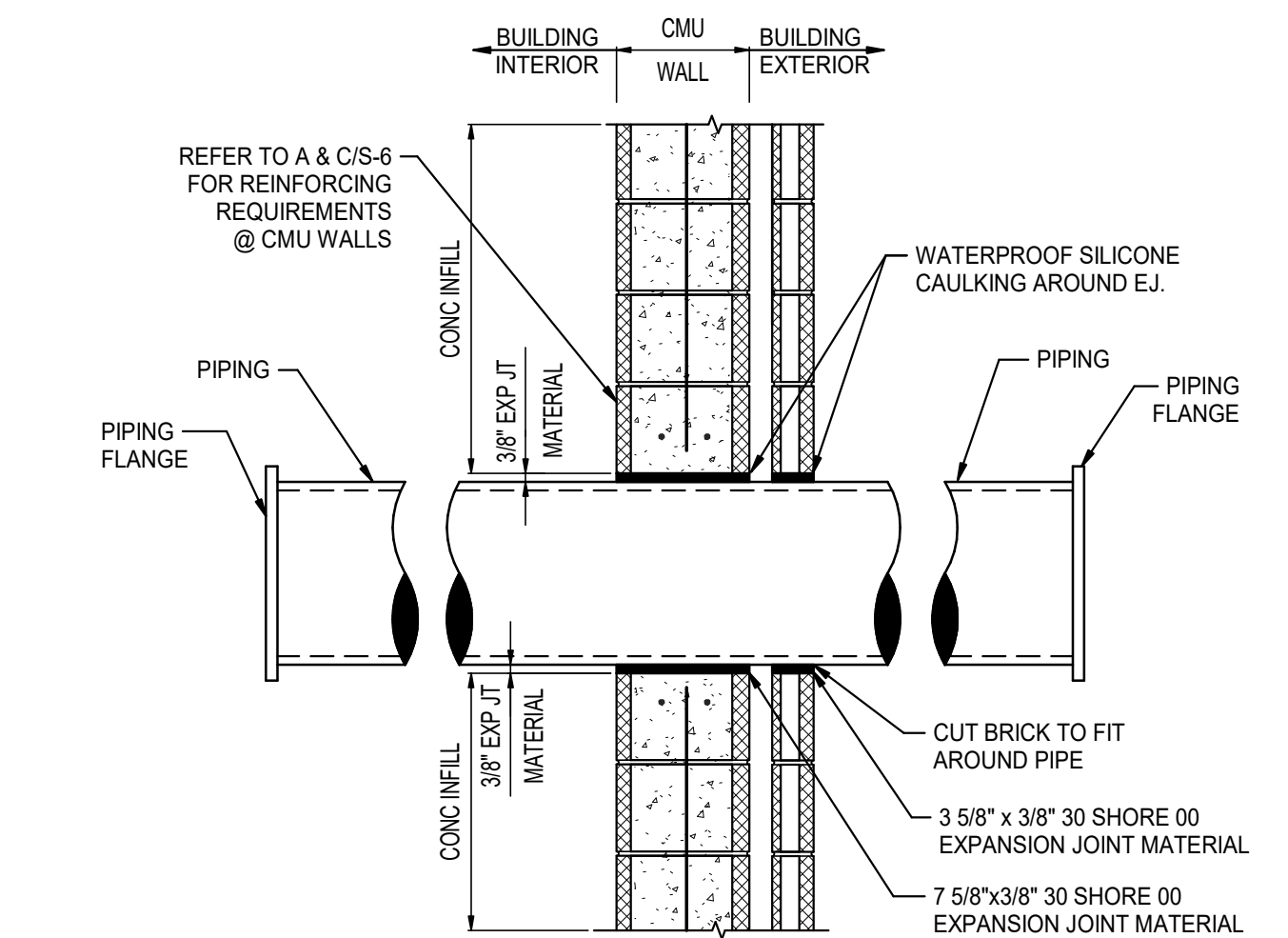
D BOND BEAM CORNER REINFORCING DETAIL
3/4" = 1'-0"



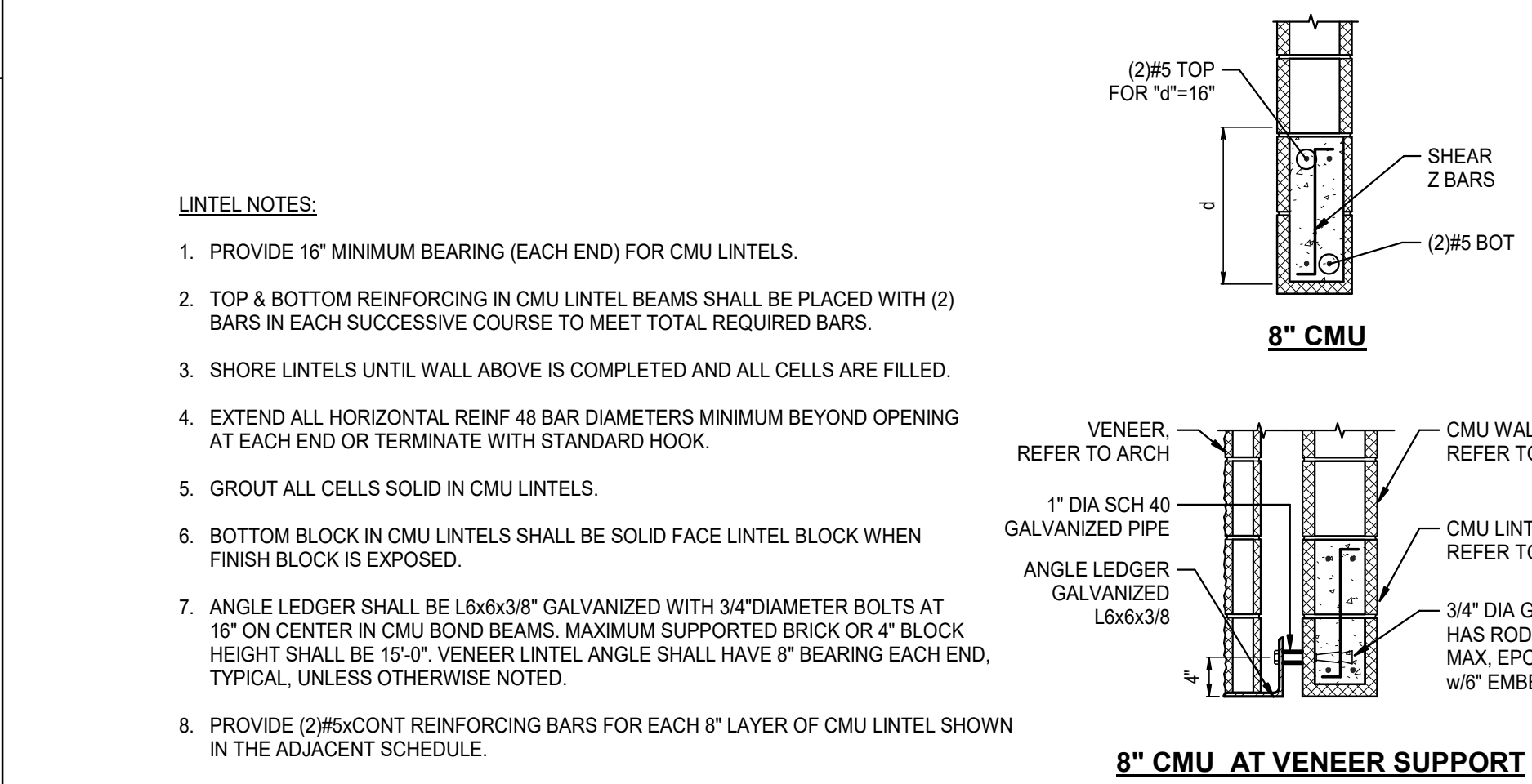
F TYPICAL CMU DETAILS
3/4" = 1'-0"



G TYPICAL CMU CONTROL JOINT DETAIL
3/4" = 1'-0"



H TYPICAL PIPING PENETRATION DETAIL @ EXT
3/4" = 1'-0"



I TYPICAL LINTEL DETAILS FOR CMU WALLS
3/4" = 1'-0"

LINTEL SCHEDULE					
MARK	WIDTH	DEPTH (d)	TOP REINF	BOT REINF	COMMENTS
LB1	**	8"	---	(2)#5	
LB2	**	16"	(2)#5	(2)#5	(2)#5xCONT EACH 8" LAYER OF BOND BEAM
LB3	**	24"	(2)#5	(2)#5	(2)#5xCONT EACH 8" LAYER OF BOND BEAM

** - DENOTES MATCH CMU WALL WIDTH DO NOT SPLICE BOTTOM BARS IN SPAN.

8" CMU JAMB SCHEDULE	
OPENING SIZE "W"	JAMB WIDTH & REINF
≤ 4'-0"	8" w/(1) #5 EA CELL
≤ 8'-0"	16" w/(1) #5 EA CELL

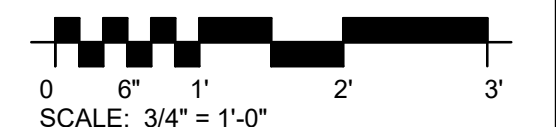
- JAMB NOTES:**
- APPLIES TO ALL OPENINGS INCLUDING BUT NOT LIMITED TO DOORS, WINDOWS, LOUVERS, DUCT PENETRATIONS, ETC.
 - REFER TO CMU WALL NOTES FOR TYP REINF.

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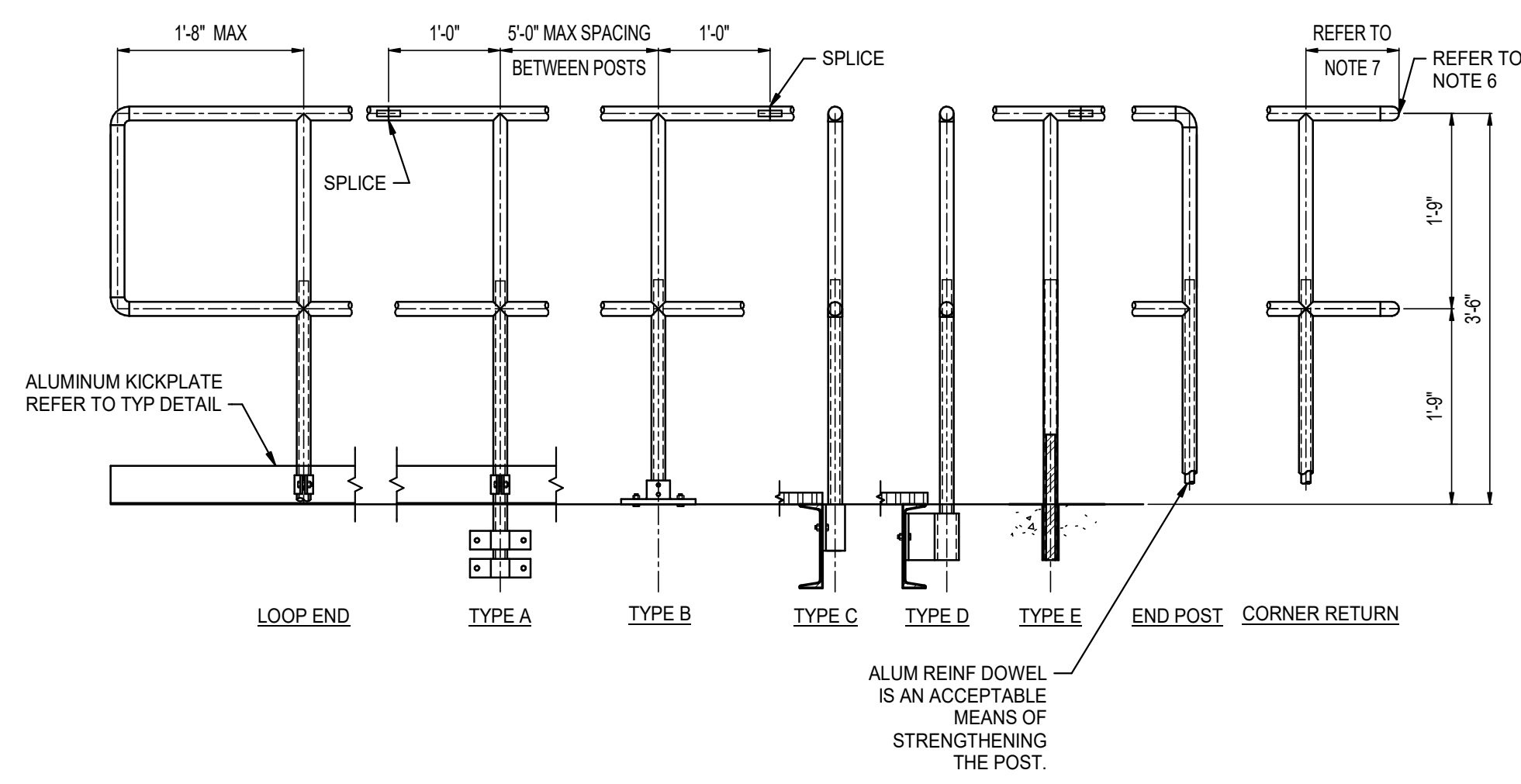
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1	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

<p>MOTT MACDONALD Mott MacDonald Florida, LLC</p>	<p>Architects Engineers Surveyors AA - C0000035 EB - 0000155 LB - 0006783 10245 Centurion Pkwy. N., Suite 320 Jacksonville, Florida 32256 Telephone: (904) 203-1090</p>	<p>DESIGNER: C. LYNER DRAWN BY: B. LEE DATE: OCT 2022 CHECKED BY: B. PERRY DATE: OCT 2022</p>	<p>DESIGN ENGINEER CHAD E. LYNER, P.E. FLORIDA REGISTRATION NO. 66277</p>	<p>St. Johns County Utility Department 1205 STATE ROAD 16 ST. AUGUSTINE, FL 32084 PHONE: (904) 209-2626 FAX: (904) 209-2627</p>	<p>CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION</p>	<p>MASONRY DETAILS</p>	<p>SHEET NO. 34</p>
							<p>DWG NO. S-6</p>
<p>ELECTRICAL BID PACKAGE</p>							

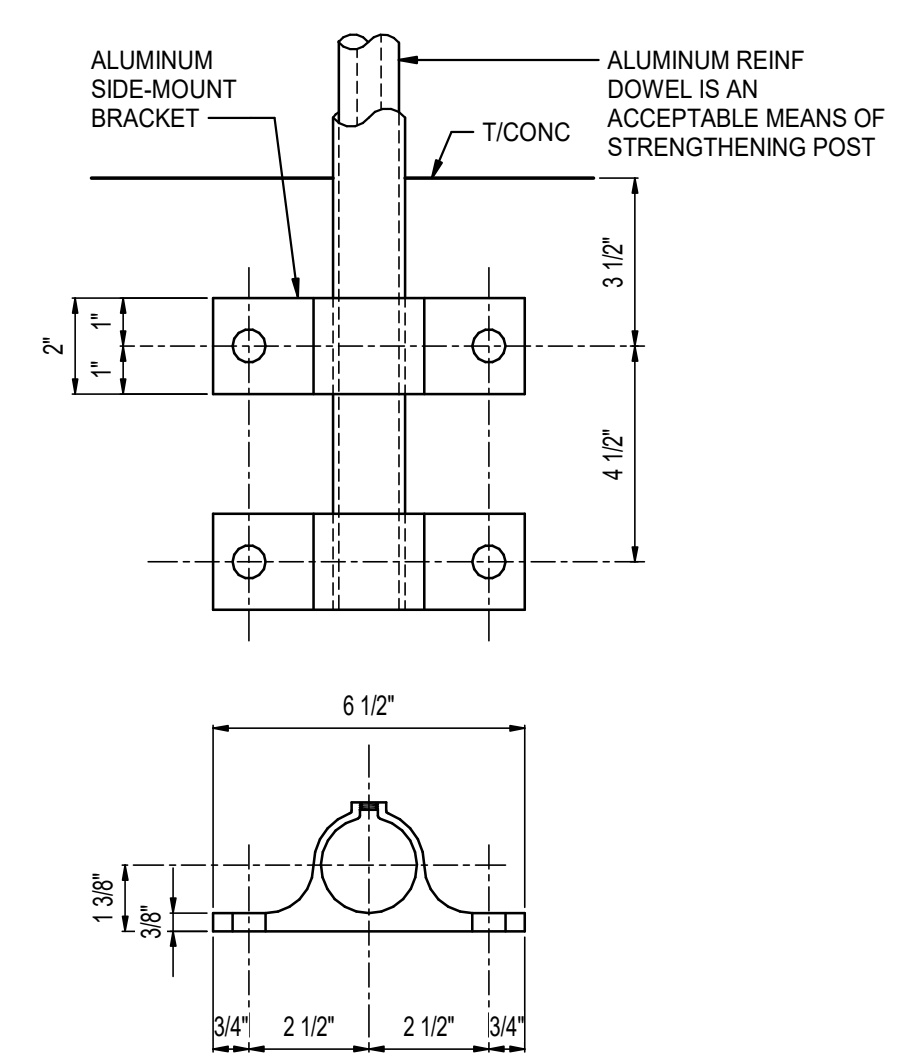


GUARDRAIL NOTES

- GUARDRAIL SHALL BE THE PRODUCT OF A COMPANY NORMALLY ENGAGED IN THE MANUFACTURE OF PIPE RAILING. RAILING SHALL BE SHOP ASSEMBLED IN LENGTHS NOT TO EXCEED 24'-0" FOR FIELD ERECTION.
- GUARDRAILS AND STAIR RAILS SHALL BE DESIGNED TO WITHSTAND A 200# CONCENTRATED LOAD APPLIED IN ANY DIRECTION AT ANY POINT ON THE TOP RAIL. GUARDRAILS AND STAIR RAILS SHALL ALSO BE DESIGNED TO WITHSTAND A LOAD OF 50#/FT APPLIED HORIZONTALLY TO THE TOP RAIL. THE 200# LOAD WILL NOT BE APPLIED SIMULTANEOUSLY WITH THE 50#/FT LOAD. IN ADDITION, THE GUARDRAIL SHALL BE DESIGNED TO WITHSTAND A LOAD OF 100#/FT APPLIED VERTICALLY DOWNWARD TO THE TOP RAIL AND SIMULTANEOUSLY WITH THE 50#/FT HORIZONTAL LOAD. THE 100#/FT VERTICAL LOAD DOES NOT APPLY TO STAIR RAILS.
- THE MANUFACTURER SHALL SUBMIT CALCULATIONS TO THE ENGINEER FOR REVIEW. TESTS OF BASE CASTINGS OR BASE EXTRUSIONS BY AN INDEPENDENT LAB OR MANUFACTURER'S LAB (IF MANUFACTURER'S LAB MEETS THE REQUIREMENTS OF THE ALUMINUM ASSOCIATION) WILL BE AN ACCEPTABLE SUBSTITUTE FOR CALCULATIONS. CALCULATIONS WILL BE REQUIRED FOR REVIEW OF ALL OTHER DESIGN ASPECTS.
- POST SPACING SHALL BE A MAXIMUM OF 5'-0". POSTS AND RAILINGS SHALL BE A MINIMUM OF 1 1/2" SCHEDULE 40 ALUMINUM PIPE ALLOY 6063-T6 ASTM-B-429 OR ASTM-B-221. THE GUARDRAIL MANUFACTURER SHALL SHOW THAT THEIR POSTS ARE OF ADEQUATE STRENGTH TO MEET THE LOADING REQUIREMENTS. IF THE MANUFACTURER'S POSTS ARE NOT OF ADEQUATE STRENGTH, THE MANUFACTURER MAY REDUCE THE POST SPACING OR ADD REINFORCING DOWELS OR MAY DO BOTH IN ORDER TO MEET LOADING REQUIREMENTS.
- THE GUARDRAIL SHALL BE MADE OF PIPES JOINED TOGETHER WITH COMPONENT FITTINGS. SAMPLES OF ALL COMPONENTS, BASES, TOE PLATE AND PIPE MUST BE SUBMITTED FOR REVIEW. COMPONENTS THAT ARE POP-RIVETED OR GLUED AT THE JOINTS WILL NOT BE ACCEPTABLE. ALL COMPONENTS MUST BE MECHANICALLY FASTENED WITH STAINLESS STEEL HARDWARE.
- POSTS SHALL NOT INTERRUPT THE CONTINUATION OF THE TOP RAIL AT ANY POINT ALONG THE RAILING, INCLUDING CORNERS AND END TERMINATIONS (OSHA 1910.23). THE TOP SURFACE OF THE TIP RAILING SHALL BE SMOOTH AND SHALL NOT BE INTERRUPTED IN PROJECTING FITTINGS.
- THE MIDRAIL AT THE CORNER RETURN SHALL BE ABLE TO WITHSTAND A 200# LOAD WITHOUT LOOSENING. THE MANUFACTURER IS TO DETERMINE THIS DIMENSION FOR THEIR SYSTEM. PROVIDE PHYSICAL TESTS FROM A LABORATORY TO CONFIRM COMPLIANCE.
- STAINLESS STEEL EXPANSION BOLTS SHALL BE SPACED 10 DIA APART AND 5 DIA EDGE DISTANCE FOR A REDUCTION IN PULLOUT STRENGTH. A SAFETY FACTOR OF 4 SHALL BE USED ON EXPANSION BOLT PULLOUT VALUES PUBLISHED BY THE MANUFACTURER. EXPANSION BOLTS SHALL BE STAINLESS STEEL TYPE 303 WEDGE BOLTS AND SHALL BE FURNISHED BY THE GUARDRAIL MANUFACTURER.
- KICK PLATE SHALL CONFORM TO OSHA STANDARDS. KICK PLATE SHALL BE A MINIMUM OF 4" HIGH AND SHALL BE AN EXTRUSION THAT ATTACHED TO THE POSTS WITH CLAMPS WHICH WILL ALLOW FOR EXPANSION AND CONTRACTION BETWEEN POSTS. KICK PLATES SHALL BE SET 1/4" ABOVE THE WALKING SURFACE. KICK PLATES SHALL BE PROVIDED ON GUARDRAILS AS REQUIRED BY OSHA AND/OR AS SHOWN ON DRAWINGS. KICK PLATES SHALL BE SHIPPED LOOSE IN STOCK LENGTHS WITH PRE-MANUFACTURED CORNERS FOR FIELD INSTALLATION.
- OPENINGS IN THE RAILING SHALL BE GUARDED BY A SELF-CLOSING GATE. (OSHA 1910.23). SAFETY CHAINS SHALL NOT BE USED UNLESS SPECIFICALLY SHOWN ON THE DRAWINGS.
- FINISH SHALL BE ALUMINUM ASSOCIATION M10-C22-A41 (215-41). THE PIPE SHALL BE PLASTIC WRAPPED. THE PLASTIC WRAP IS TO BE REMOVED AFTER ERECTION.
- ALUMINUM SURFACES IN CONTACT WITH CONCRETE, GROUT, OR DISSIMILAR METALS SHALL BE COATED WITH A CHROMATE CONVERSION COATING.
- GUARDRAILS SHALL BE IN ACCORDANCE WITH OSHA REGULATION 29CFR 1910 AND 7TH EDITION FLORIDA BUILDING CODE (2020).



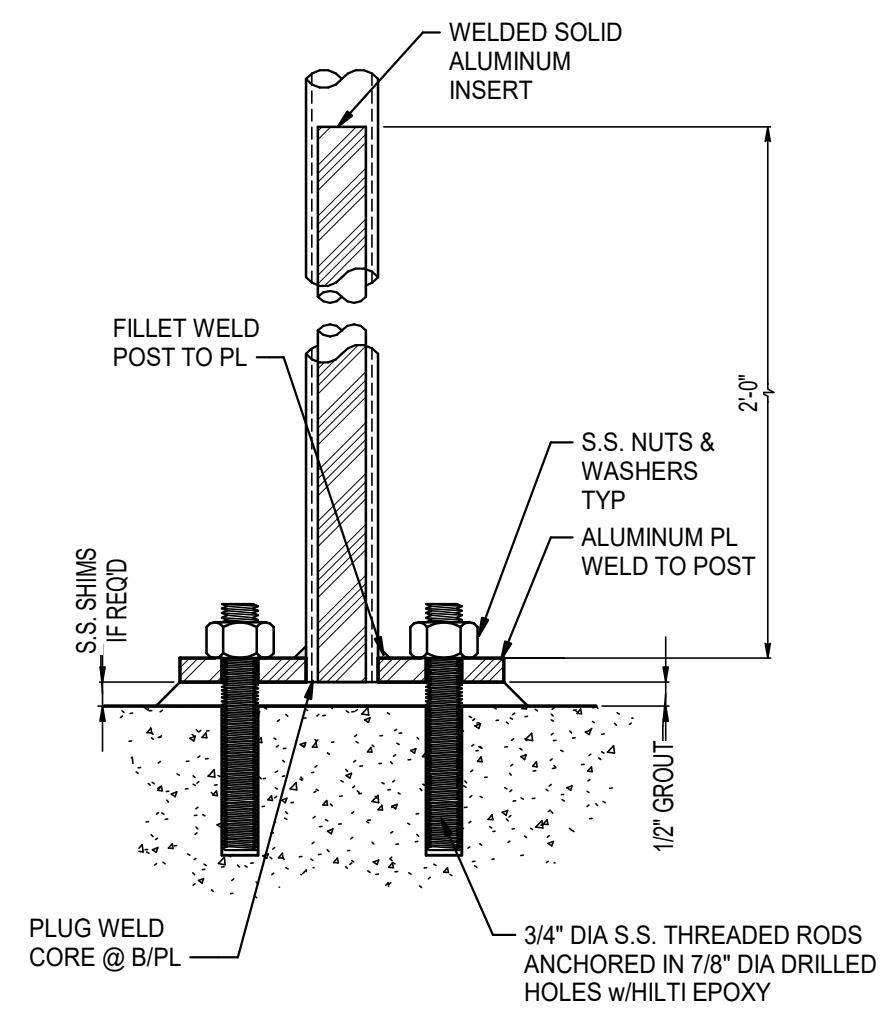
TYPICAL GUARDRAIL DETAIL
3/4" = 1'-0"



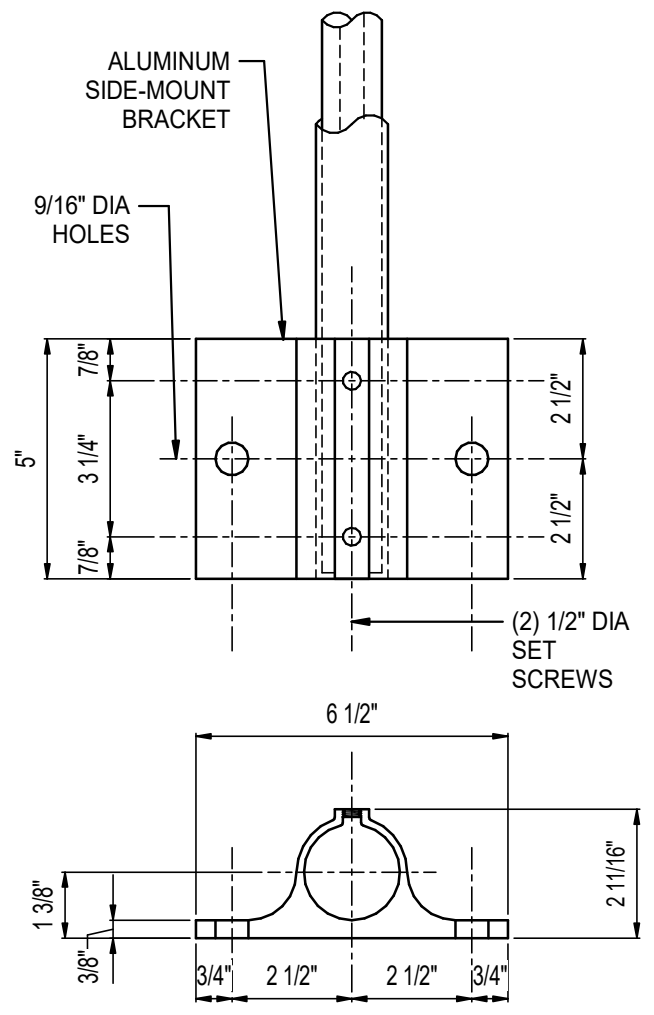
A TYPE A
3" = 1'-0"

ALUMINUM GUARDRAIL NOTES

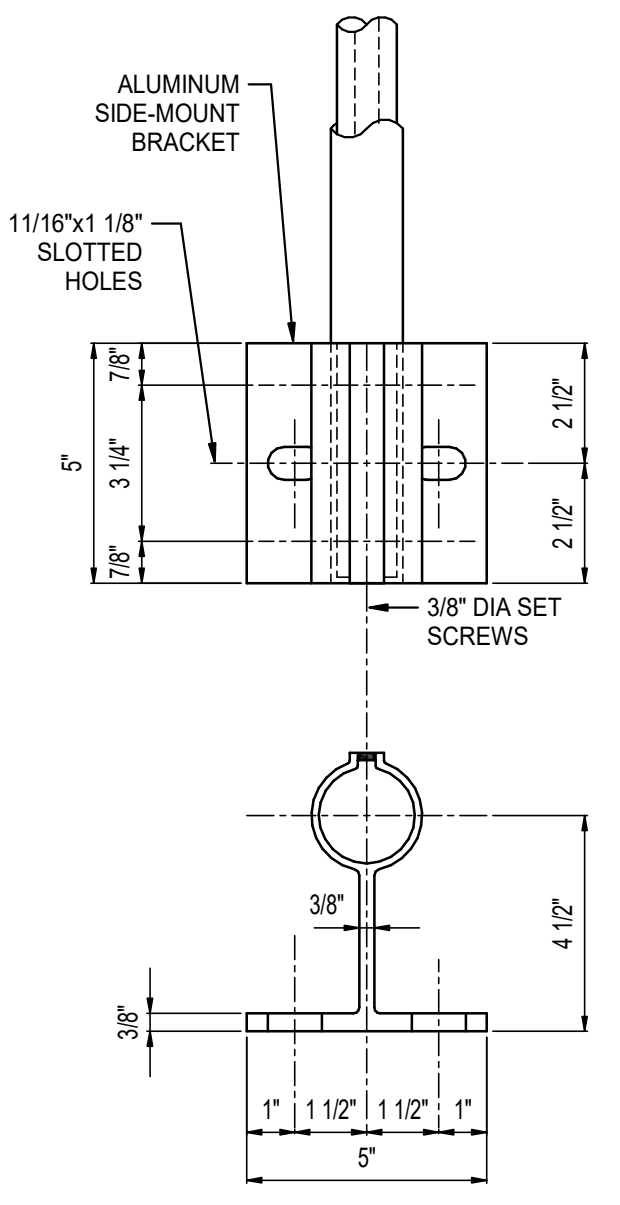
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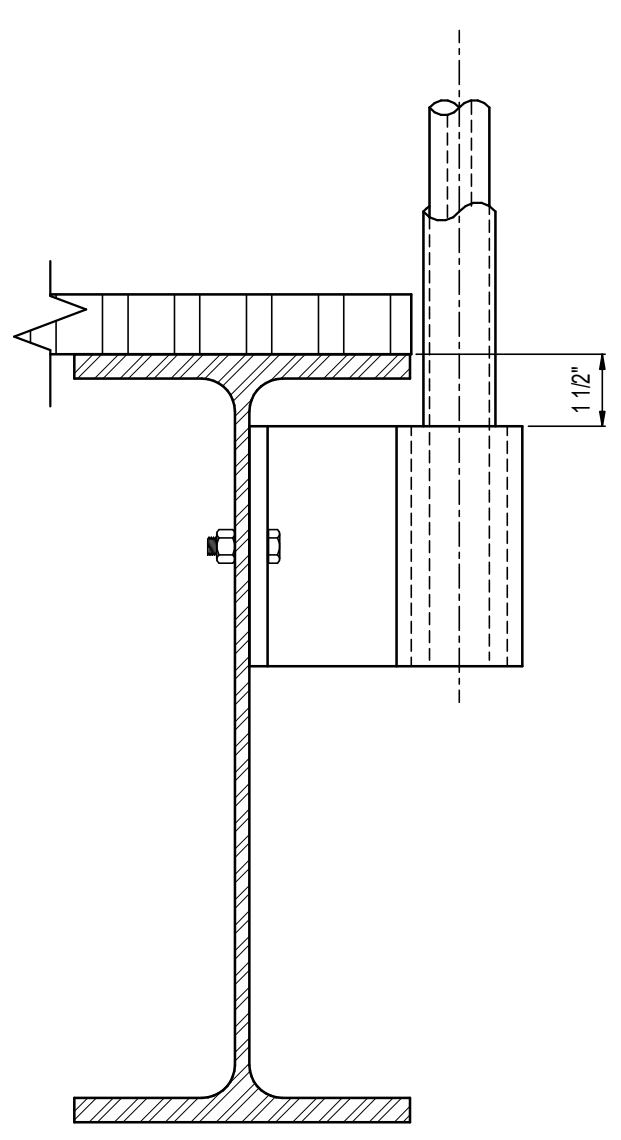
B TYPE B
3" = 1'-0"



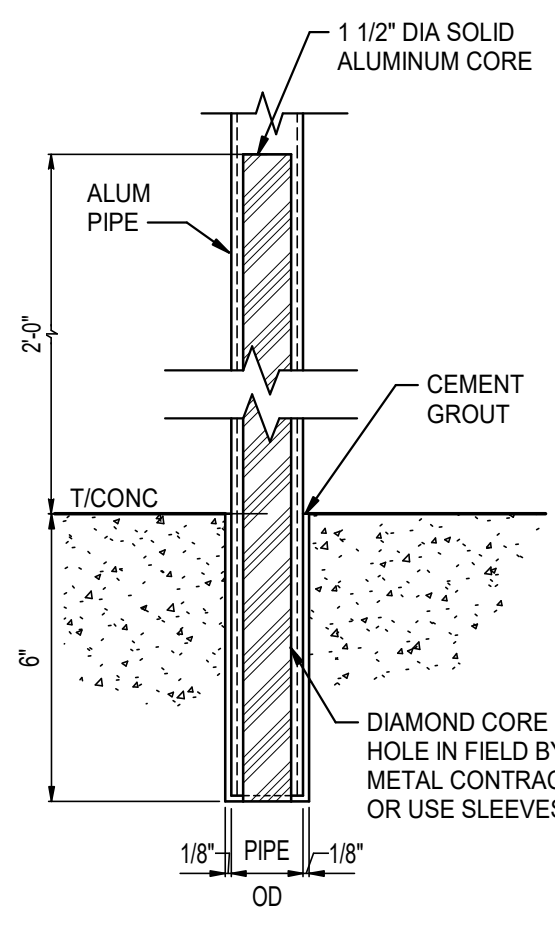
C TYPE C
3" = 1'-0"



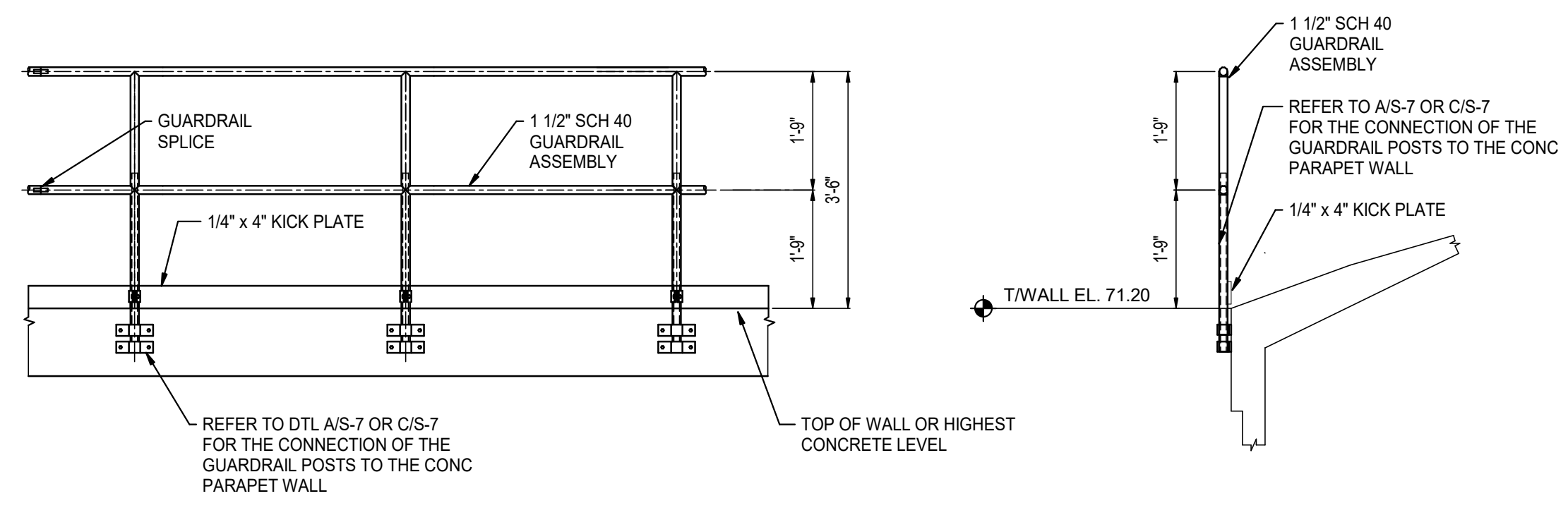
D TYPE D
3" = 1'-0"



E TYPE E
3" = 1'-0"



F KICKPLATE DETAIL
3" = 1'-0"



G PERIMETER GST GUARDRAIL DETAIL
1/2" = 1'-0"

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MOTT MACDONALD
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DESIGNER: C. LYNER
DRAWN BY: B. LEE
DATE: OCT 2022
CHECKED BY: B. PERRY
DATE: OCT 2022

DESIGN ENGINEER
CHAD E. LYNER, P.E.
FLORIDA REGISTRATION NO.
66277

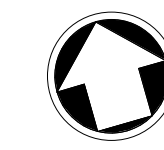


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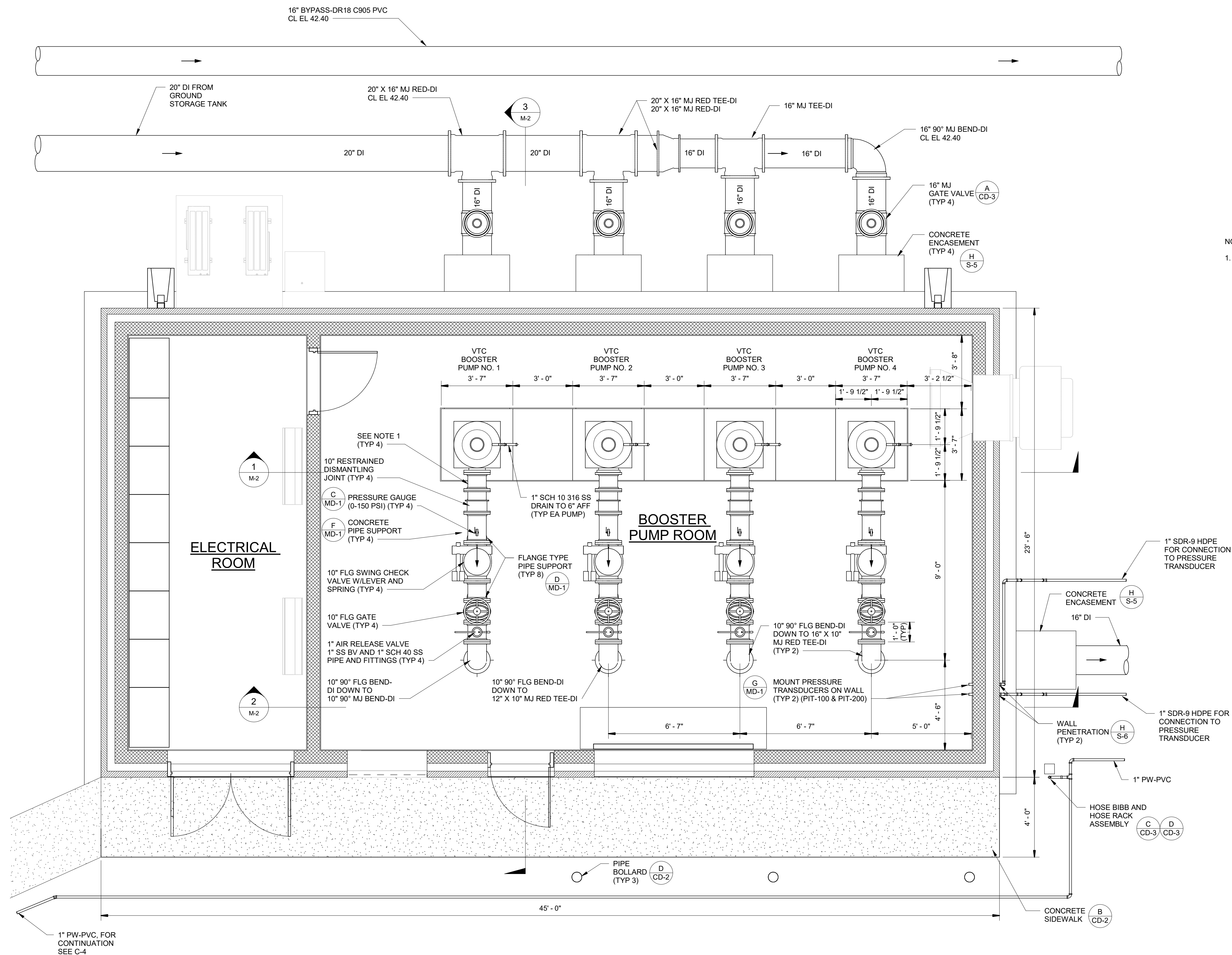
CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

GUARDRAIL DETAILS

SHEET NO.	35
DWG NO.	S-7
ELECTRICAL BID PACKAGE	



0 2 4 6
SCALE: 3/8" = 1'-0"



- NOTES:
- CONTRACTOR SHALL NOTE THAT THE DESIGN IS BASED ON GOULD'S PUMP MODEL 12FDLC. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MODIFY THE ECCENTRIC REDUCER AT THE PUMP SUCTION AND PROVIDE A REDUCER AT THE DISCHARGE OF THE PUMP AS NEEDED BASED ON CONTRACTOR'S PUMP SELECTION AT NO COST TO THE OWNER.

PLAN
SCALE: 3/8" = 1'-0"

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DESIGNER: L. TRACY
DRAWN BY: B. LEE
DATE: OCT 2022
CHECKED BY: L. SAMEL
DATE: OCT 2022

DESIGN ENGINEER
LESLIE S. SAMEL, P.E.
FLORIDA REGISTRATION NO.
68763



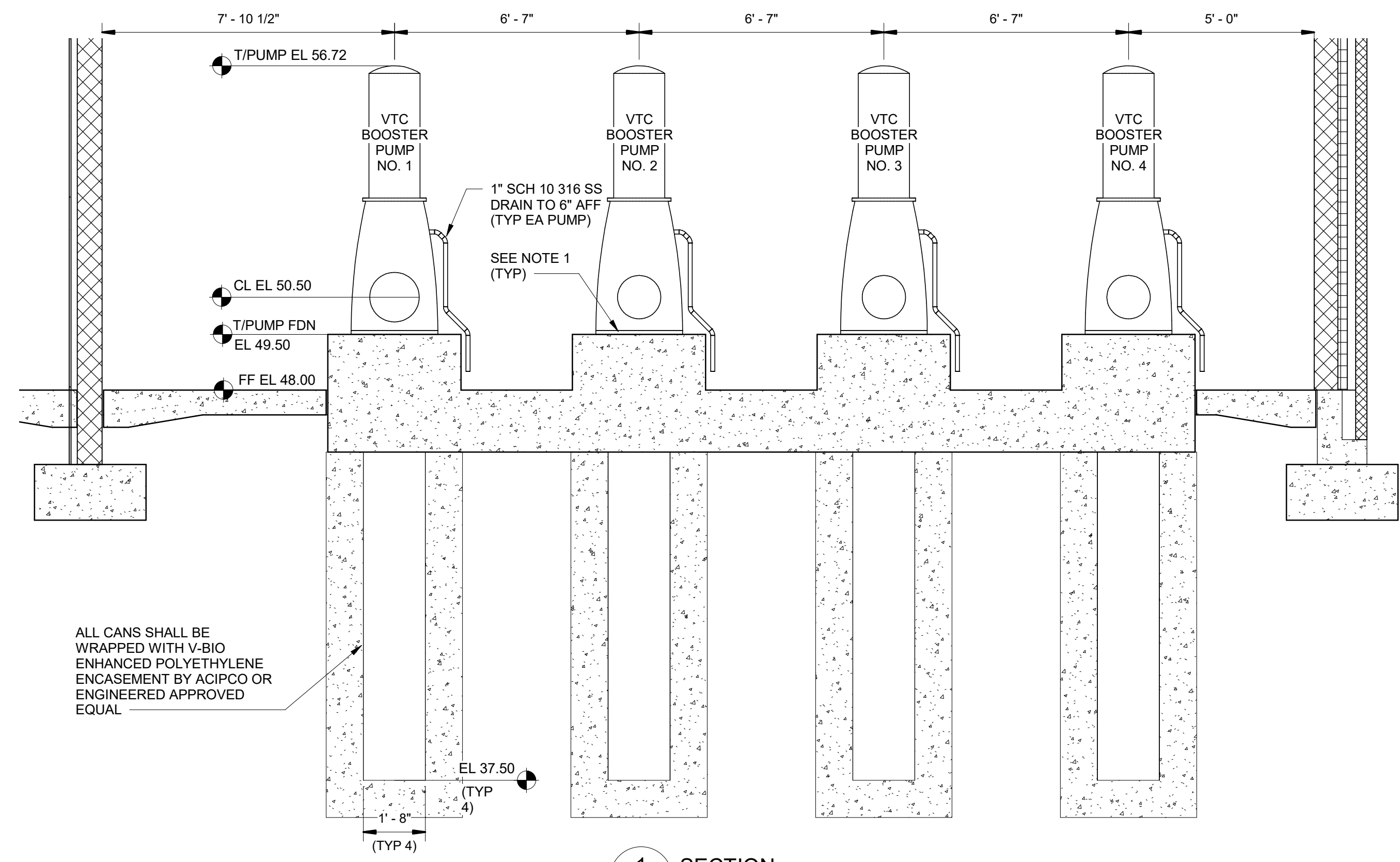
St. Johns County
Utility Department
1205 STATE ROAD 16
ST. AUGUSTINE, FL 32084
PHONE: (904) 209-2626 FAX: (904) 209-2627

CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

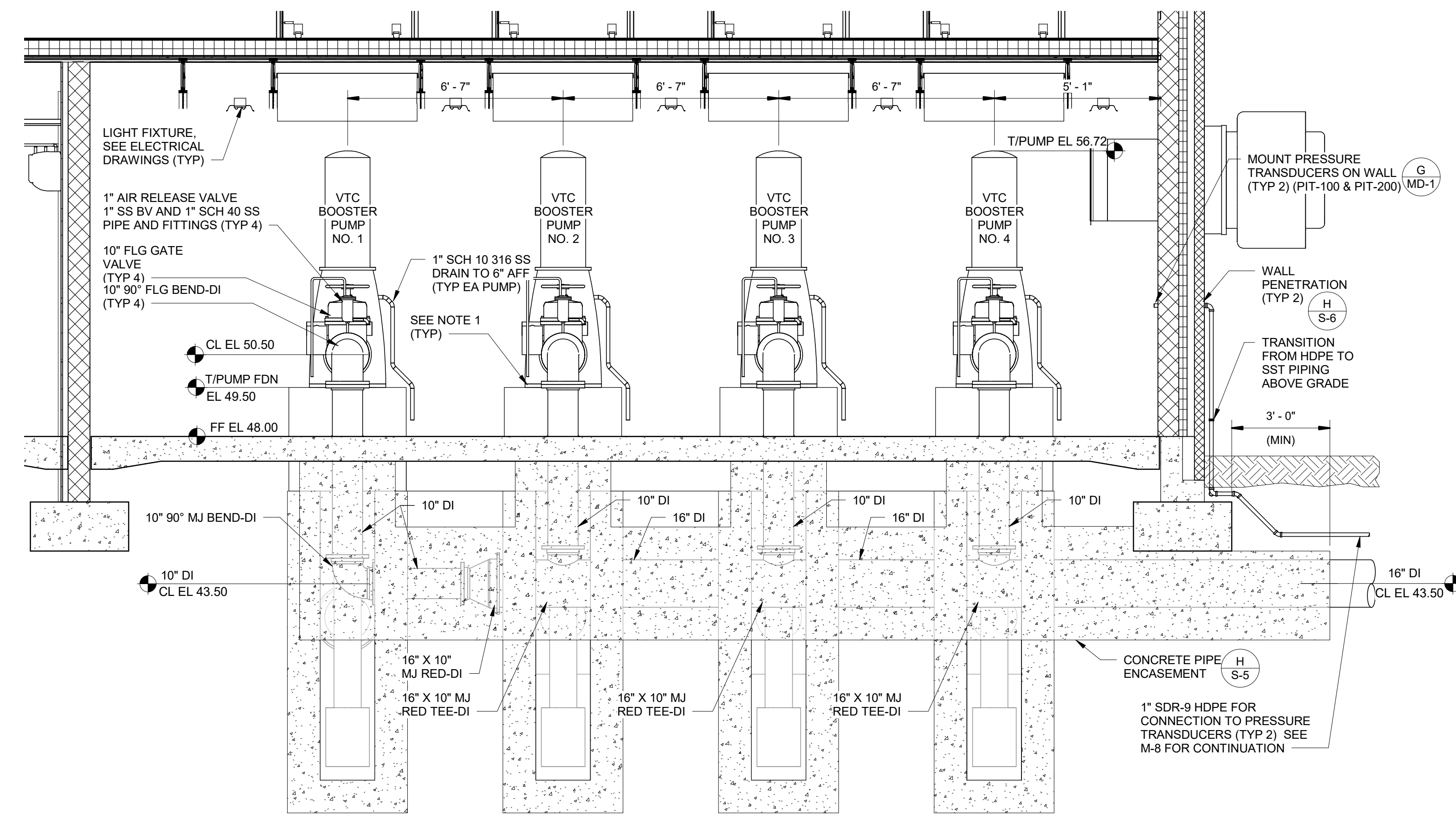
BOOSTER PUMP ROOM
PLAN

SHEET NO.
36
DWG NO.
M-1
ELECTRICAL
BID PACKAGE

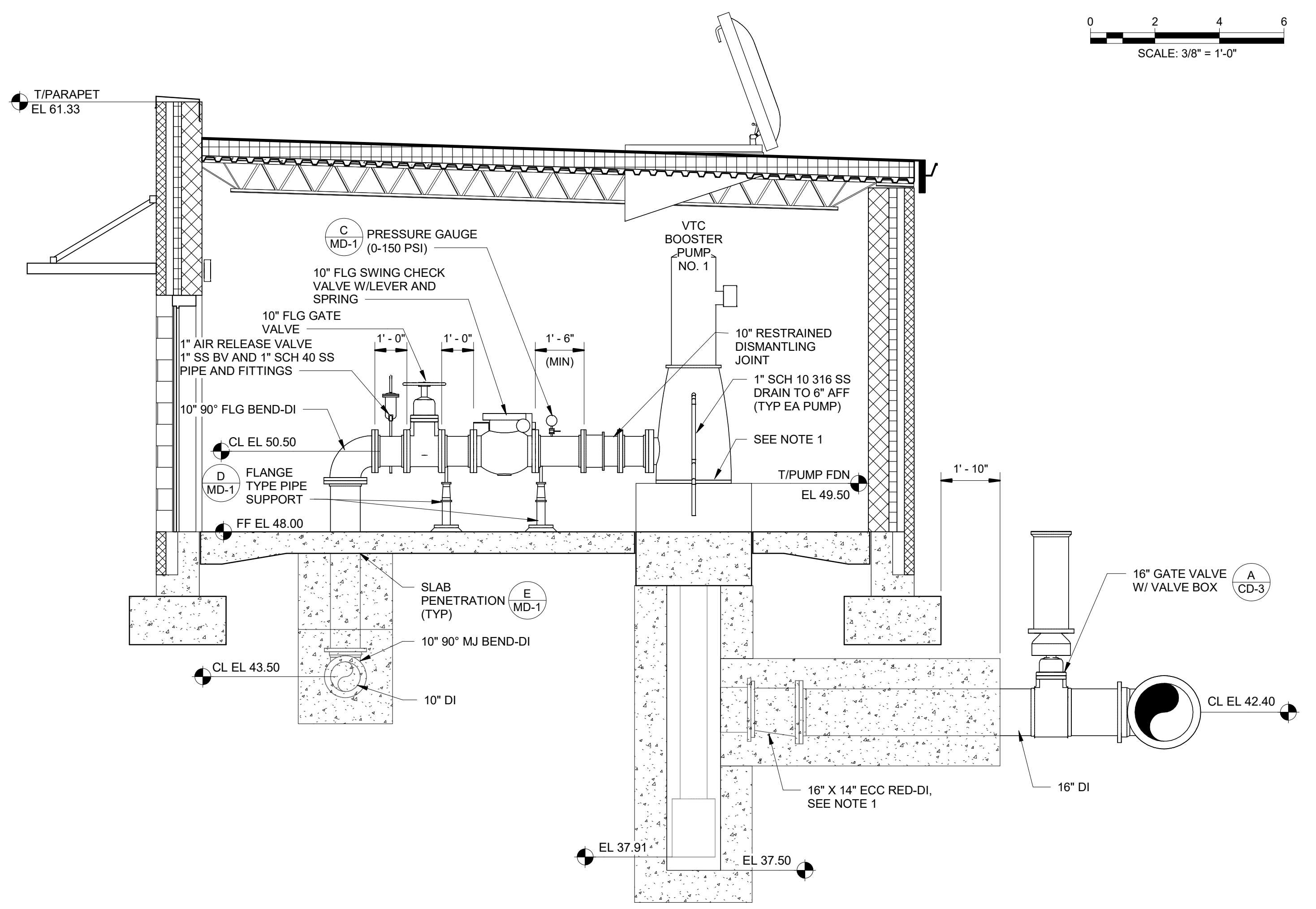
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1 SECTION
M-1
3/8" = 1'-0"



2 SECTION
M-1
3/8" = 1'-0"



3 SECTION
M-1
3/8" = 1'-0"

NOTES:
1. CONTRACTOR SHALL NOTE THAT THE DESIGN IS BASED ON GOULD'S PUMP MODEL 12FDLC. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MODIFY THE ECCENTRIC REDUCER AT THE PUMP SUCTION AND PROVIDE A REDUCER AT THE DISCHARGE OF THE PUMP AS NEEDED BASED ON CONTRACTOR'S PUMP SELECTION AT NO COST TO THE OWNER.

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NO.	BY	DATE	SYMBOL	REVISIONS
1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M
MOTT MACDONALD
Mott MacDonald Florida, LLC

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10245 Centurion Pkwy, N., Suite 320
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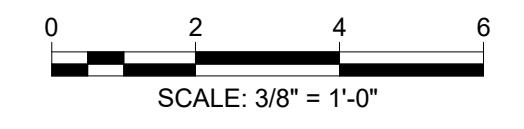
DESIGN ENGINEER
LESLIE S. SAMEL, P.E.
FLORIDA REGISTRATION NO.
68763

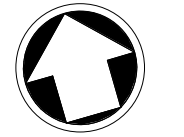
St. Johns County
Utility Department
1205 STATE ROAD 16
ST. AUGUSTINE, FL 32084
PHONE: (904) 209-2626 FAX: (904) 209-2627

CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

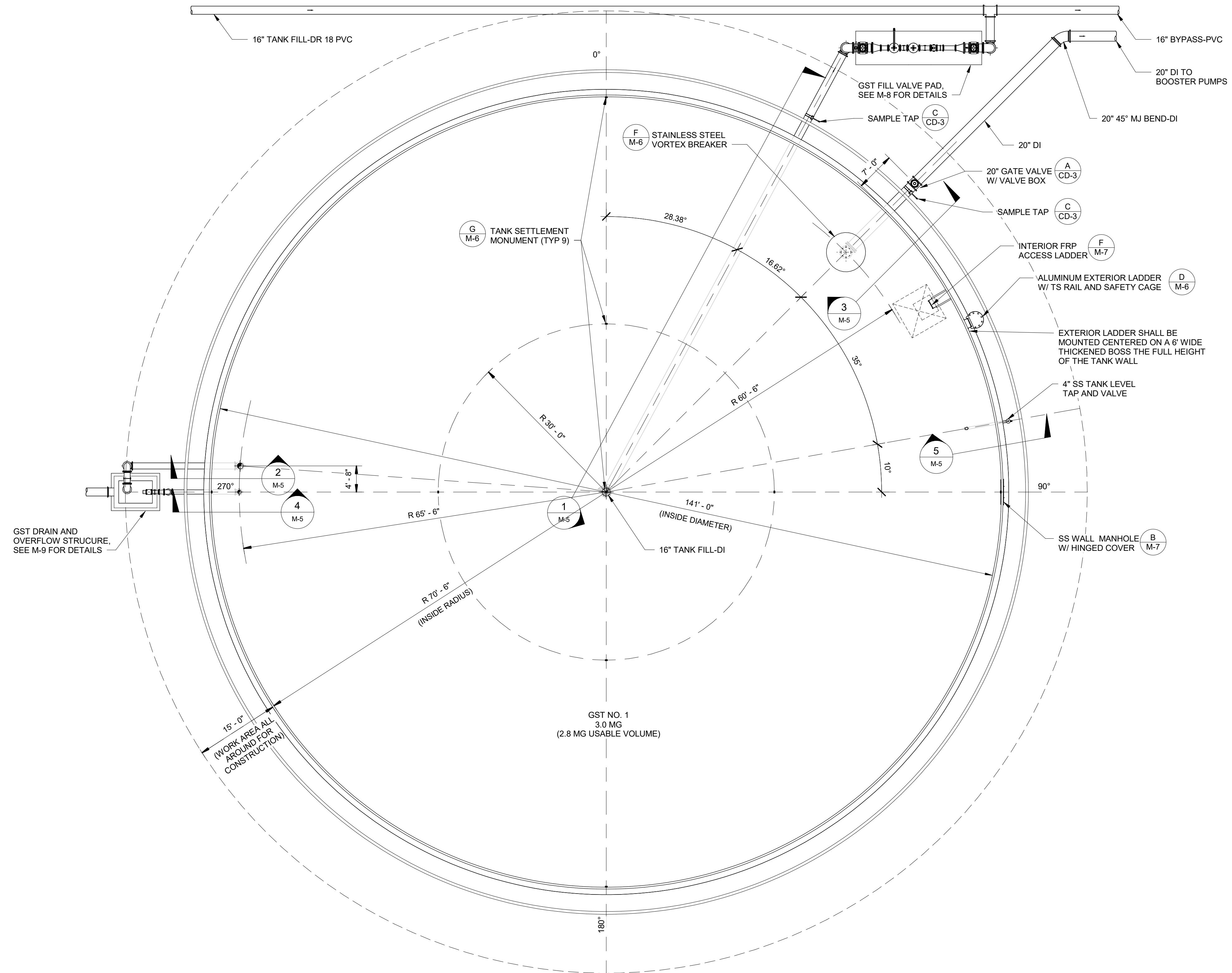
BOOSTER PUMP ROOM
SECTIONS

SHEET NO.
37
DWG NO.
M-2
ELECTRICAL
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0 8 16 24
SCALE: 3/32" = 1'-0"



GST SLAB PLAN
SCALE: 3/32" = 1'-0"

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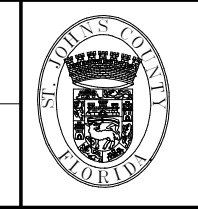
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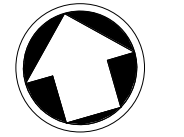


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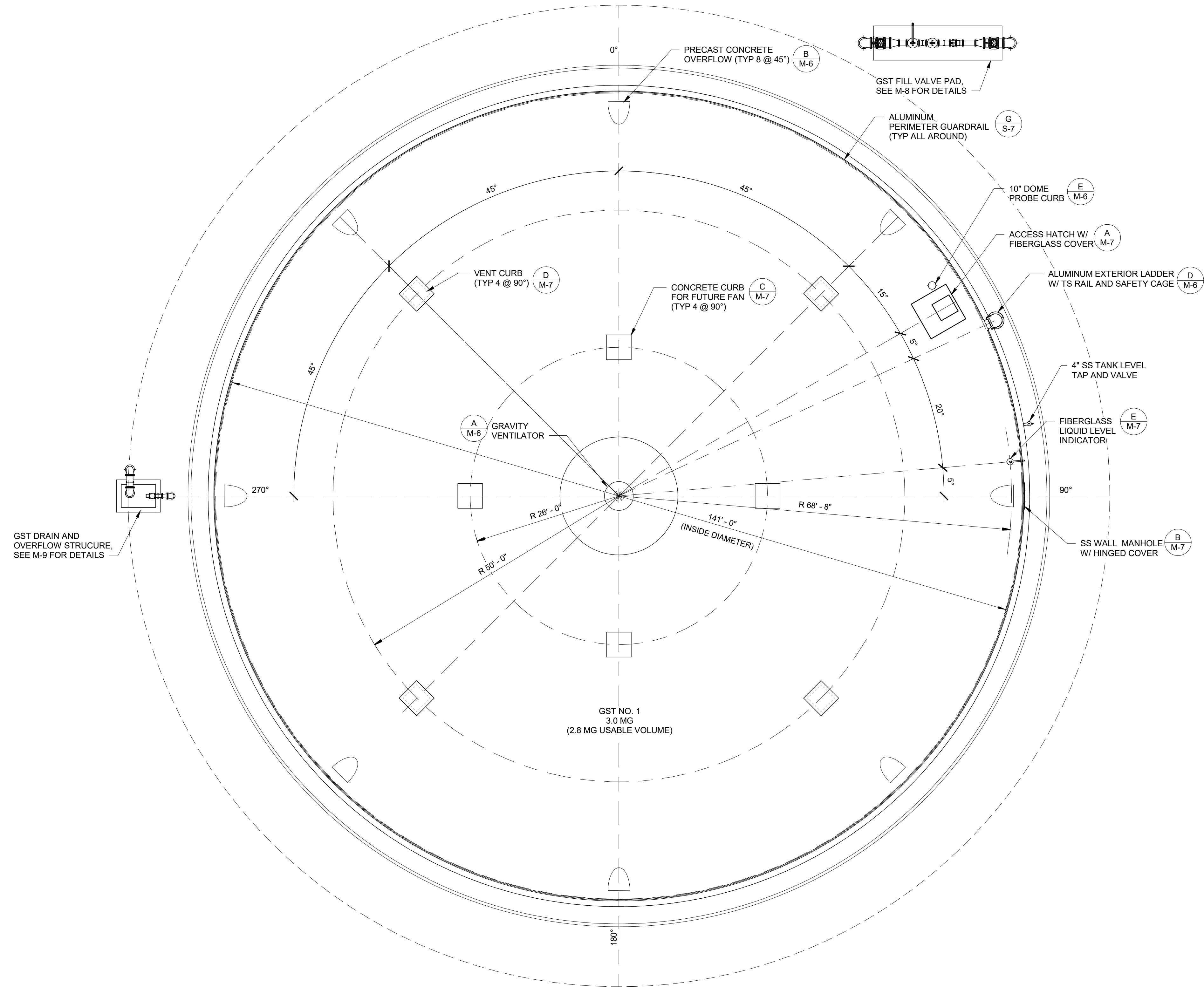
**CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION**

**GROUND STORAGE TANK
SLAB PLAN**

SHEET NO.
38
DWG NO.
M-3
ELECTRICAL
BID PACKAGE



0 8 16 24
SCALE: 3/32" = 1'-0"



GST ROOF PLAN
SCALE: 3/32" = 1'-0"

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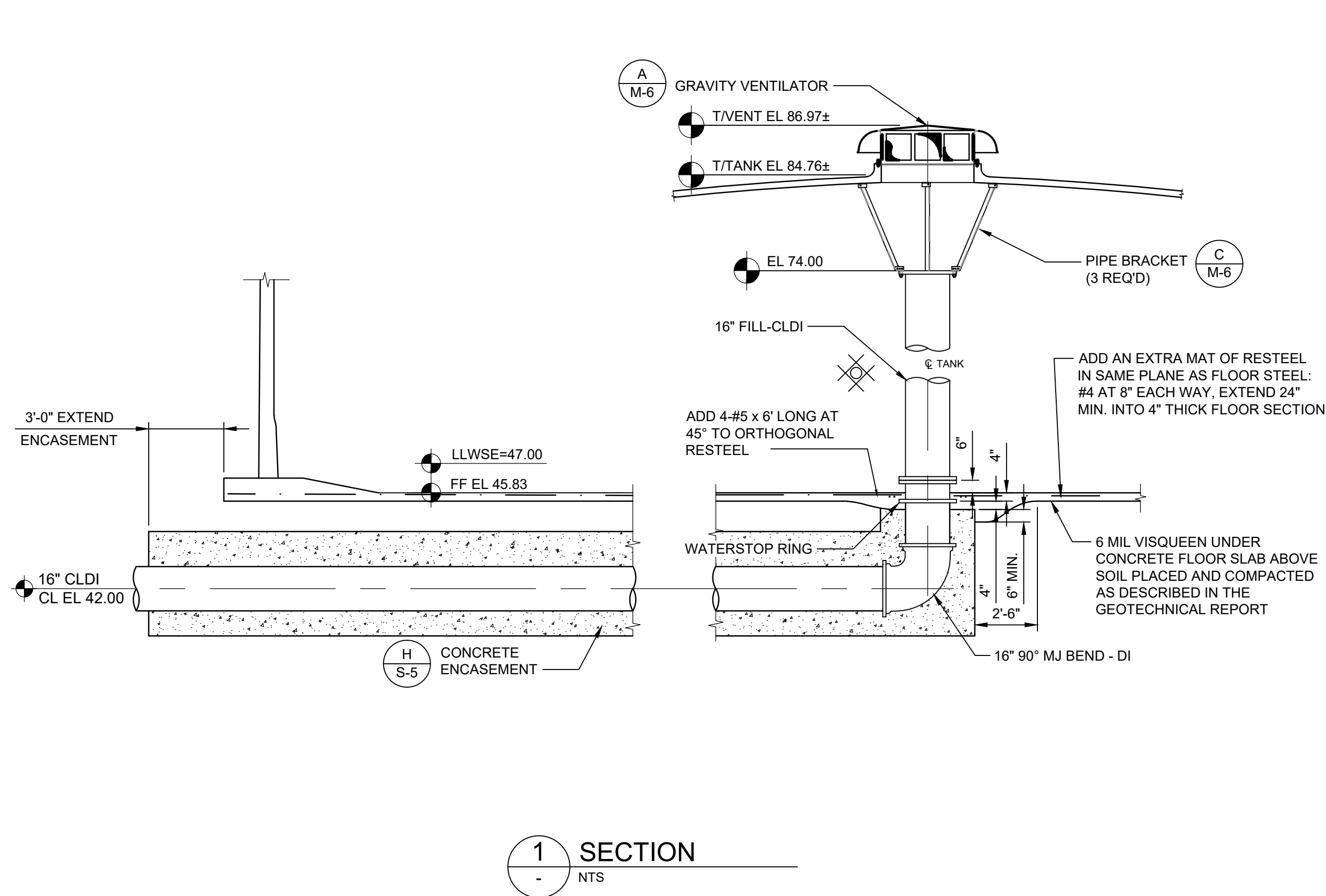


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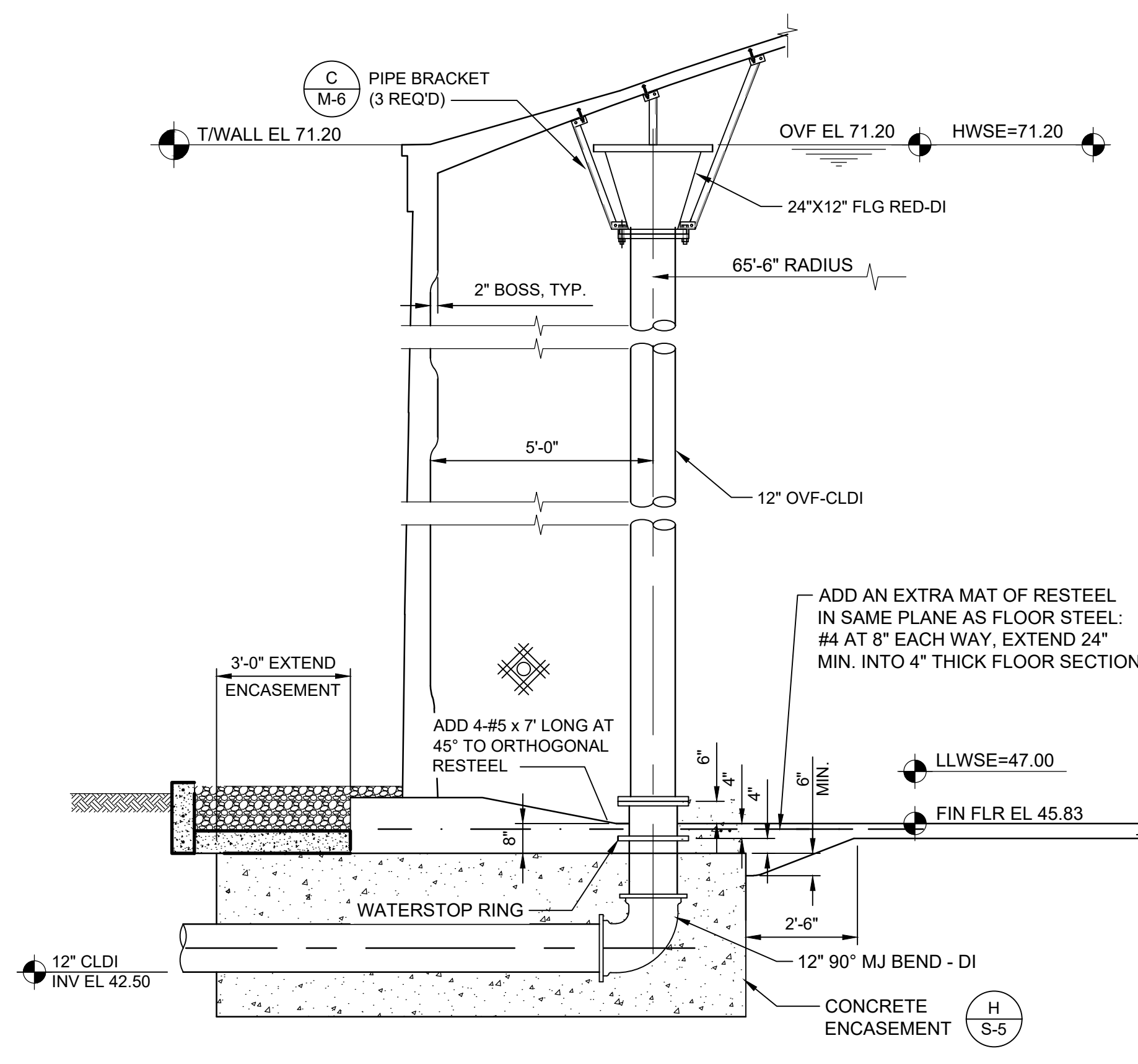
CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

GROUND STORAGE TANK ROOF PLAN

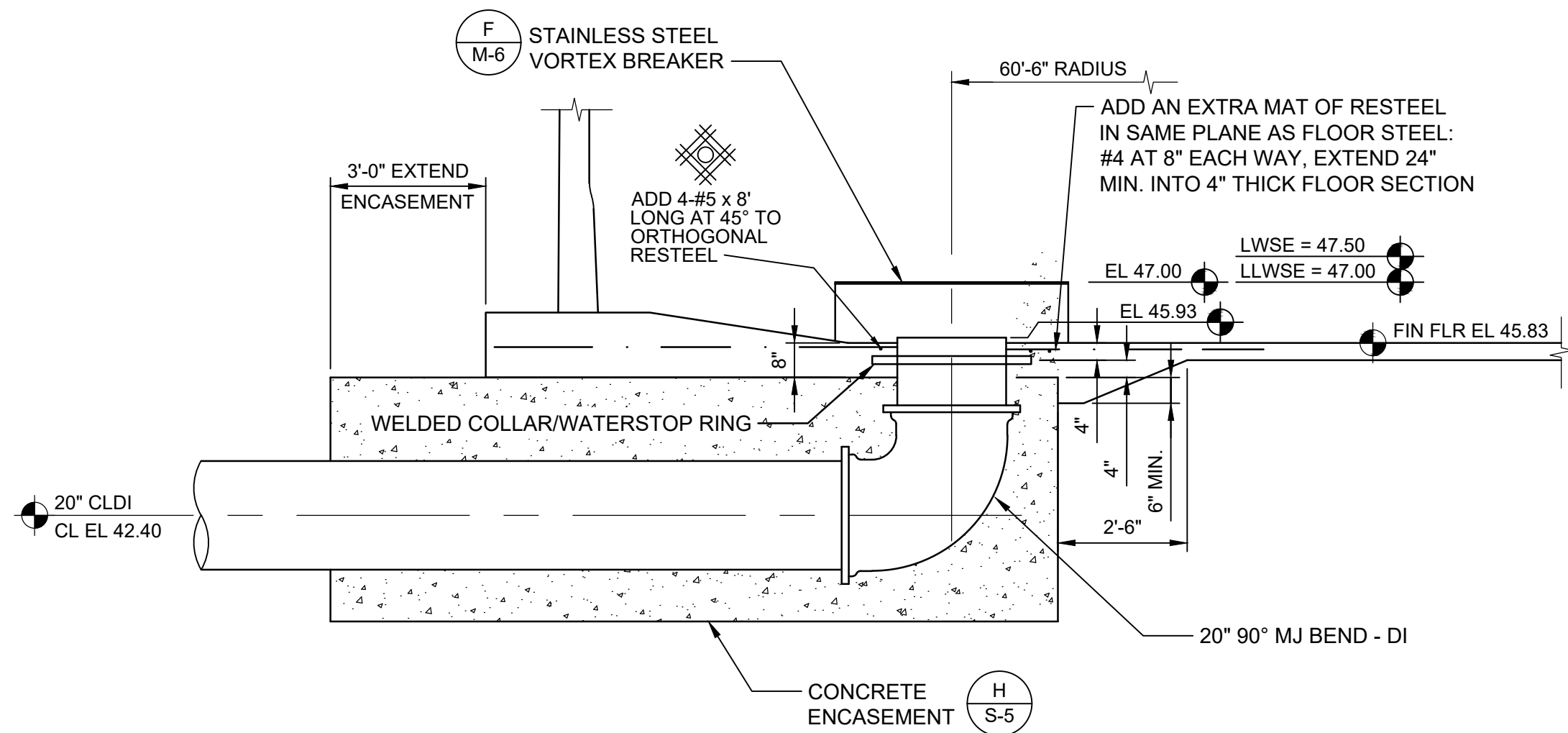
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DWG NO. M-4
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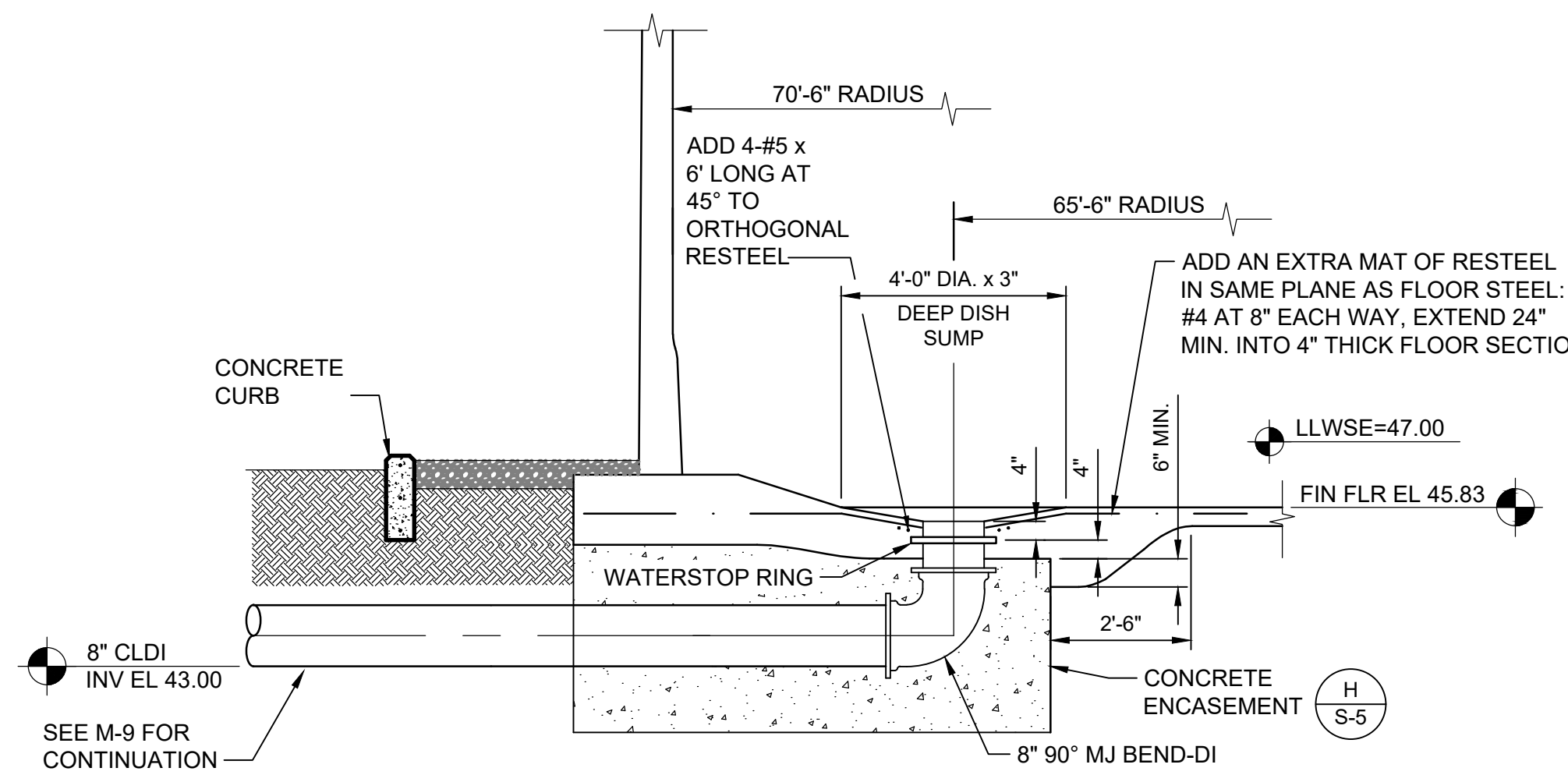
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- NTS



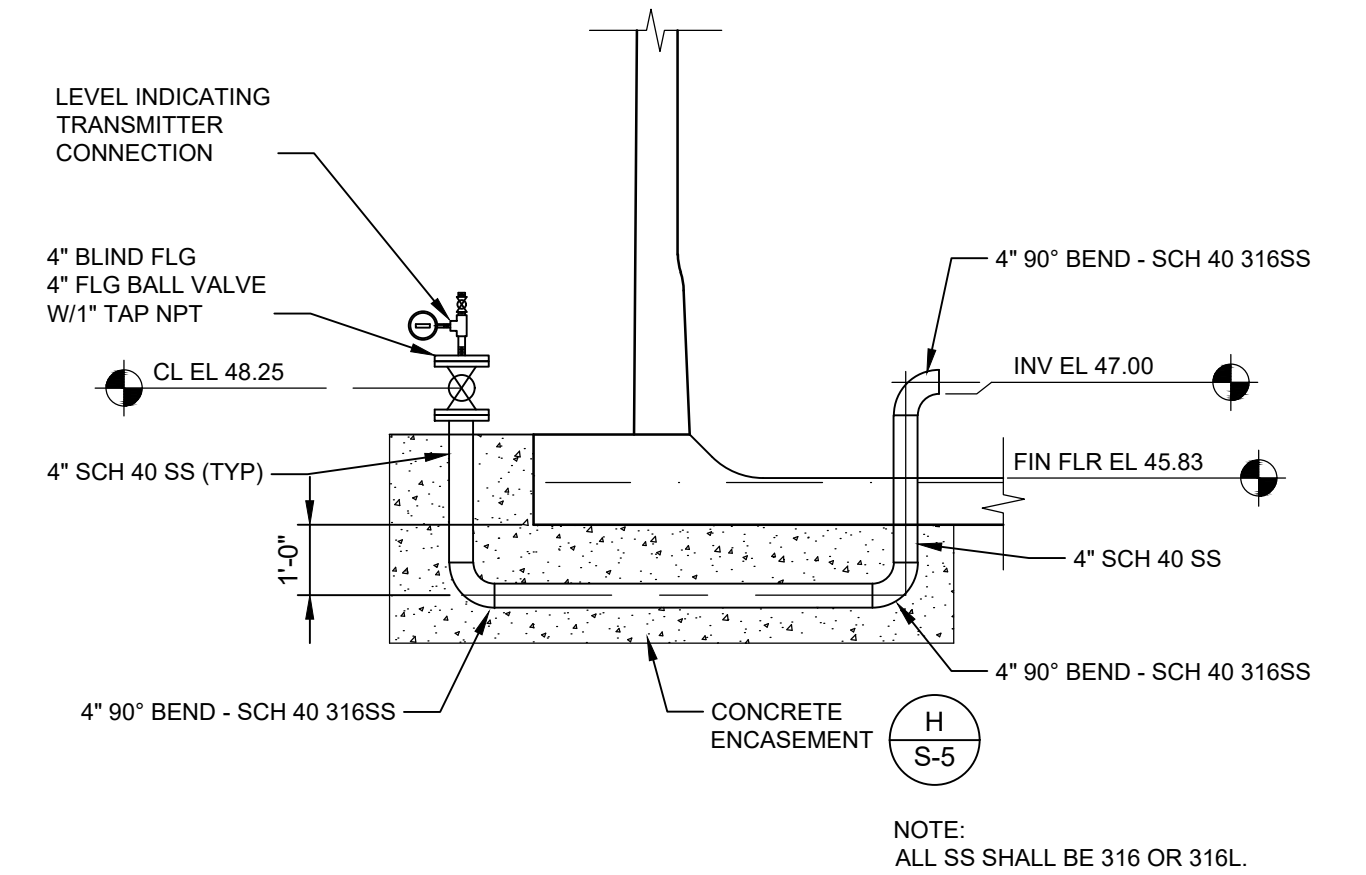
2 12" OVERFLOW SECTION
- NTS



3 20" TANK EFFLUENT WITH ANTI-VORTEX PLATE
- NTS



4 8" DRAIN SECTION
- NTS



5 GROUND STORAGE TANK LEVEL TAP AND VALVE
- NTS

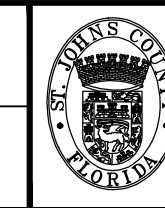
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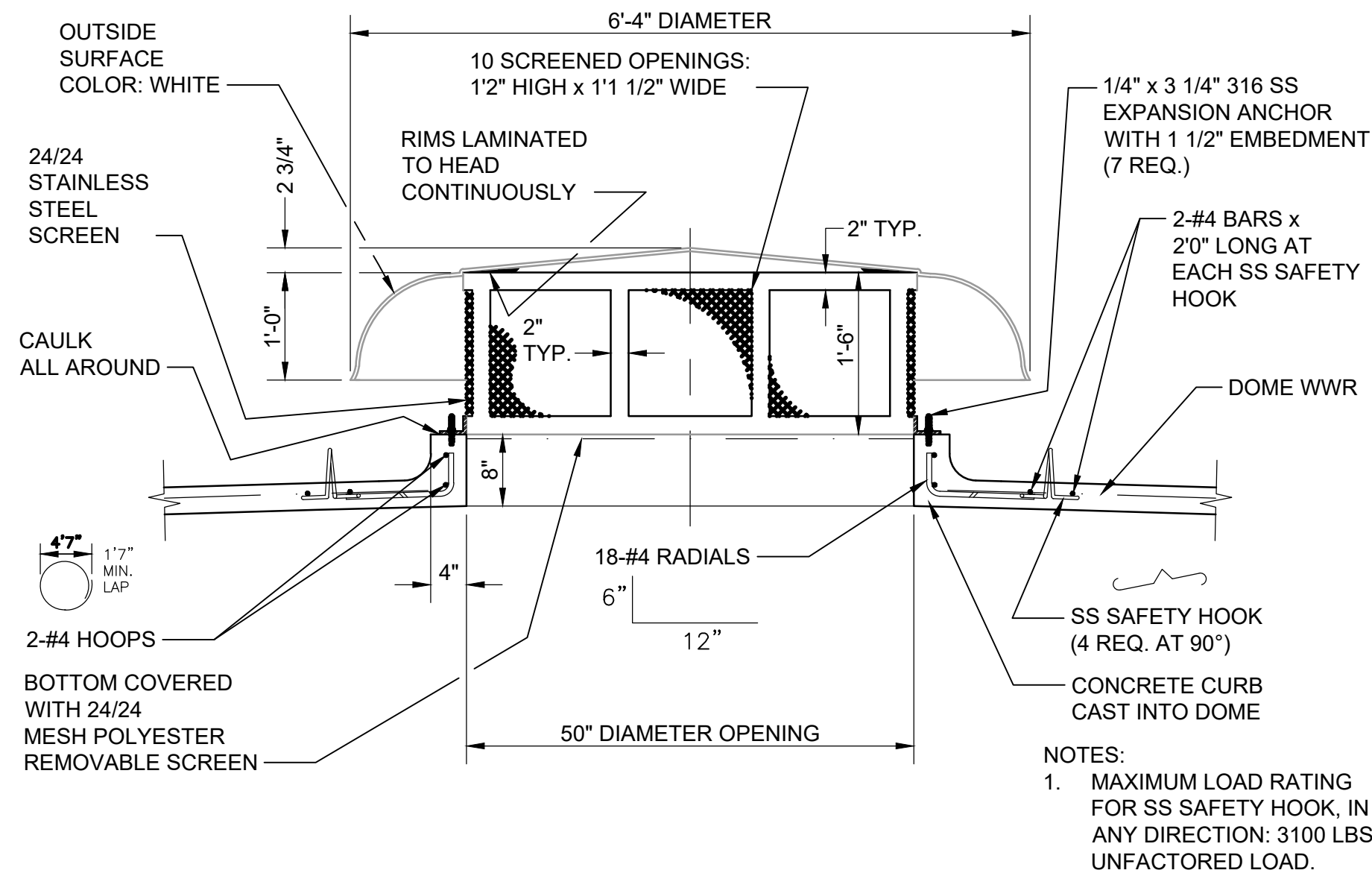


St. Johns County
Utility Department
1205 STATE ROAD 16
ST. AUGUSTINE, FL 32084
PHONE: (904) 209-2626 FAX: (904) 209-2627

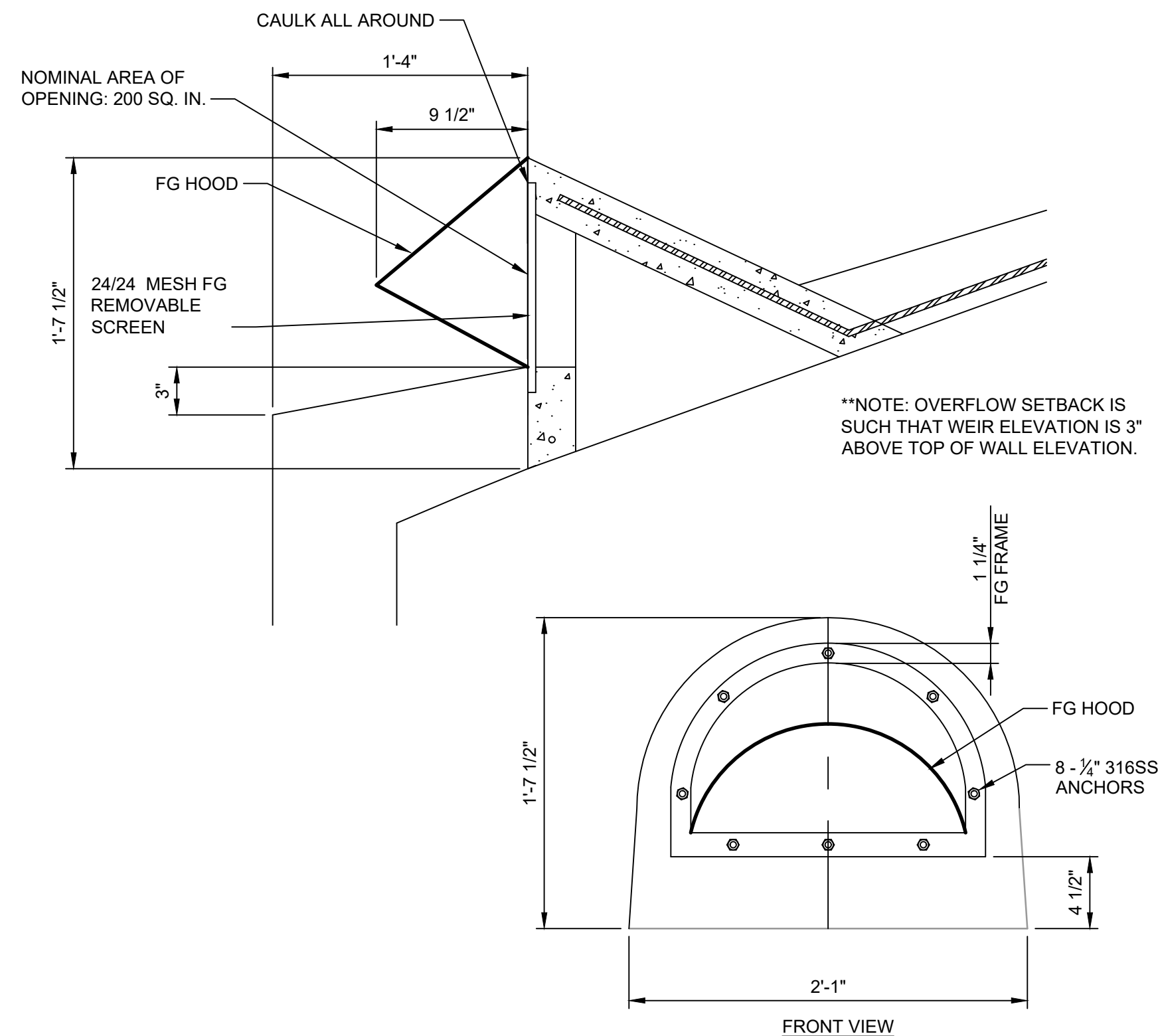
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

GROUND STORAGE TANK
SECTIONS

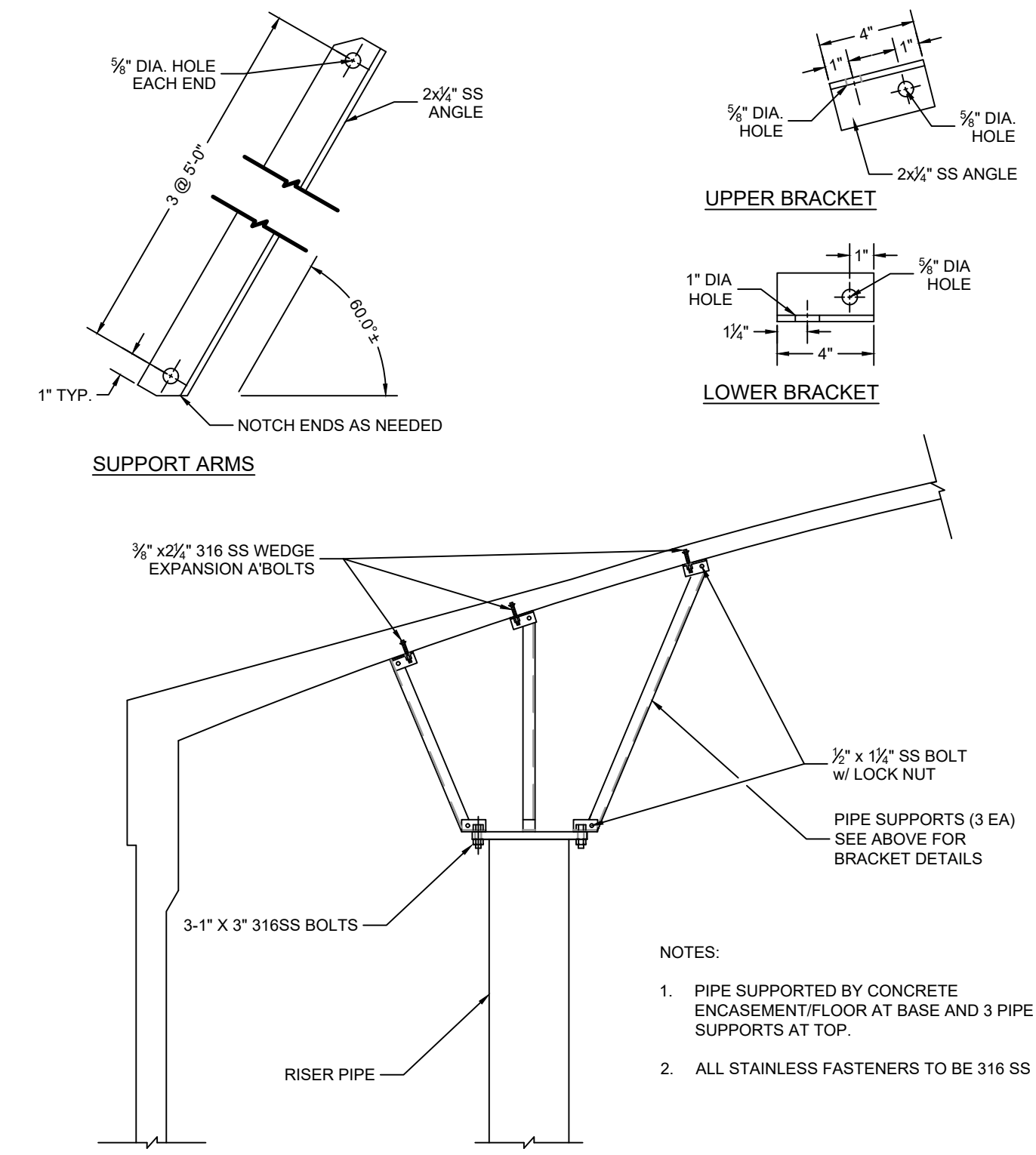
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40
DWG NO.
M-5
ELECTRICAL
BID PACKAGE



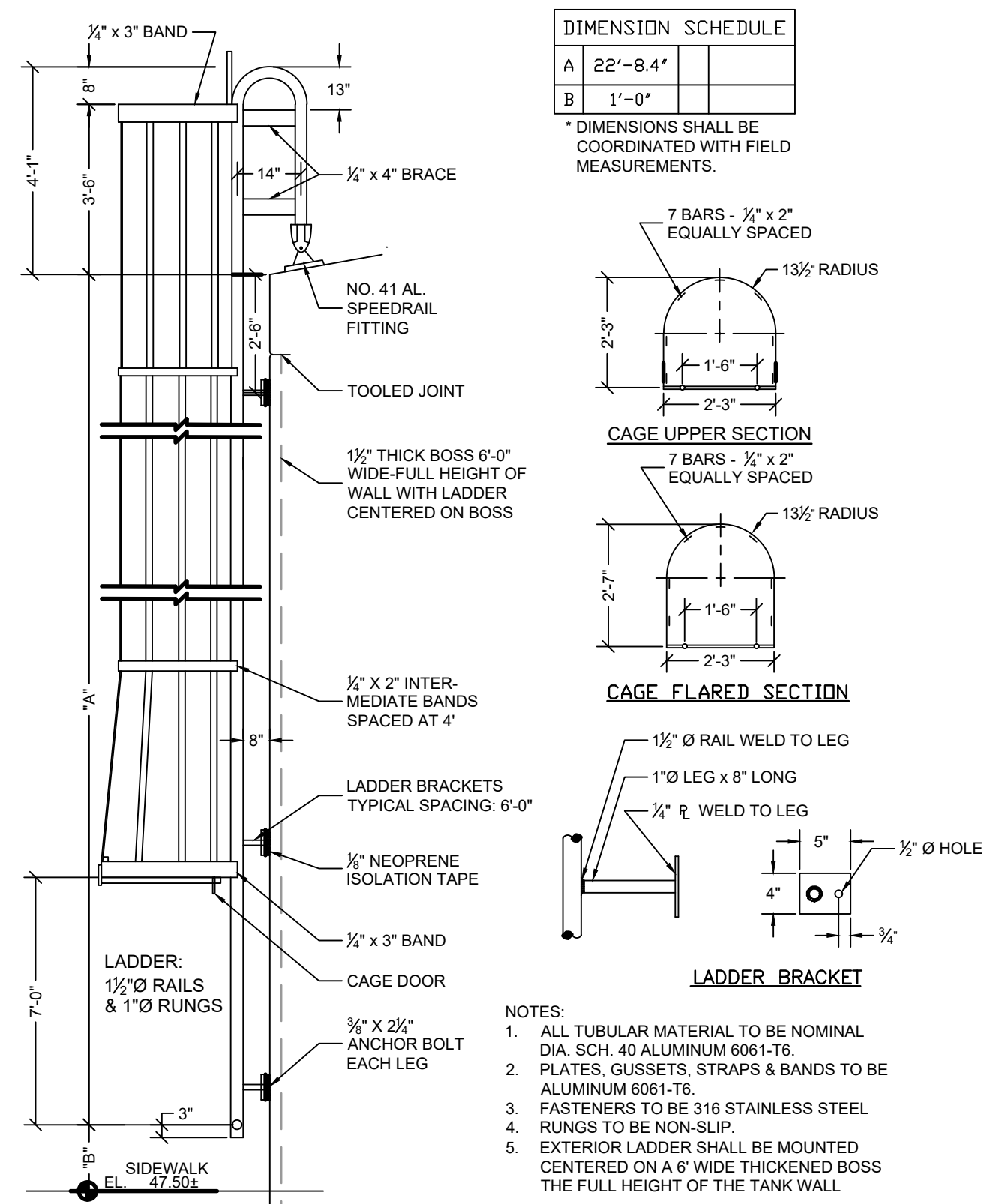
A GRAVITY VENTILATOR
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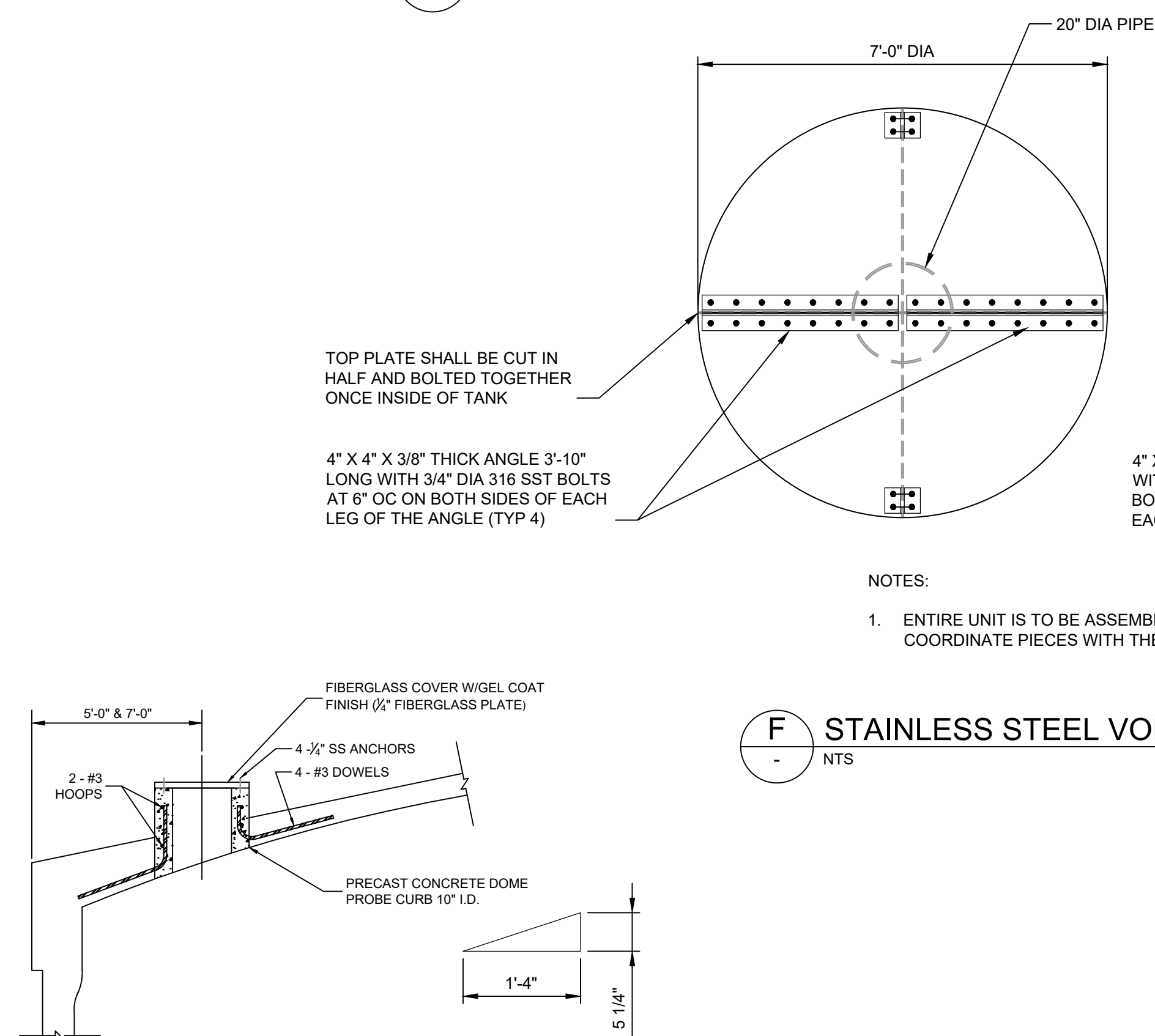
B PRECAST CONCRETE OVERFLOW
NTS



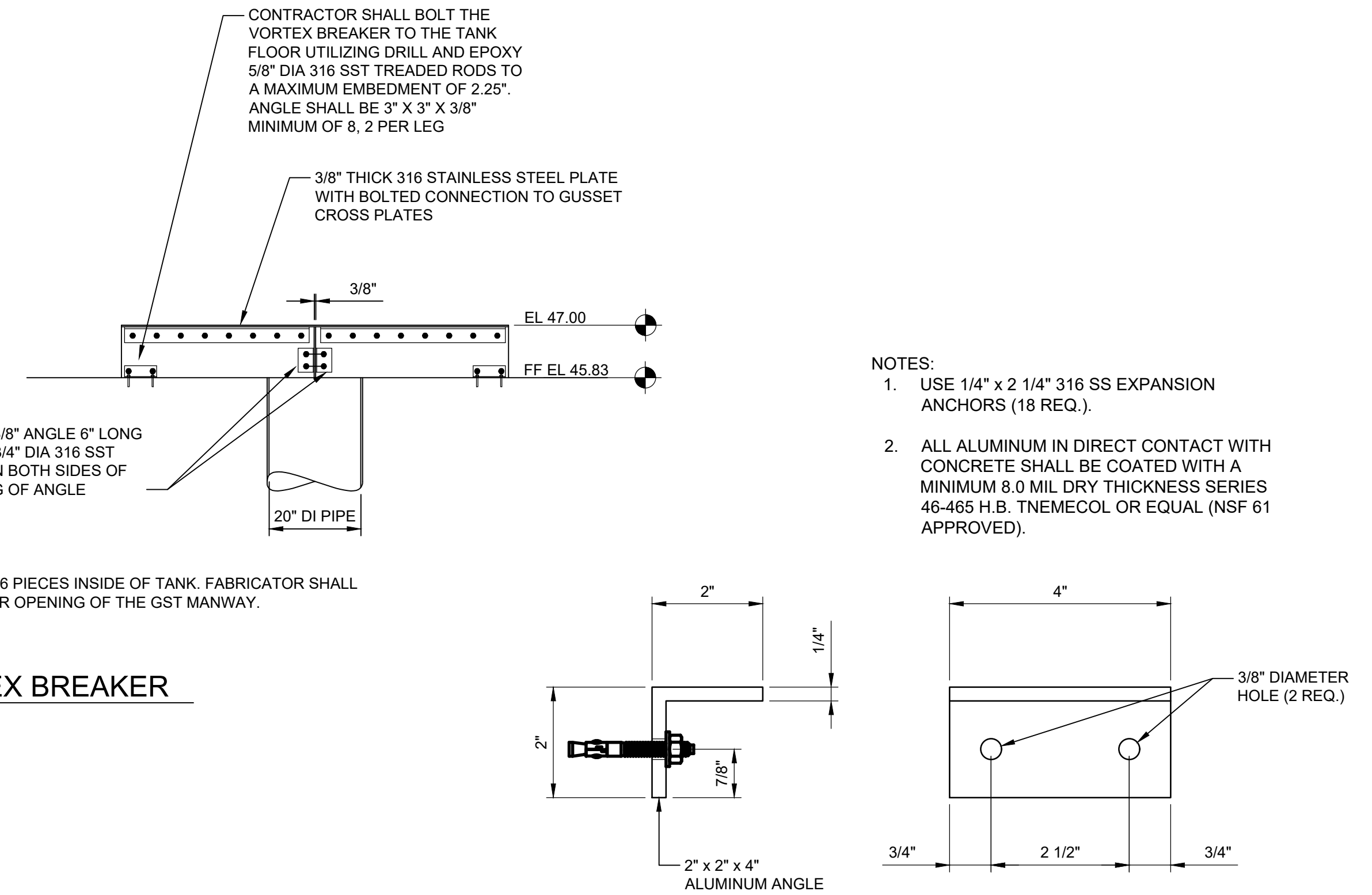
C PIPE BRACKET
NTS



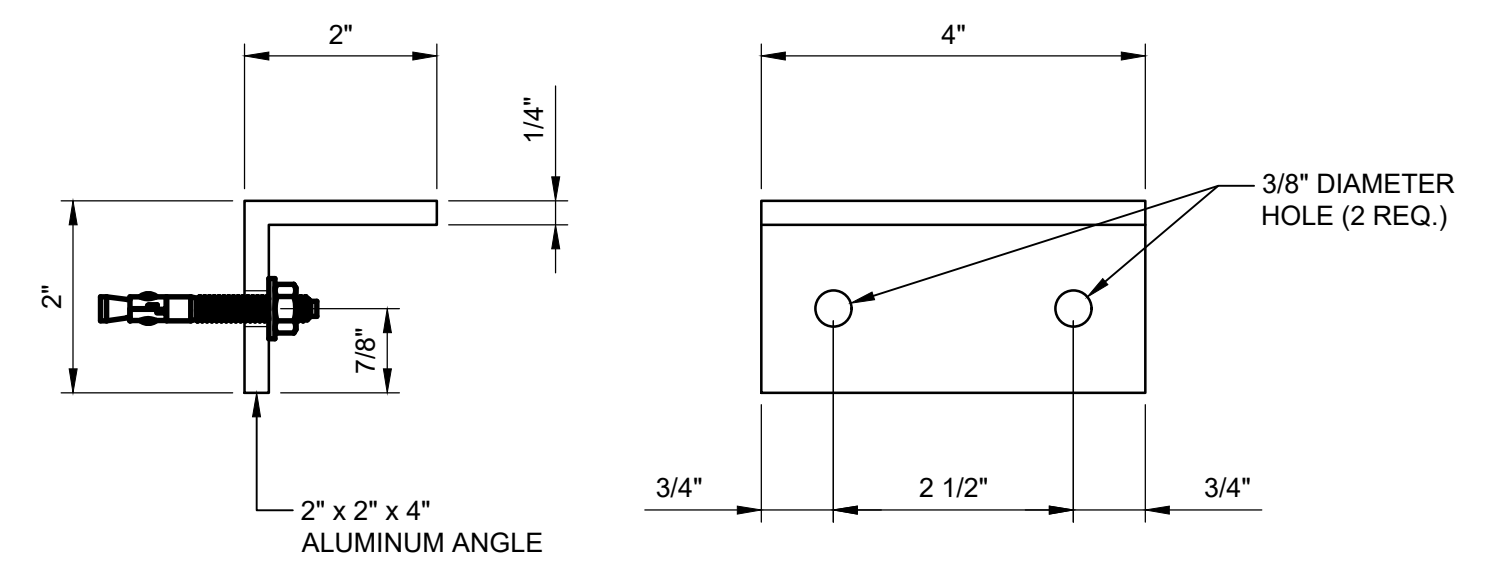
D EXTERIOR ALUMINUM LADDER W/ TS SAFETY RAIL, SAFETY CAGE AND LOCKABLE SECURITY GATE
NTS



E 10\"/>



F STAINLESS STEEL VORTEX BREAKER
NTS



G TANK SETTLEMENT MONUMENT
NTS

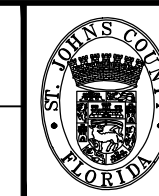
NO.	BY	DATE	SYMBOL	REVISIONS
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Mott MacDonald Florida, LLC

Architects Engineers Surveyors
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DATE: OCT 2022
CHECKED BY: L. SAMEL
DATE: OCT 2022

DESIGN ENGINEER
LESLIE S. SAMEL, P.E.
FLORIDA REGISTRATION NO.
68763

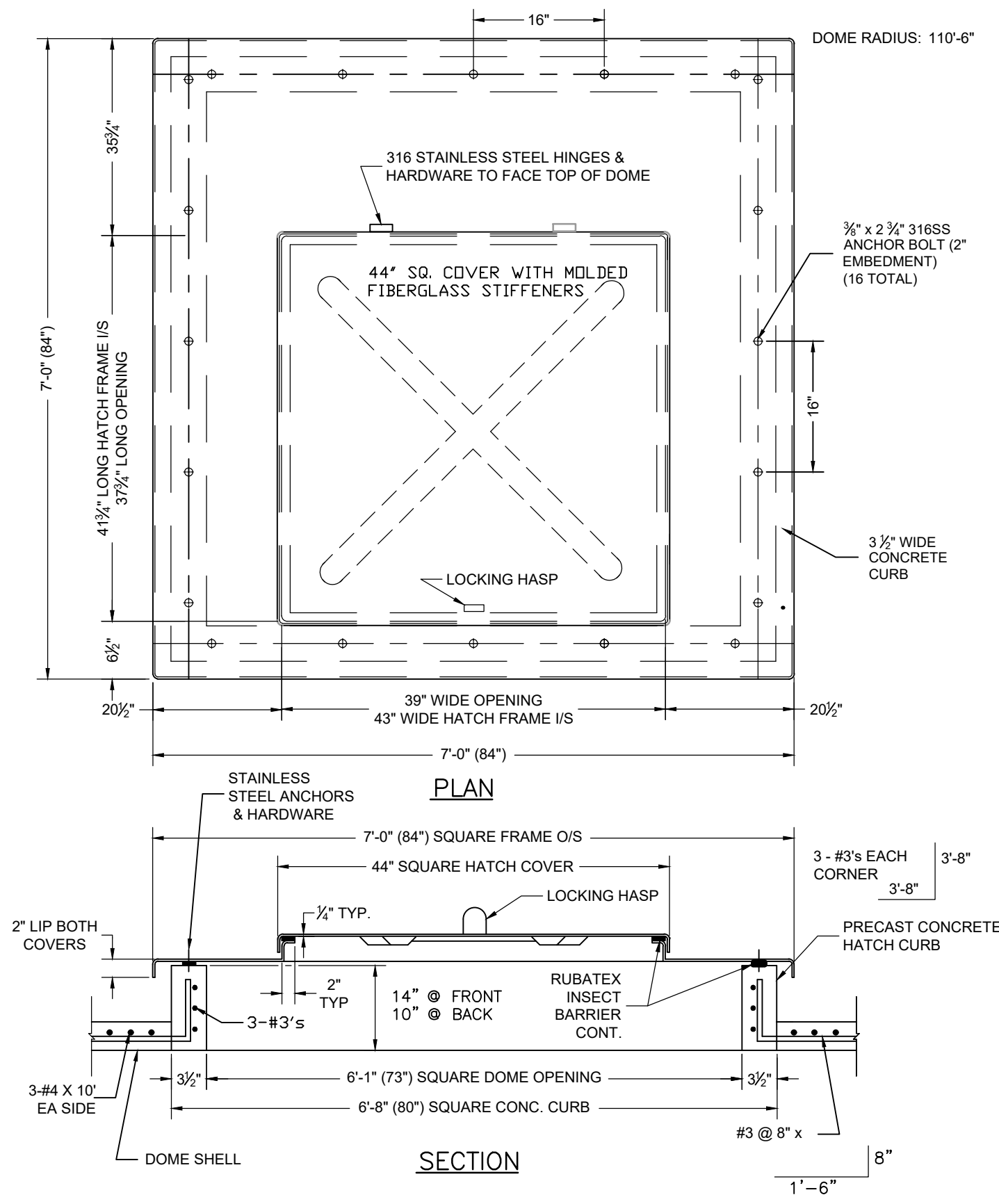


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Utility Department
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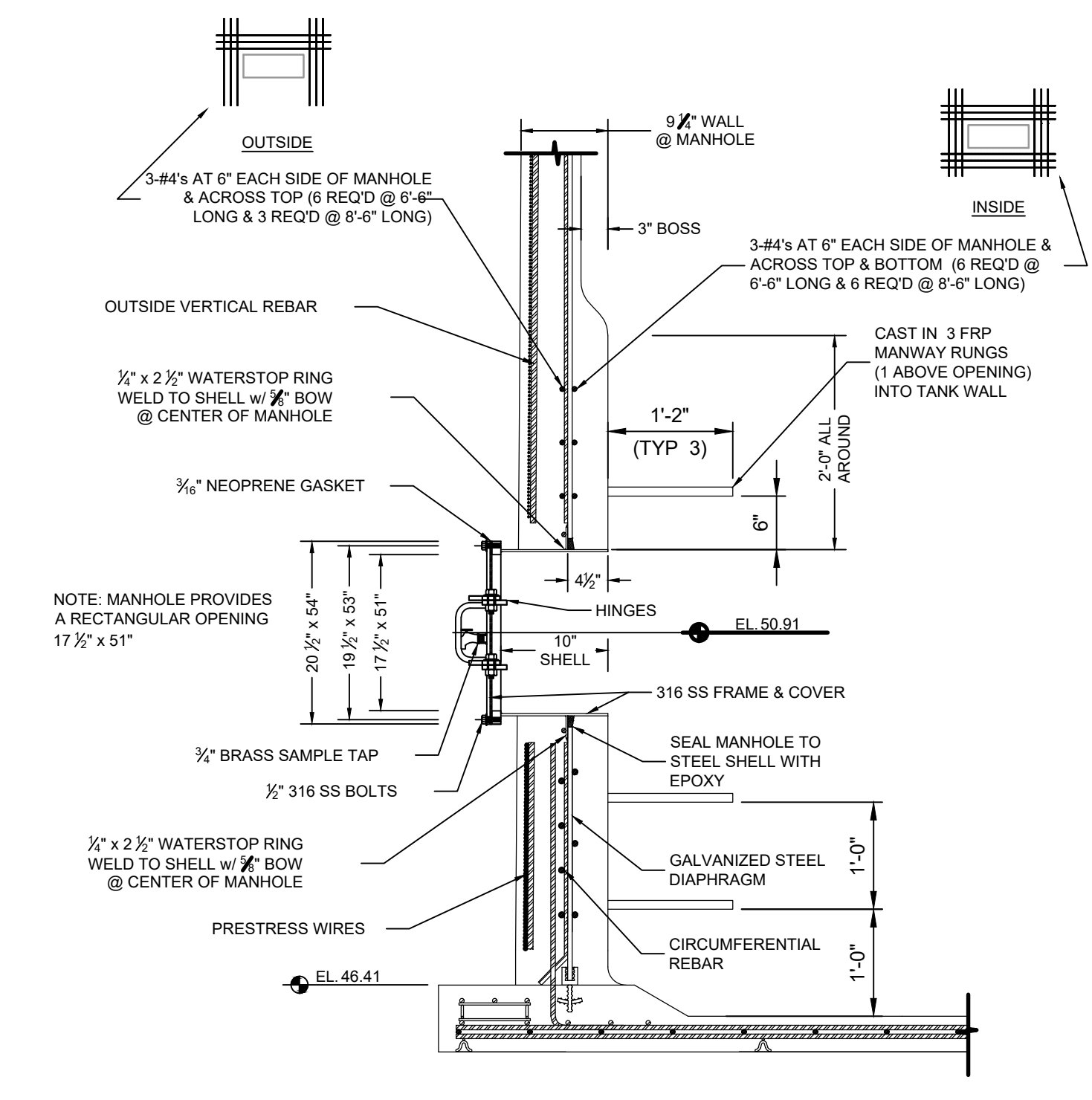
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

GROUND STORAGE TANK
DETAILS

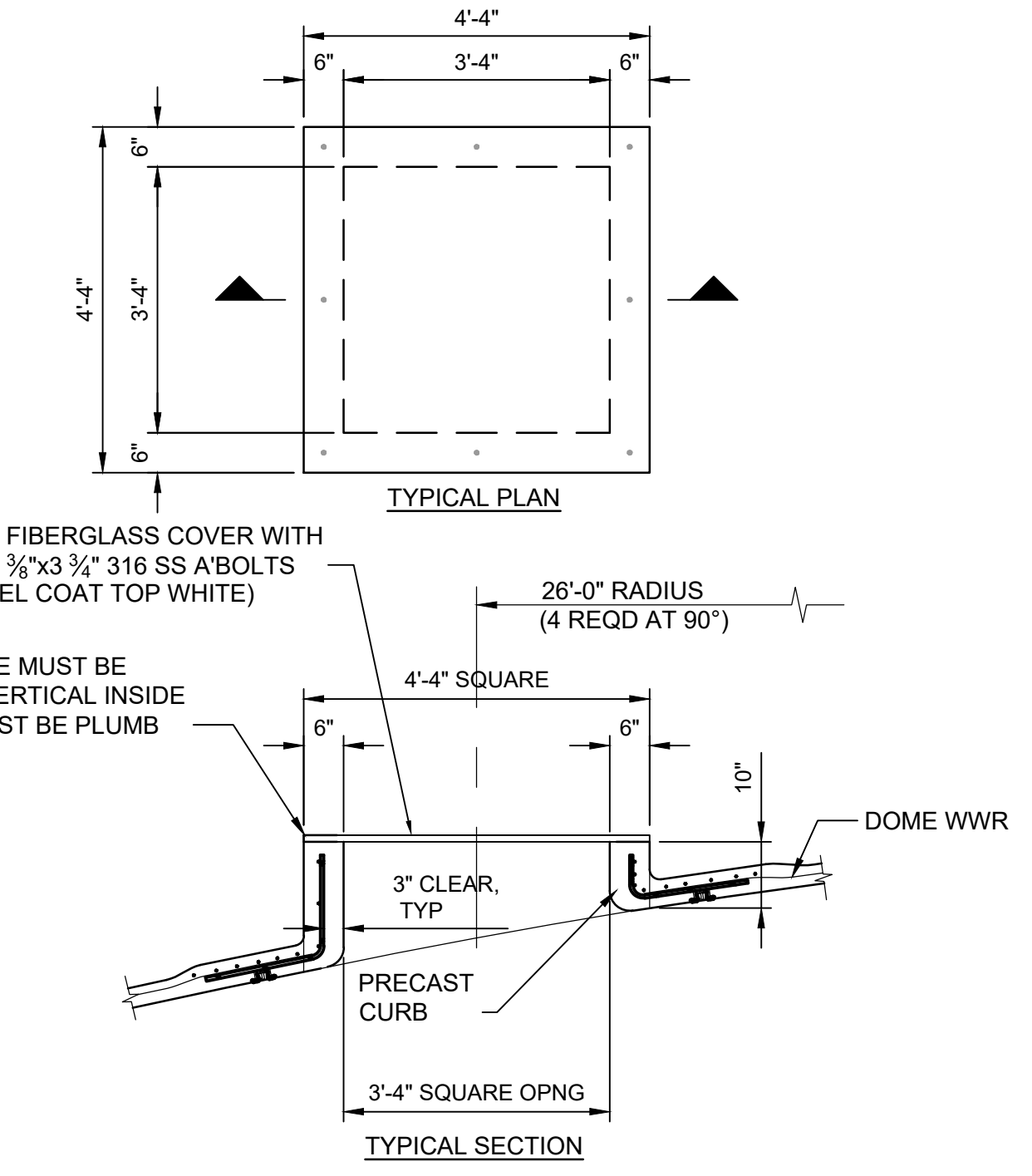
SHEET NO.
41
DWG NO.
M-6
ELECTRICAL
BID PACKAGE



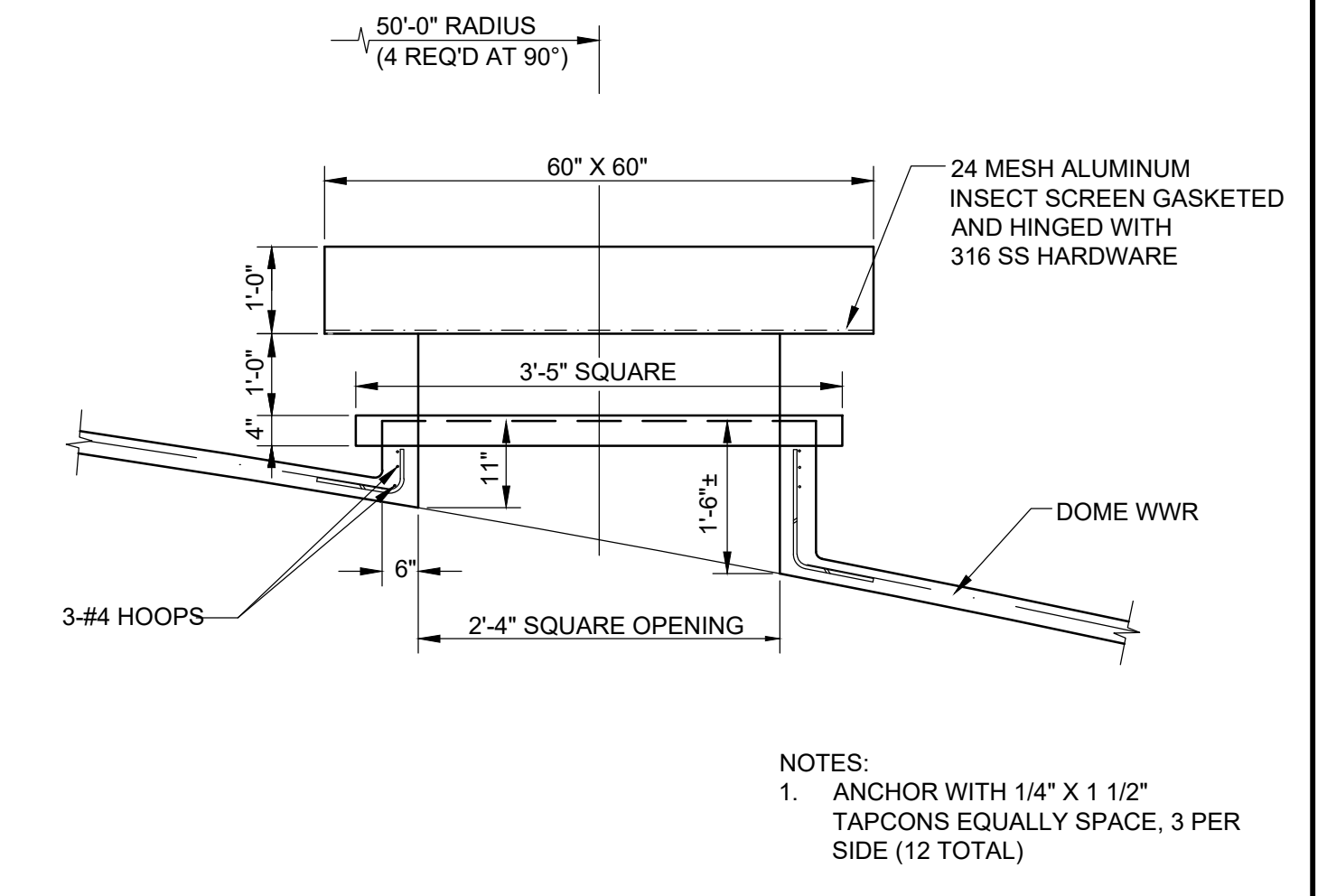
B 316 SS WALL MANHOLE W/ HINGED COVER DETAIL
NTS



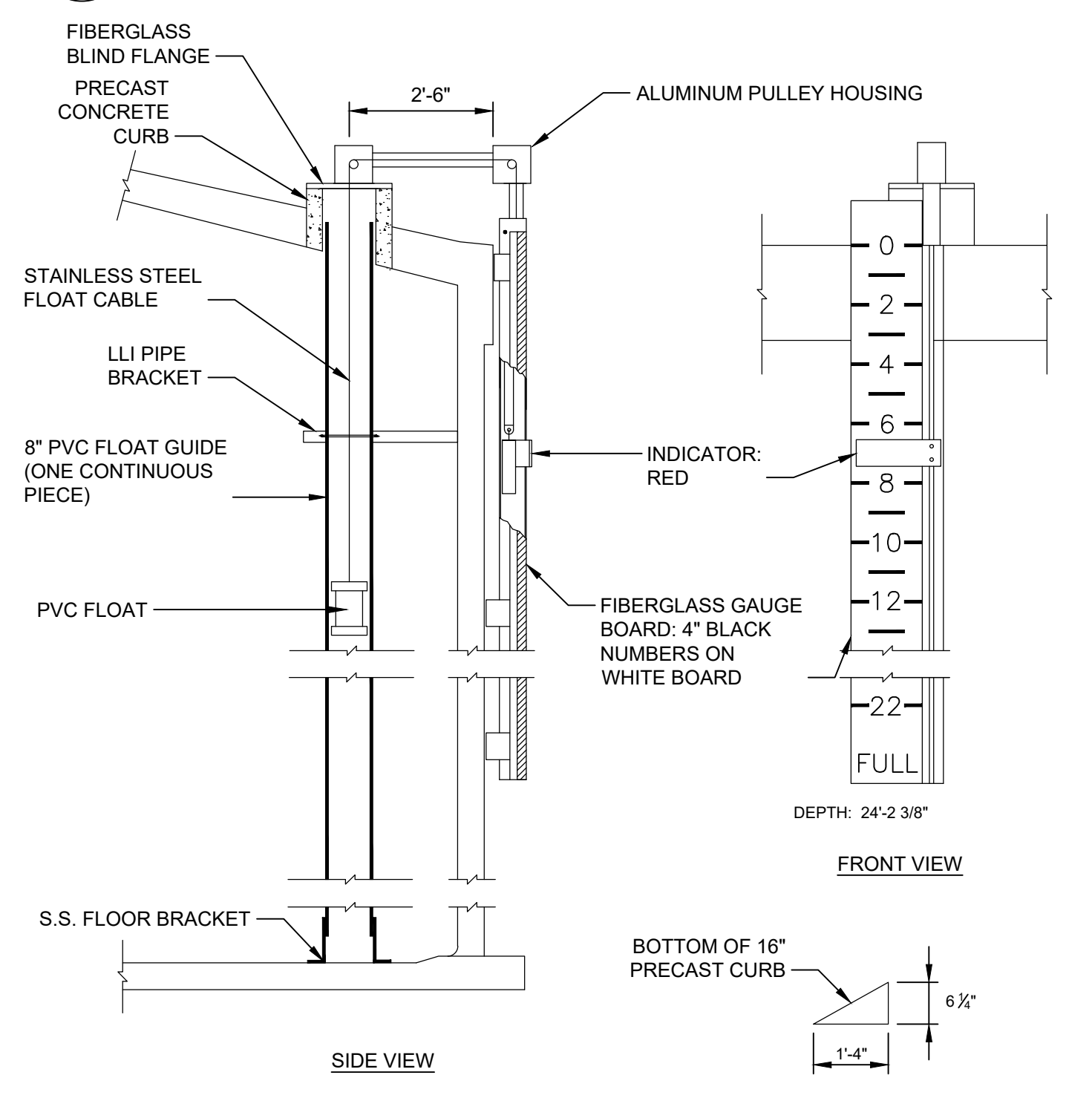
C CONCRETE CURB FOR FUTURE FAN
NTS



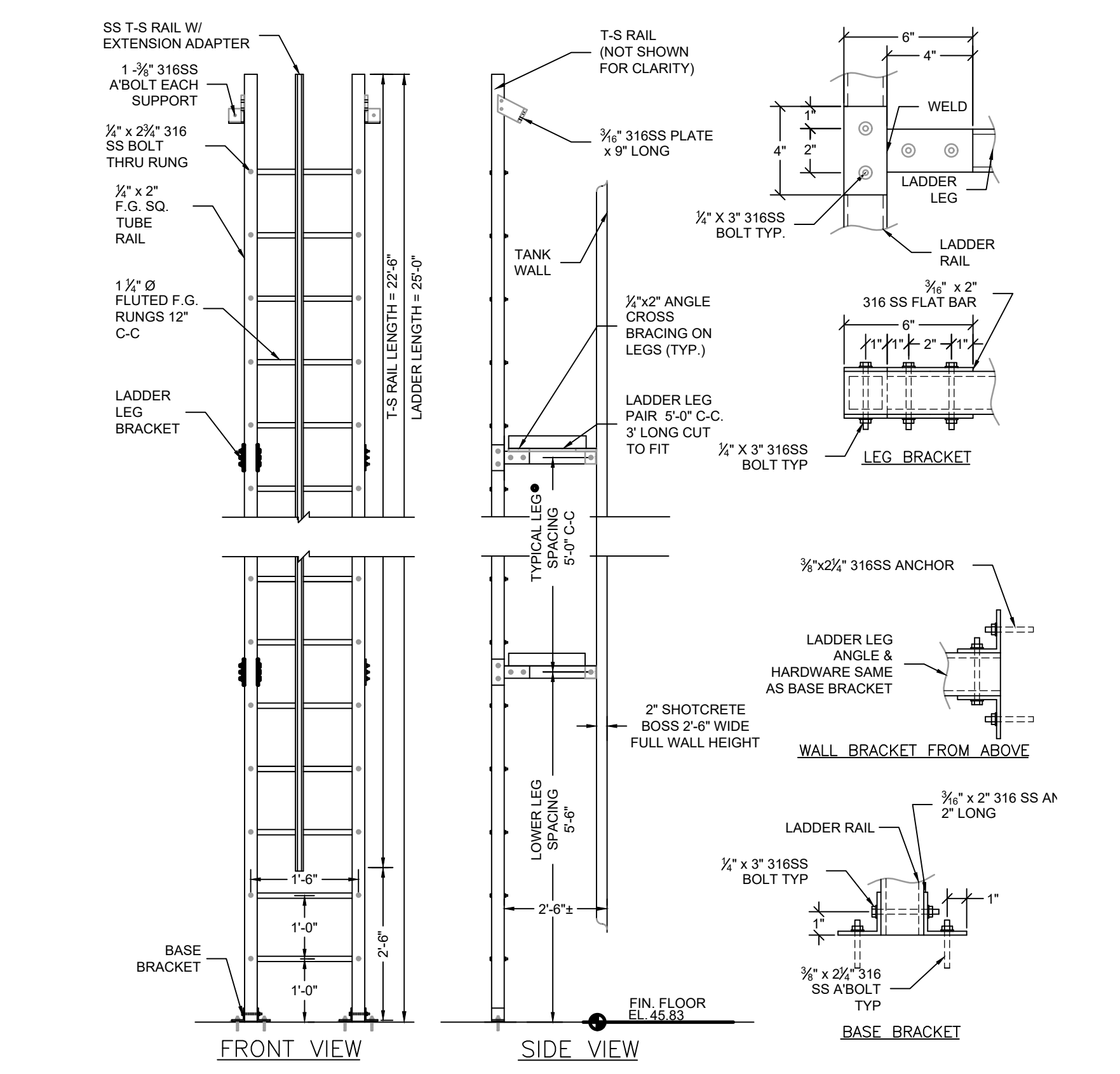
D CONCRETE INTAKE VENT CURB
NTS



A ACCESS HATCH WITH FIBERGLASS COVER DETAIL
NTS



F INTERIOR FRP LADDER W/ STAINLESS STEEL TS SAFETY RAIL
NTS



E FIBERGLASS LIQUID LEVEL INDICATOR
NTS

NO.	BY	DATE	SYMBOL	REVISIONS
6.				
5.				
4.				
3.				
2.				
1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M
MOTT
MACDONALD
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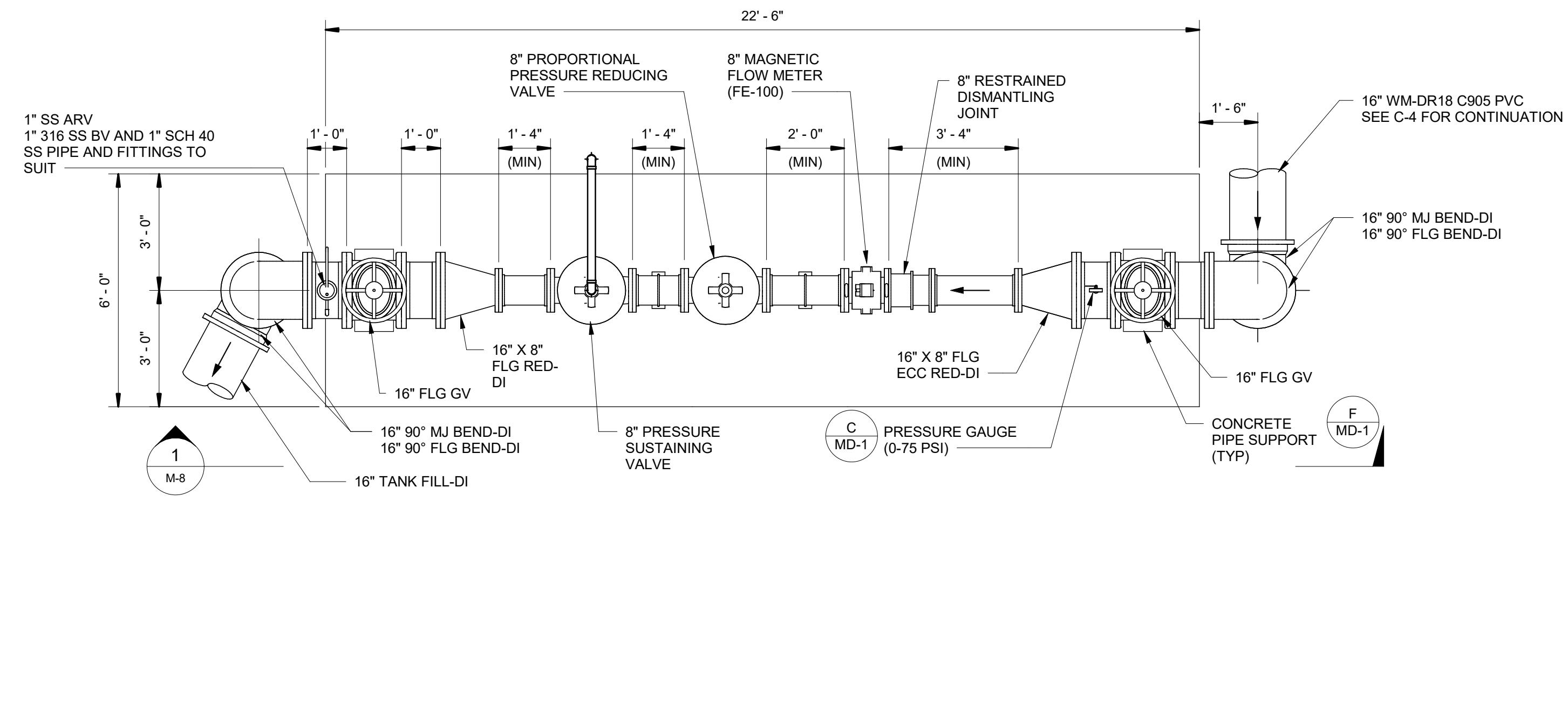
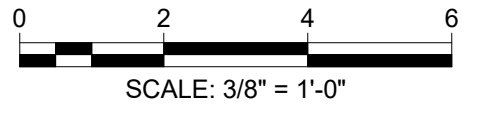


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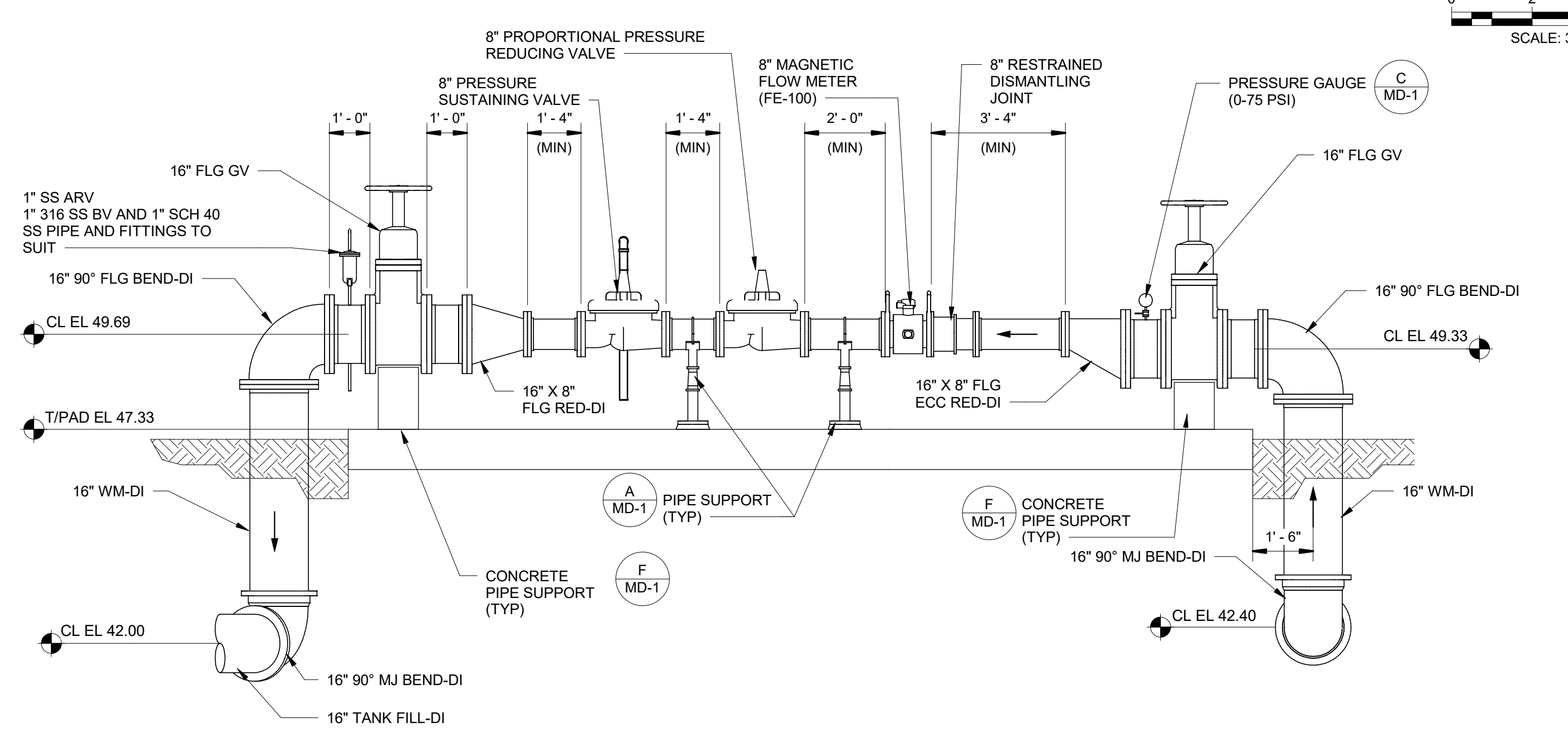
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

GROUND STORAGE TANK
DETAILS

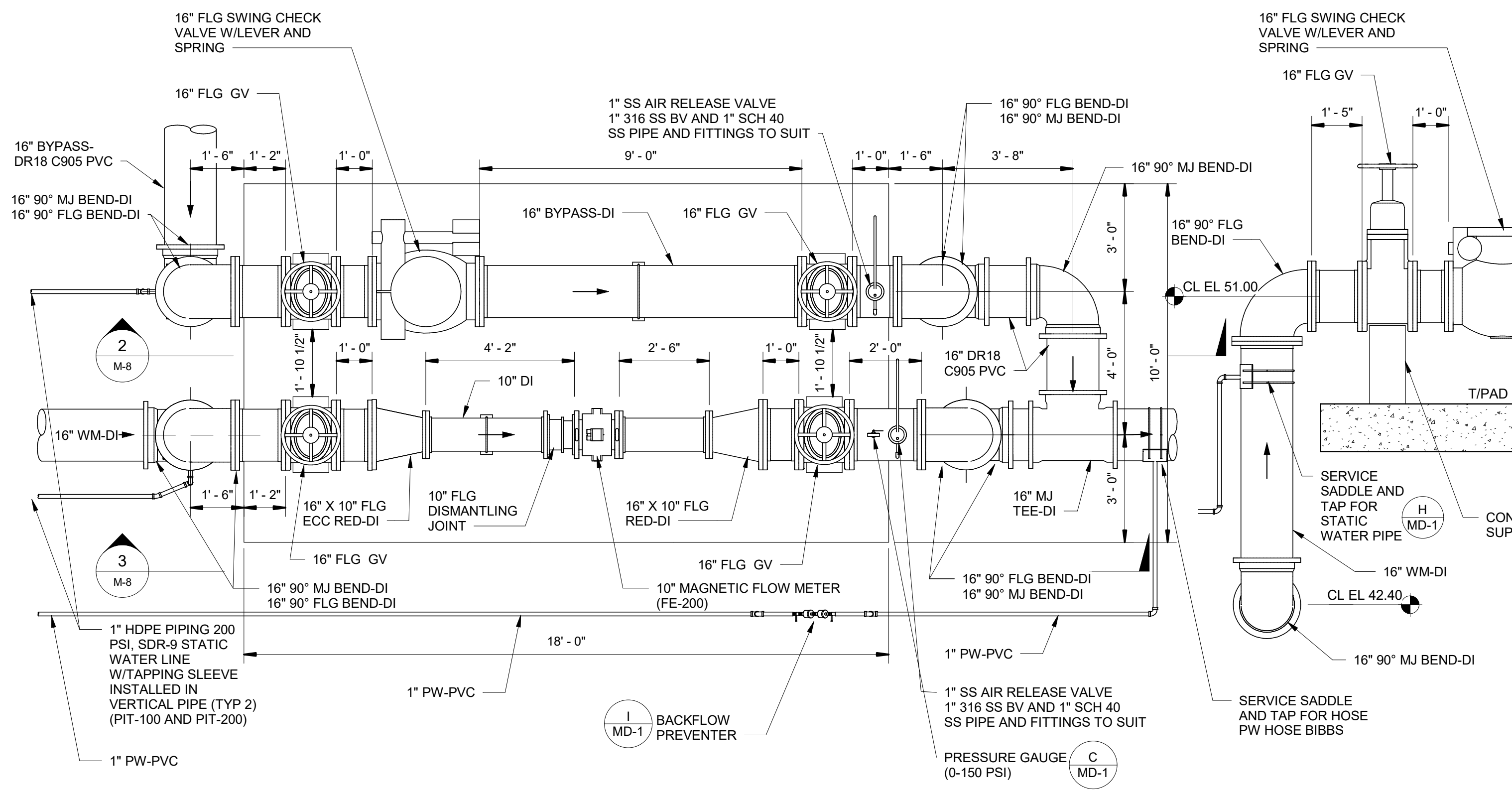
SHEET NO.
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DWG NO.
M-7
ELECTRICAL
BID PACKAGE



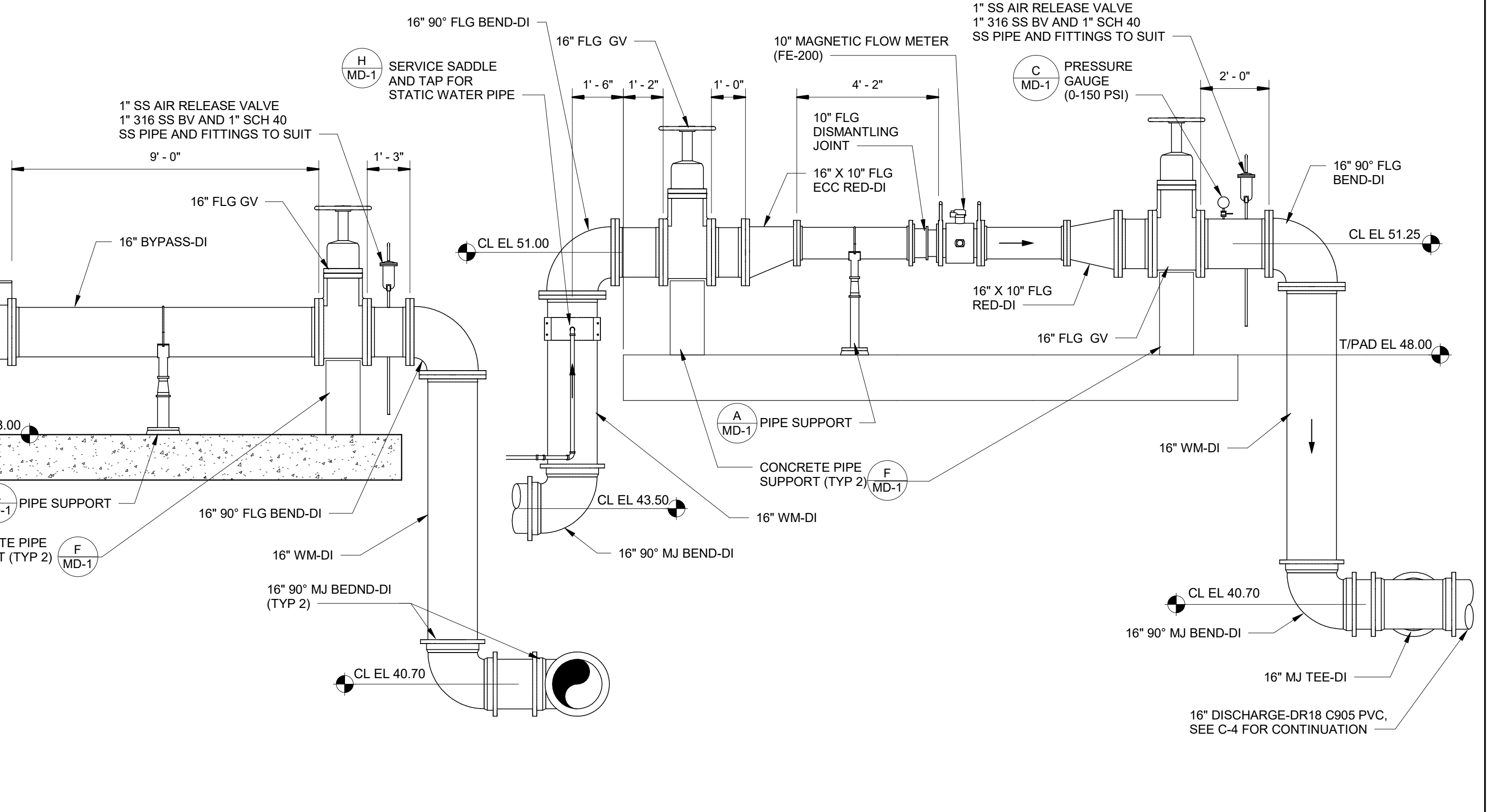
GST FILL VALVE PLAN
SCALE: 3/8" = 1'-0"



1 SECTION
SCALE: 3/8" = 1'-0"



DISCHARGE FLOW METER AND BYPASS PLAN
SCALE: 3/8" = 1'-0"



2 SECTION
SCALE: 3/8" = 1'-0"

3 SECTION
SCALE: 3/8" = 1'-0"

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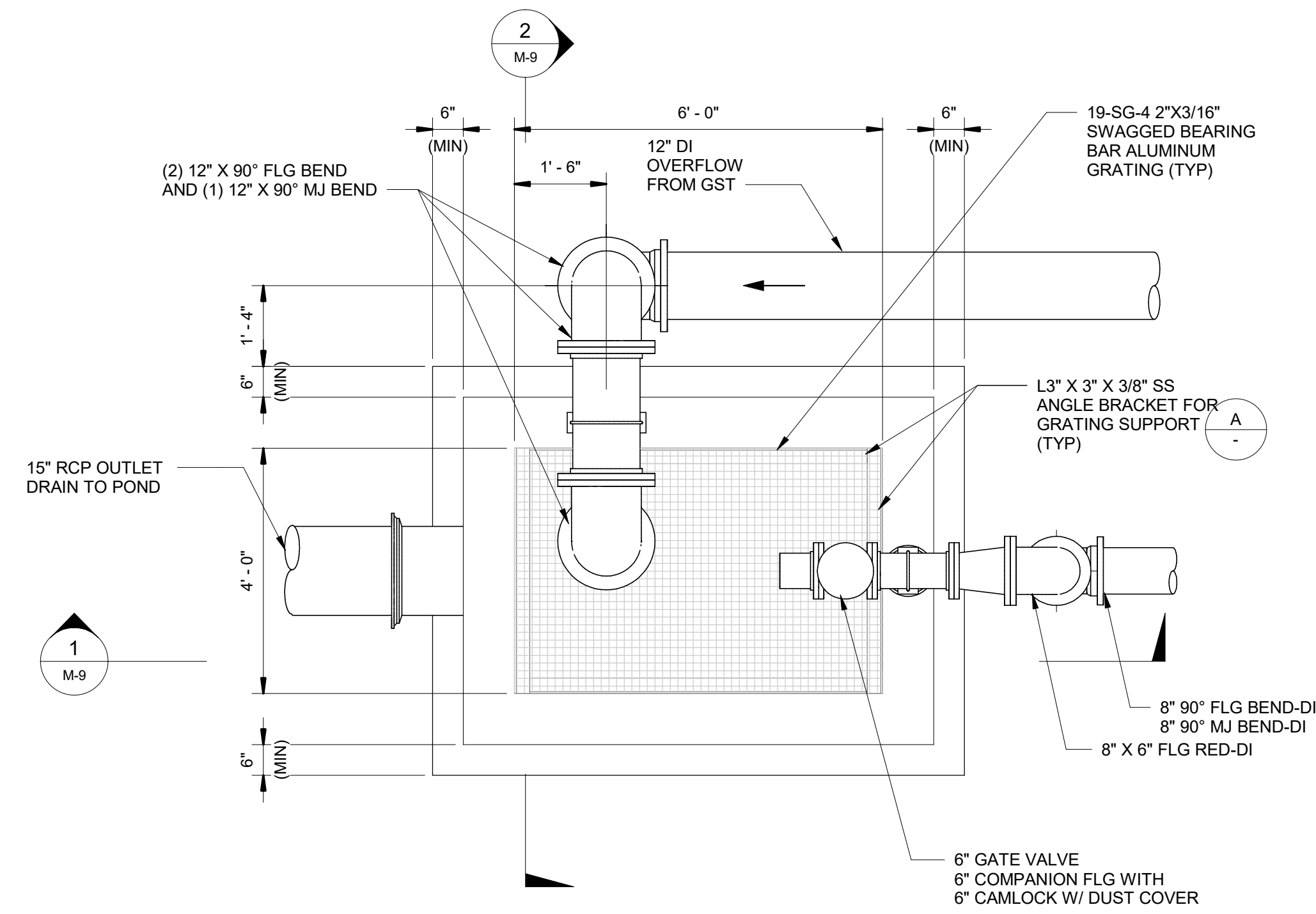
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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

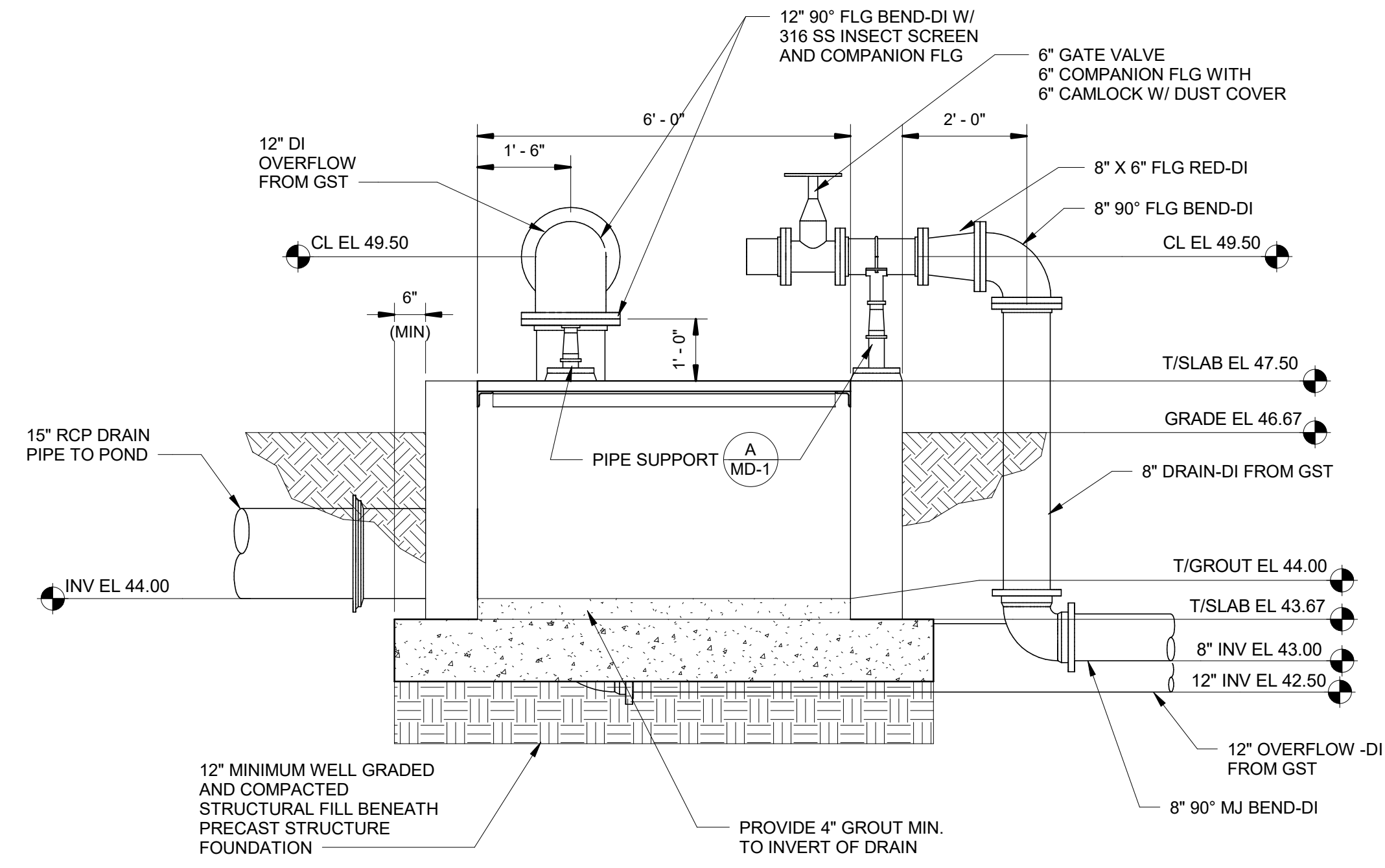
FILL VALVE, DISCHARGE FLOW METER, AND BYPASS PLANS AND SECTIONS

SHEET NO. 43
DWG NO. M-8
ELECTRICAL BID PACKAGE

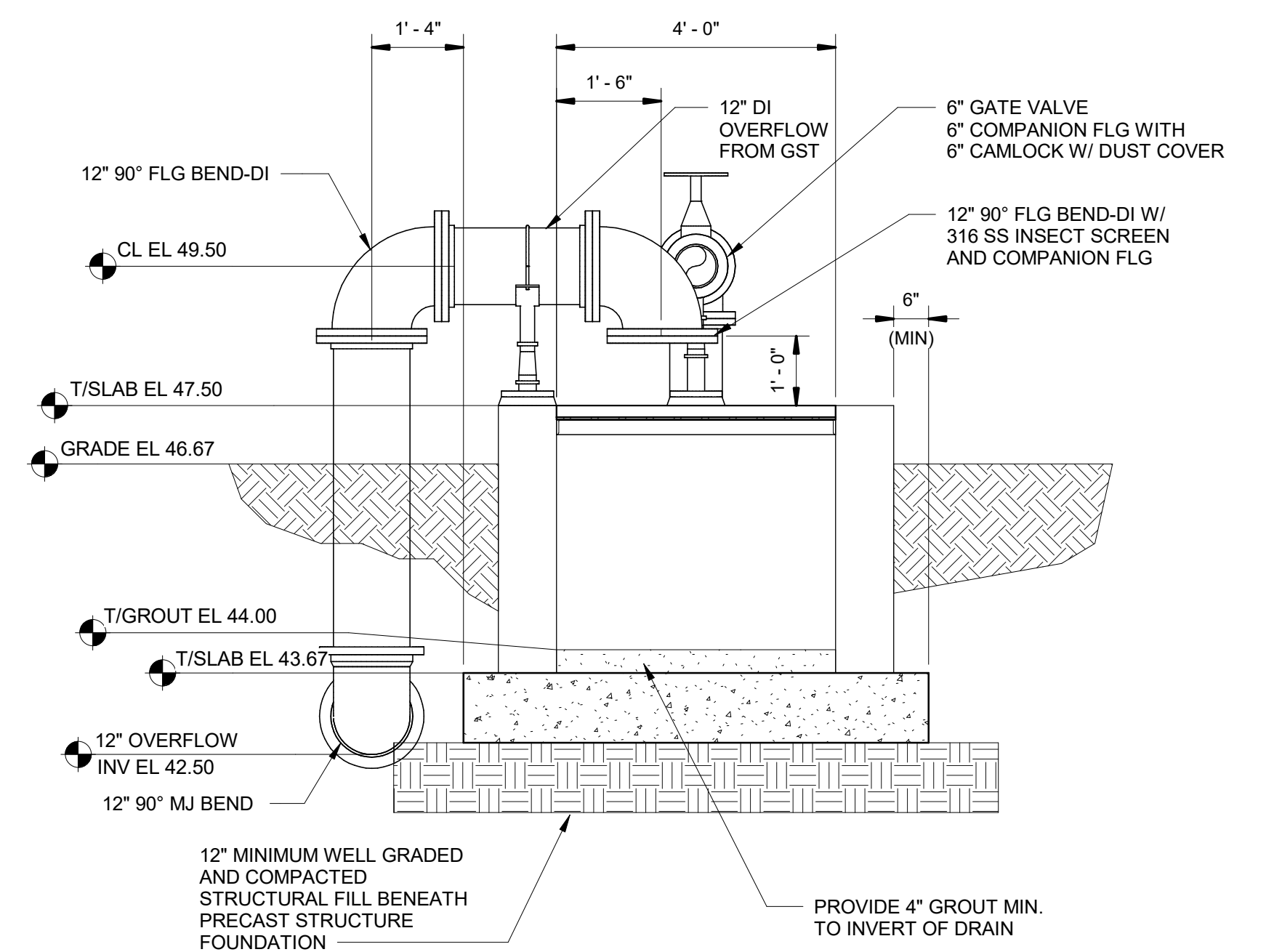
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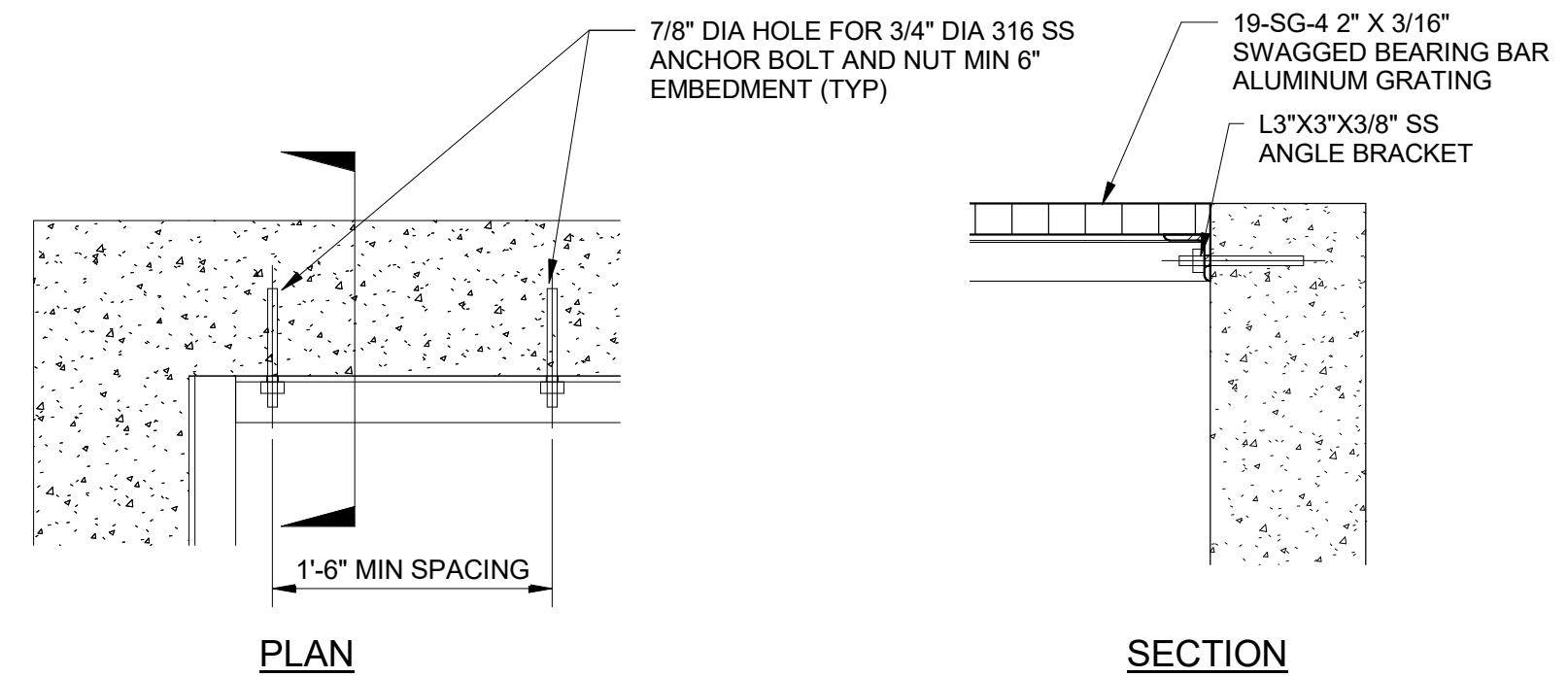
TANK DRAIN AND OVERFLOW STRUCTURE
SCALE: 1/2" = 1'-0"



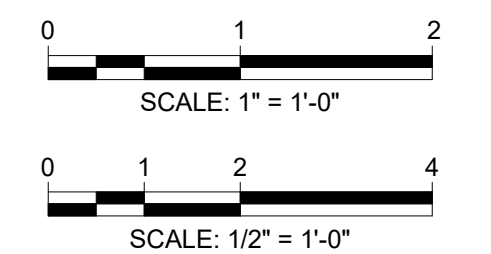
1 SECTION
1/2" = 1'-0"



2 SECTION
1/2" = 1'-0"



A GRATING SUPPORT ANGLE BRACKET
1" = 1'-0"



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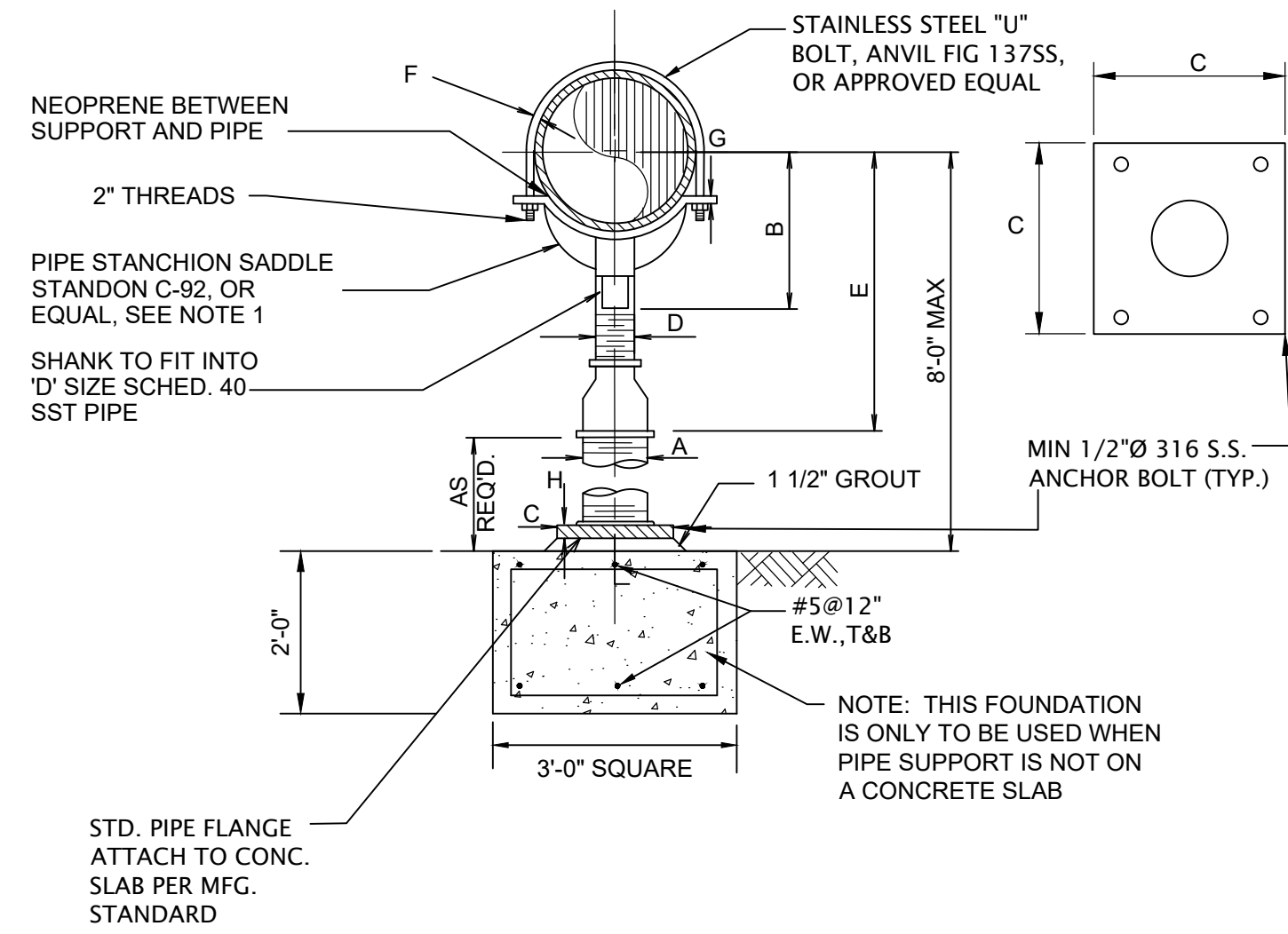
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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

GROUND STORAGE TANK DRAIN AND OVERFLOW STRUCTURE PLAN AND SECTIONS

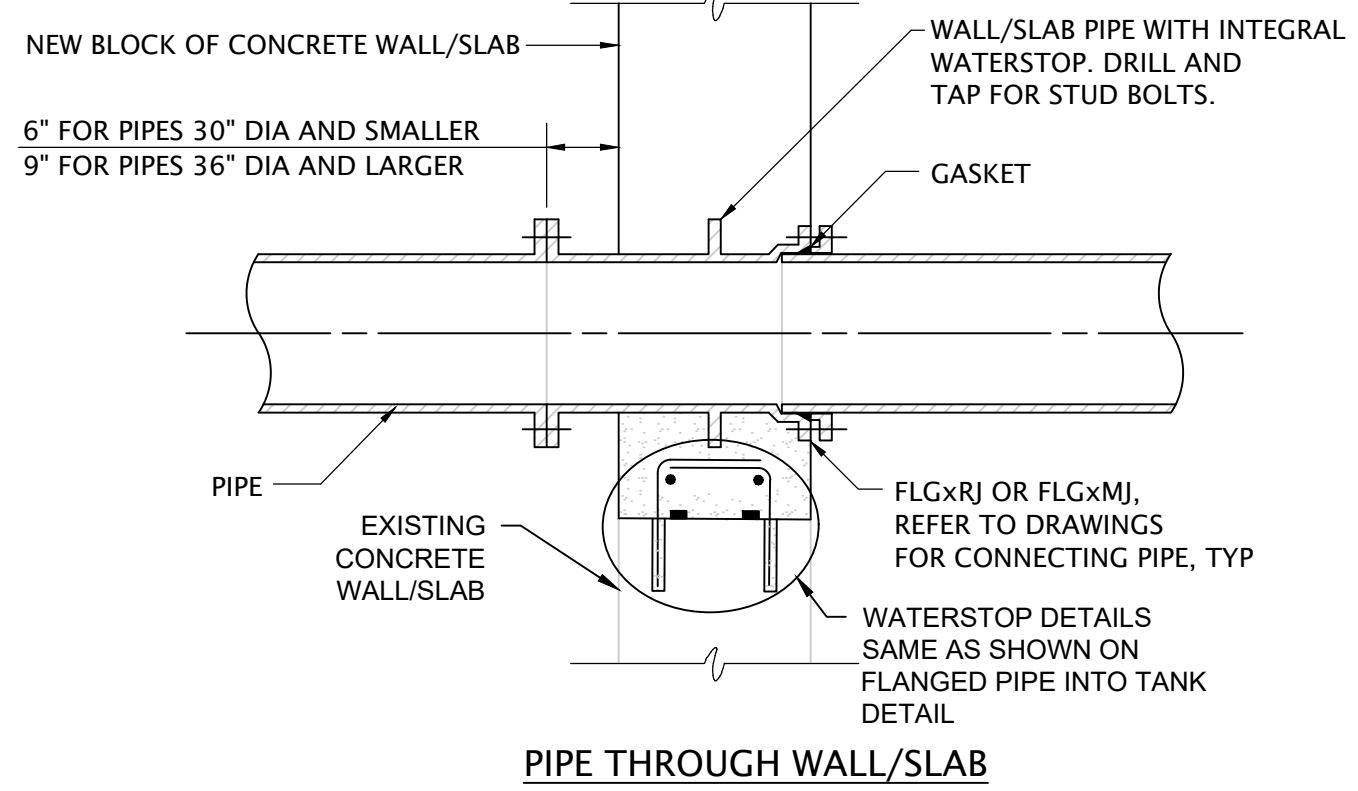
SHEET NO. 44
DWG NO. M-9
ELECTRICAL BID PACKAGE

PIPE SIZE	A	B	C	D	E		F	G	H
					MIN.	MAX.			
2 1/2"	2 1/2"	3 1/2"	9"	1 1/2"	8"	13"	1/2"	3/16"	3/8"
3"	2 1/2"	3 3/4"	9"	1 1/2"	8 1/4"	13 1/4"	1/2"	3/16"	3/8"
3 1/2"	2 1/2"	4"	9"	1 1/2"	8 1/2"	13 1/2"	1/2"	3/16"	3/8"
4"	3"	4 1/4"	9"	2 1/2"	9 1/4"	14"	1/2"	3/16"	3/8"
5"	3"	4 7/8"	9"	2 1/2"	10"	14 3/4"	5/8"	3/16"	3/8"
6"	3"	5 1/2"	9"	2 1/2"	10 1/2"	15 1/4"	5/8"	1/4"	3/8"
8"	3"	6 7/8"	9"	2 1/2"	11 3/4"	16 1/2"	5/8"	1/4"	3/8"
10"	3"	8 1/2"	9"	2 1/2"	13 1/2"	18 1/4"	3/4"	1/4"	1/2"
12"	3"	9 15/16"	9"	2 1/2"	15"	19 3/4"	3/4"	1/4"	1/2"
14"	4"	10 15/16"	11"	3"	16 1/4"	20 3/4"	3/4"	1/4"	1/2"
16"	4"	12 3/8"	11"	3"	17 3/4"	22 1/4"	7/8"	3/8"	1/2"
18"	6"	13 7/8"	13 1/2"	3 1/2"	19 1/2"	24"	1"	3/8"	1/2"
20"	6"	15 3/8"	13 1/2"	3 1/2"	21"	25 1/2"	1"	3/8"	1/2"
24"	6"	17 15/16"	13 1/2"	4"	23 3/4"	28 1/4"	1"	3/8"	1/2"
30"	6"	21 5/16"	13 1/2"	4"	27"	31 1/2"	1"	1/2"	5/8"
32"	6"	22 1/2"	13 1/2"	4"	28 1/4"	32 3/4"	1"	1/2"	5/8"
36"	6"	24 1/2"	13 1/2"	4"	30 1/4"	34 3/4"	1"	1/2"	5/8"



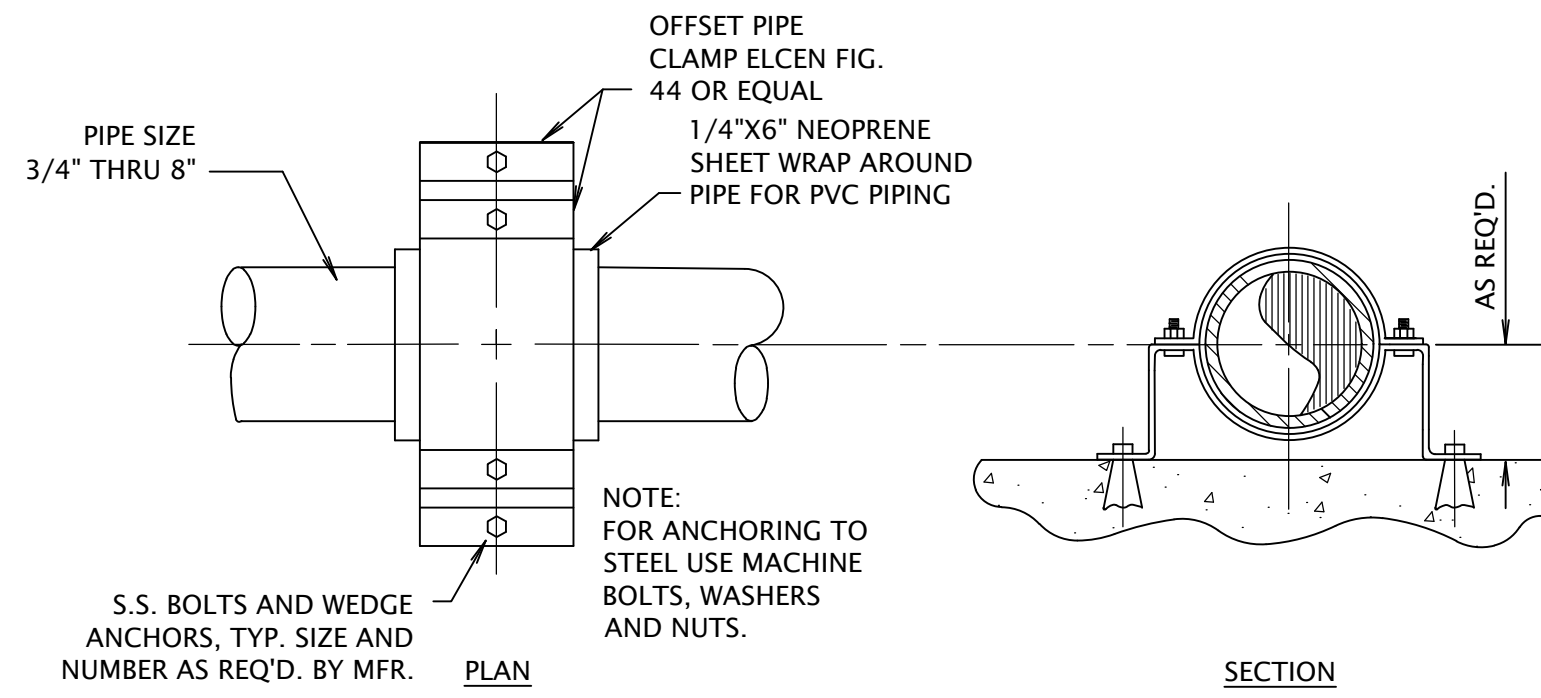
- NOTE:
- SADDLE SHALL BE USED FOR SUPPORT LOCATED UNDER PIPING. SUPPORTS UNDER VALVES SHALL UTILIZE A FLAT PLATE PEDESTAL SUPPORT WITHOUT U-BOLT. VALVE SUPPORT SHALL BE EQUAL TO VALVE SUPPORT "E" AS MANUFACTURED BY E-Z LINE AND SHALL BE SIZED FOR THE VALVE.

A 304 SS PIPE SUPPORT
- NTS

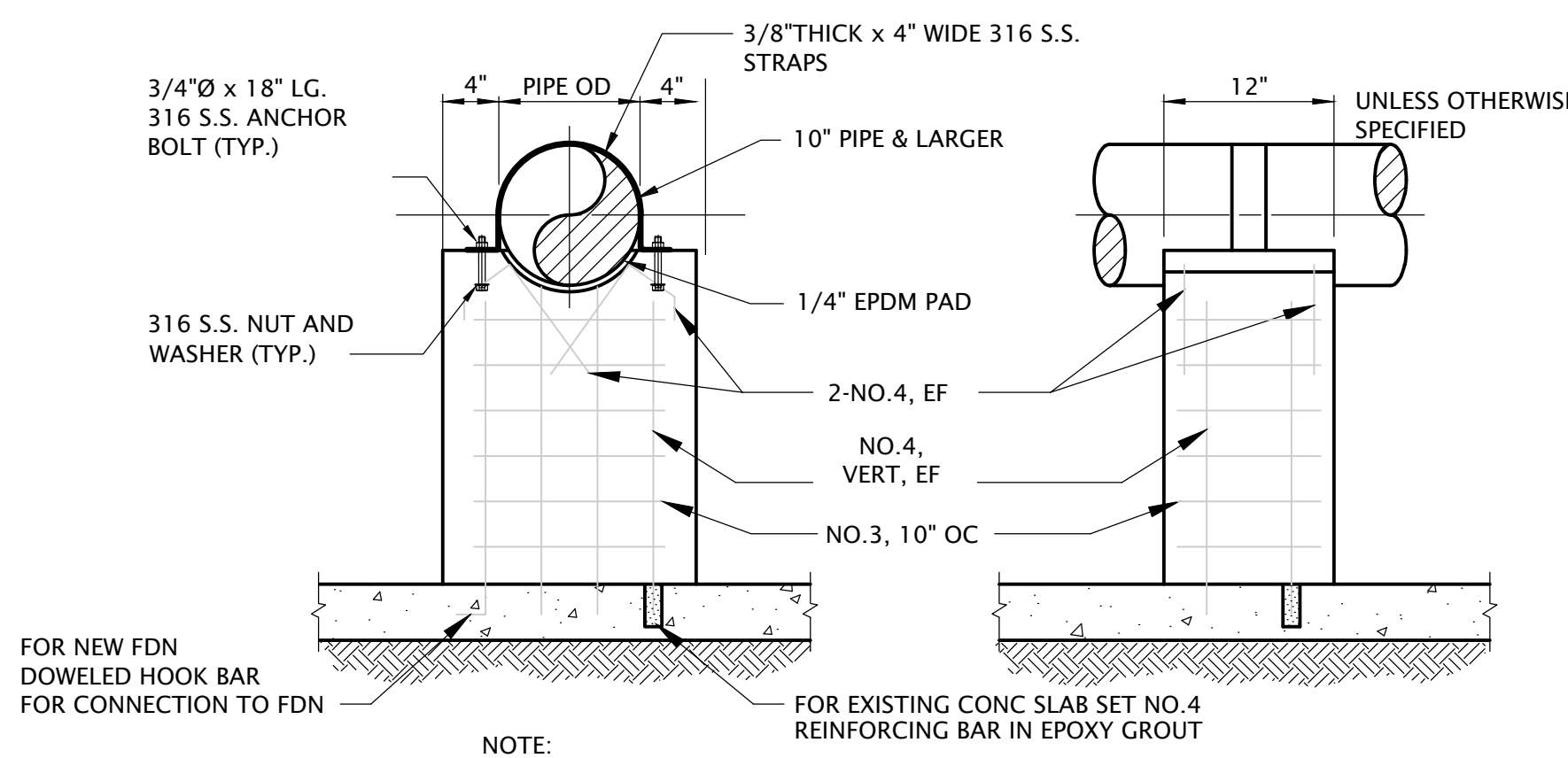


- NOTES:
- ALL WALL PIPES SHALL BE CAST UNLESS OTHERWISE NOTED.
 - PROVIDE PIPE JOINT WITHIN TWO (2) FEET OF EXTERIOR FACE OF WALL AT CONNECTION TO ALL NEW AND EXISTING STRUCTURES OR MANHOLES.
 - ALL NEW OPENINGS IN EXISTING CONCRETE WALLS SHALL BE ACCOMPLISHED WITH A CLEAN SAW-CUT OR SINGLE CORE DRILLED AS REQUIRED. SURFACES SHALL BE ROUGHENED BY APPROVED METHODS (NOT APPLICABLE).
 - FIRESTOP SLEEVED PENETRATIONS THROUGH FIRE-RATED WALLS OR FLOORS (NOT APPLICABLE).

E WALL/SLAB PENETRATION
- NTS

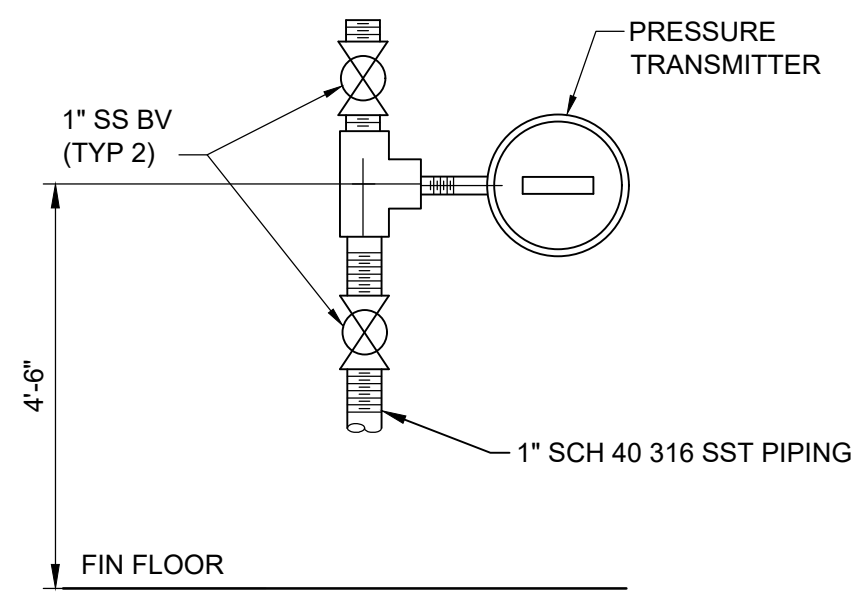


B 304 SS PIPE CLAMP
- NTS



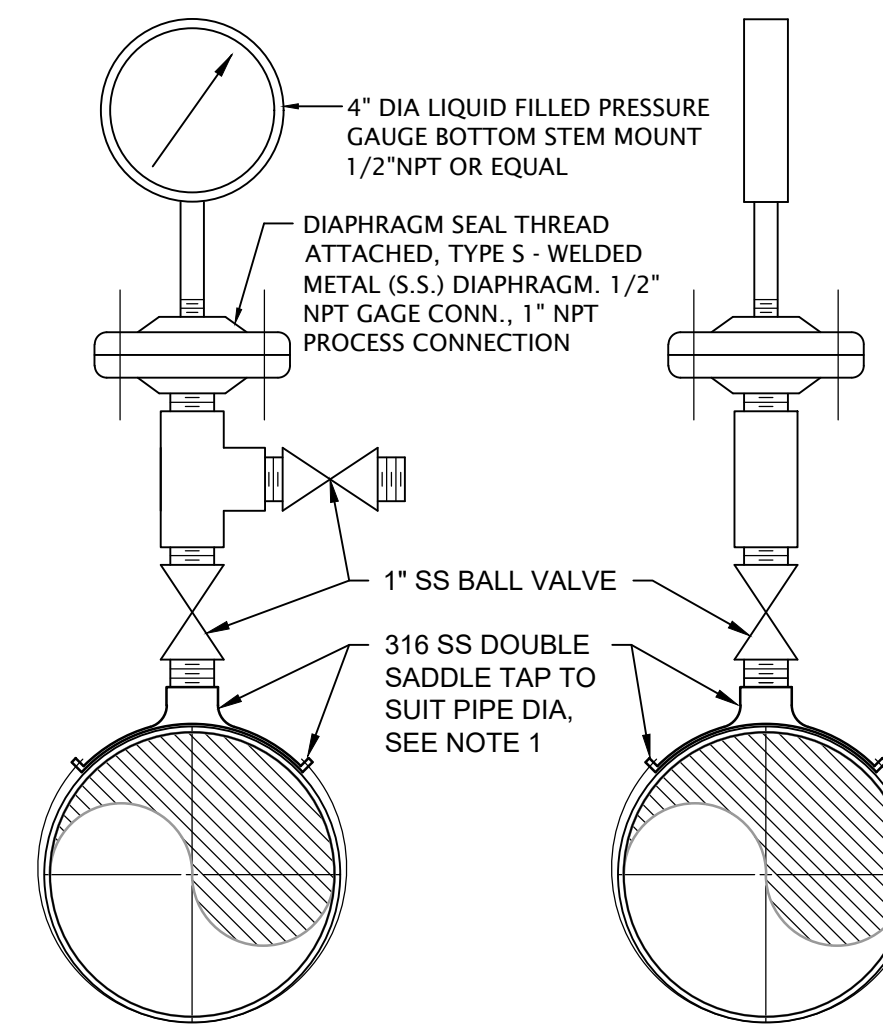
- NOTE:
- WHERE PIPE SUPPORT IS UNDER A PIPE APPURTENANCE THAT CANNOT ACCOMMODATE A STRAP, CONTRACTOR SHALL PROVIDE THE SUPPORT WITH NO STRAP.

F TYPICAL CONCRETE PIPE SUPPORT
- NTS



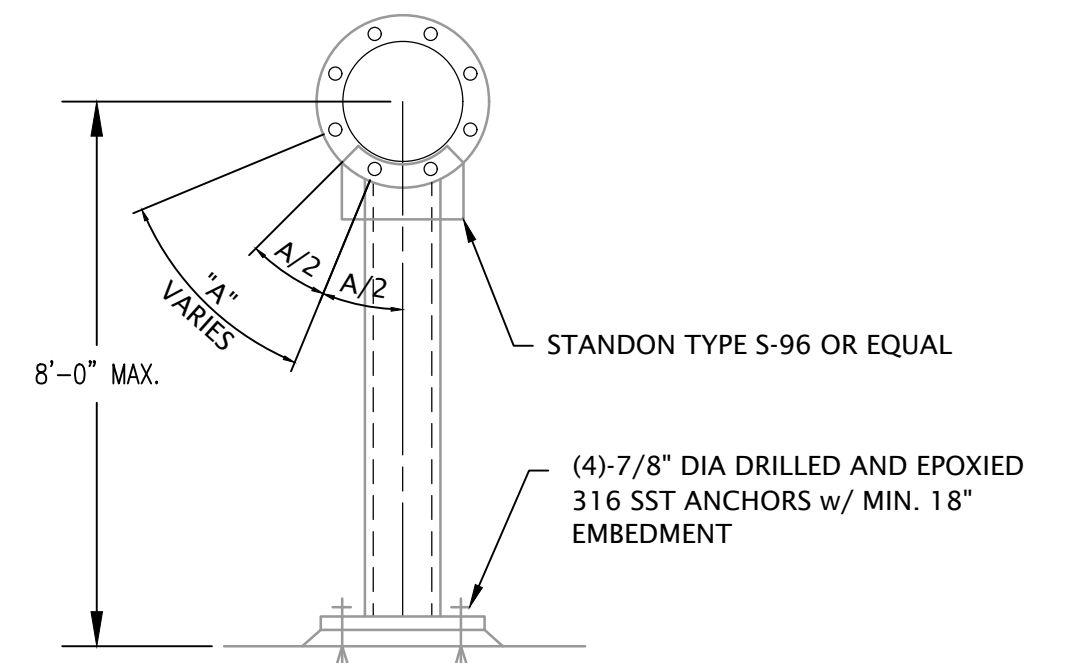
- NOTES:
- ALL PIPING, FITTINGS AND VALVES SHALL BE 316 STAINLESS STEEL.
 - SUPPORT PIPING AGAINST WALL WITH PIPE CLAMS AS PER DETAIL B/MD-1.

G PIT CONNECTION
- NTS

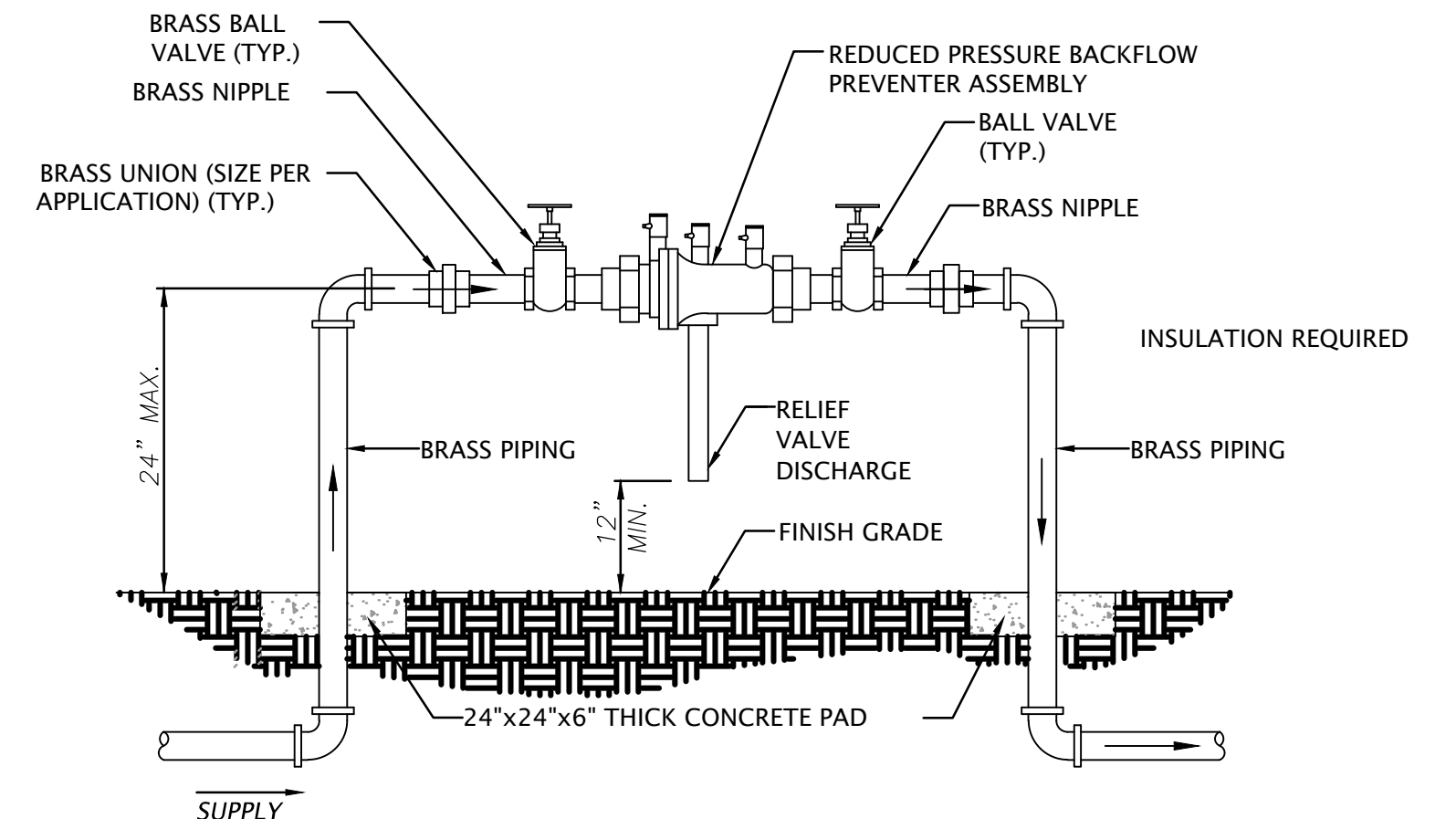


- NOTE:
- SADDLE TAPS SHALL BE USED ON DUCTILE IRON AND PVC PIPING. ALL PRESSURE GAUGE CONNECTIONS ON STAINLESS STEEL PIPING SHALL BE WELDED TAPS UNLESS OTHERWISE AGREED UPON WITH ENGINEER.

C PRESSURE GAUGE
- NTS



D 304 SS PIPE FLANGE CRADLE SUPPORT
- NTS



I BACKFLOW PREVENTER DETAIL
- NTS

1" SERVICE	NO.	ITEM	ITEM PRODUCT
	1	SERVICE SADDLE	FORD FC202
	2	CORPORATION STOP	FORD F1000-4

H WATER MAIN CONNECTION
- NTS

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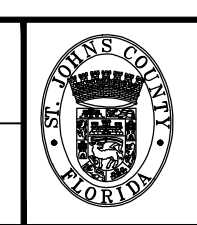
NO.	BY	DATE	SYMBOL	REVISIONS
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M
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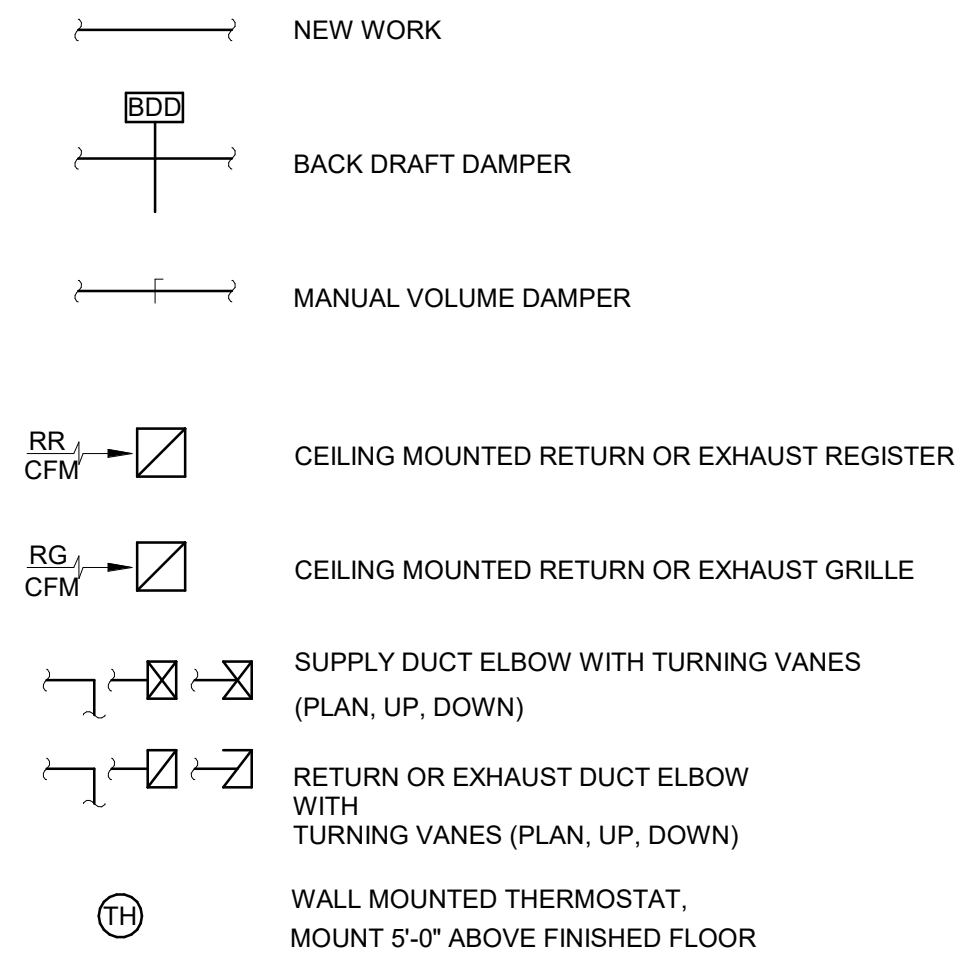


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GR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

MISCELLANEOUS
MECHANICAL DETAILS
SHEET NO. 45
DWG NO. MD-1
ELECTRICAL
BID PACKAGE

HVAC LEGEND



HVAC ABBREVIATIONS

AC	AIR CONDITIONING UNIT	LRA	LOCKED ROTOR AMPERES
ACCU	AIR COOLED CONDENSING UNIT	LV	LOUVER
AD	ACCESS DOOR	MAX	MAXIMUM
AFF	ABOVE FINISHED FLOOR	MBCA	MINIMUM BRANCH CIRCUIT AMPACITY
AHU	AIR HANDLING UNIT	MBH	THOUSAND BTU PER HOUR
AMP	AMPERE	MCA	MINIMUM CIRCUIT AMPERES
ARCH	ARCHITECTURAL	MD	MOTORIZED DAMPER
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	MECH.	MECHANICAL
B/D	BELT DRIVE	MIN	MINIMUM
BDD	BACK DRAFT DAMPER	MSCP	MAXIMUM OVERCURRENT PROTECTION
BHP	BREAK HORSEPOWER	NC	NORMALLY CLOSED
BLDG.	BUILDING	NFA	NET FREE AREA
BTU	BRITISH THERMAL UNIT	NO	NORMALLY OPEN
BTUH	BRITISH THERMAL UNITS PER HOUR	NTS	NOT TO SCALE
CD	CONDENSATE DRAIN	OA	OUTSIDE AIR
CFM	CUBIC FEET PER MINUTE	OAI	OUTSIDE AIR INTAKE
CONT.	CONTINUATION	OSA	OUTSIDE SUPPLY AIR
CP	CONDENSATE PUMP	PD	PRESSURE DROP
CU	CONDENSING UNIT	PH	PHASE
CU. FT.	CUBIC FEET	PRESS.	PRESSURIZATION
DB	DRY BULB	PSI	POUNDS PER SQUARE INCH
dB	DECIBELS	PSIG	POUNDS PER SQUARE INCH, GAUGE
DD	DIRECT DRIVE	QTY	QUANTITY
DIA	DIAMETER	RA	RETURN AIR
DN	DOWN	RG	RETURN GRILLE
DWG	DRAWING	RH	RELATIVE HUMIDITY
DX	DIRECT EXPANSION	RLA	RUNNING LOAD AMPERES
EA	EACH	RM	ROOM
EAT	ENTERING AIR TEMPERATURE	R.O.	ROOF OPENING
EER	ENERGY EFFICIENCY RATIO	RPM	REVOLUTIONS PER MINUTE
EF	EXHAUST FAN	RR	RETURN REGISTER
EL	ELEVATION	SA	SUPPLY AIR
ELEC.	ELECTRICAL	SEER	SEASONAL ENERGY EFFICIENCY RATIO
ER	EXHAUST REGISTER	SENS.	SENSIBLE
ESP	EXTERNAL STATIC PRESSURE	SF	SUPPLY FAN
EXH.	EXHAUST	SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
°F	DEGREE, FAHRENHEIT	SQ	SQUARE
FLA	FULL LOAD AMPERES	SQ. FT.	SQUARE FEET
FPM	FEET PER MINUTE	SP	STATIC PRESSURE
FT	FEET	SR	SUPPLY REGISTER
FT. WG.	FEET OF WATER COLUMN GAUGE	TSP	TOTAL STATIC PRESSURE
GA.	GAUGE	TYP	TYPICAL
H	HEIGHT	V	VOLT
HP	HORSEPOWER	VD	VOLUME DAMPER
HR	HOURS	VIF	VERIFY IN FIELD
HZ	HERTZ	VFD	VARIABLE FREQUENCY DRIVE
IN.	INCHES	W	WIDTH
IN. WG.	INCHES OF WATER COLUMN GAUGE	W/	WITH
KW	KILOWATT	WB	WET BULB
L	LENGTH	W.C.	WATER COLUMN
LAT	LEAVING AIR TEMPERATURE	WG	WATER GAUGE
LBS	POUNDS	WMS	WIRE MESH SCREEN
LF	LINEAR FEET		

GENERAL NOTES

1. DUE TO THE SMALL SCALE OF THE DRAWINGS THE DUCTWORK AND PIPING SHOWN ARE DIAGRAMMATIC. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY OFFSETS TO AVOID CONFLICTS WITH STRUCTURAL ELEMENTS, LIGHTING FIXTURES, PLUMBING AND SPRINKLER PIPING.
2. DUE TO TIGHT SPACE CONDITIONS, COORDINATION OF DUCT, PIPE, CONDUITS AND STRUCTURAL MEMBER LOCATIONS IS CRITICAL. GENERAL CONTRACTOR SHALL PREPARE COORDINATION DRAWINGS TO BE SIGNED BY ALL TRADES. COORDINATION DRAWINGS SHOULD INCLUDE ALL DUCTWORK, PIPING, LIGHTING FIXTURES, ETC. OBTAIN ENGINEER'S APPROVAL PRIOR TO DUCTWORK AND PIPING INSTALLATION.
3. PRIOR TO ORDERING OR FABRICATING ANY NEW EQUIPMENT, THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES. EQUIPMENT LOCATIONS AND CONNECTION SIZES SHALL BE DERIVED FROM THE MANUFACTURER'S CERTIFIED DRAWINGS FOR THE SPECIFIC EQUIPMENT THAT WILL ACTUALLY BE FURNISHED AND INSTALLED FOR THIS PROJECT. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.
4. THE DETAILS INDICATED ON THE DRAWINGS AS TYPICAL SHALL APPLY TO ALL SIMILAR CONDITIONS UNLESS NOTED SPECIFICALLY OTHERWISE.
5. ALL SPACE TEMPERATURE SENSORS (THERMOSTATS) SHALL BE MOUNTED AT 5'-0" ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE.
6. WHEN PIPES, DUCTS AND OTHER HANGING ITEMS ARE SUPPORTED FROM THE STRUCTURAL ELEMENTS, THE CONTRACTOR SHALL PROVIDE THE MISCELLANEOUS STEEL NECESSARY TO SUPPORT PIPING, DUCTWORK AND MECHANICAL EQUIPMENT.
7. SHOULD DISCREPANCIES OCCUR BETWEEN CONTRACT DRAWINGS AND CONTRACT SPECIFICATIONS, THE MORE STRINGENT REQUIREMENTS IN CONJUNCTION WITH APPLICABLE LOCAL CODES, STANDARDS, RULES, REGULATIONS, LAWS, ETC. SHALL APPLY.

10/17/2022 11:59:15 AM

B:\0555346\CR-208 HVAC BPS.rvt

NO.	BY	DATE	SYMBOL	REVISIONS
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CHECKED BY: M. LAPILUSA
DATE: OCTOBER 2022

DESIGN ENGINEER
JACK WANG, P.E.
FLORIDA REGISTRATION NO.
81017

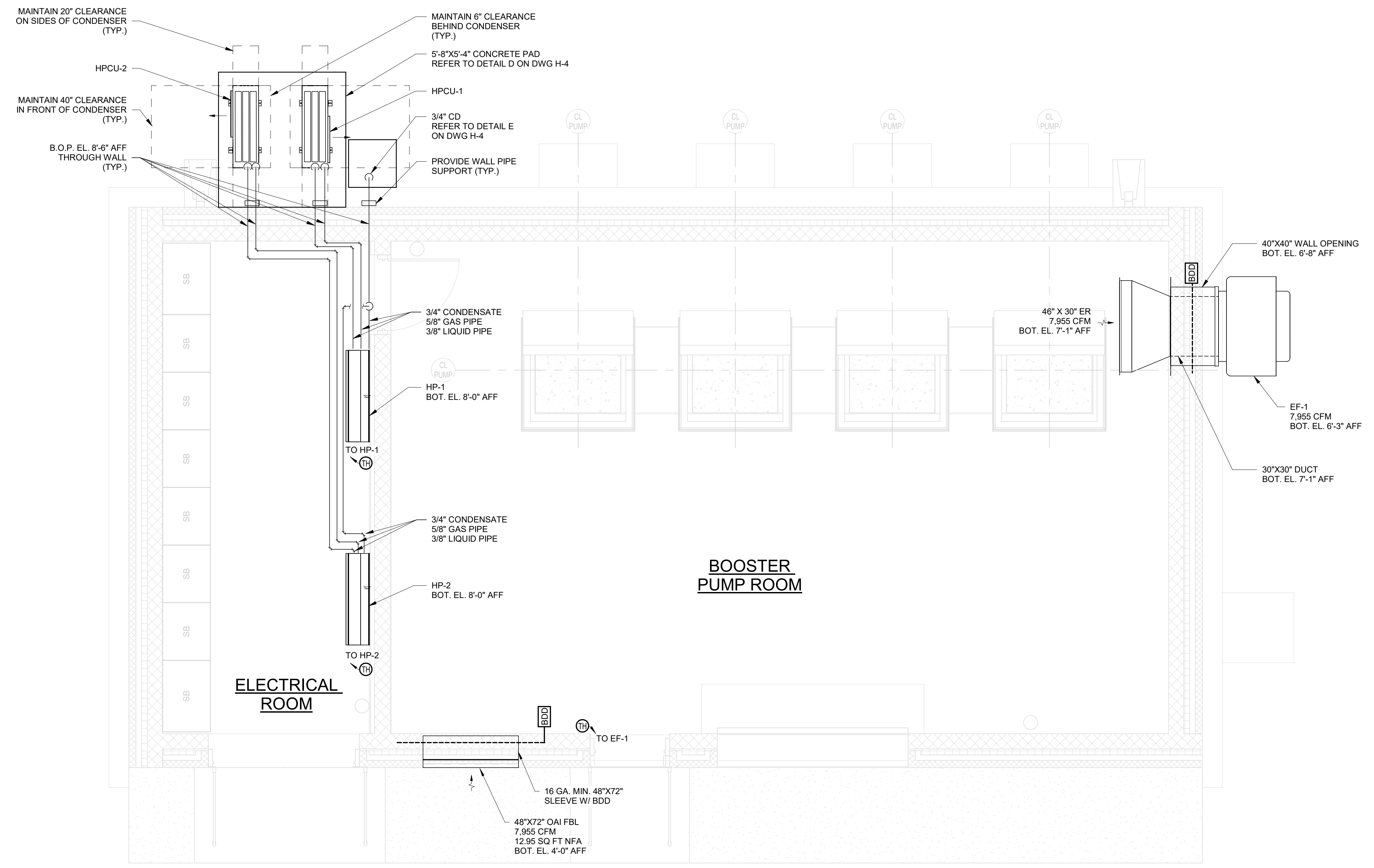
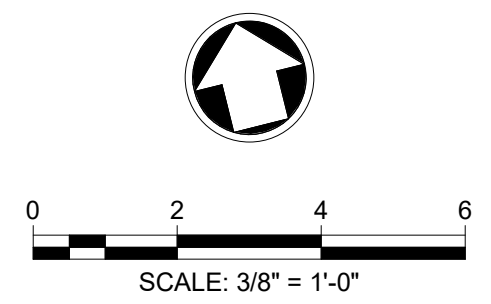


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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

HVAC LEGEND, SYMBOLS, AND ABBREVIATIONS

SHEET NO. 46
DWG NO. H-1
ELECTRICAL BID PACKAGE



PLAN
SCALE: 3/8" = 1'-0"

10/17/2022 11:59:15 AM

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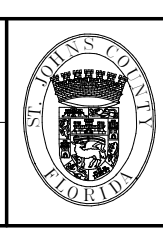
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CHECKED BY: M. LAPILUSA
DATE: OCTOBER 2022

DESIGN ENGINEER
JACK WANG, P.E.
FLORIDA REGISTRATION NO.
81017

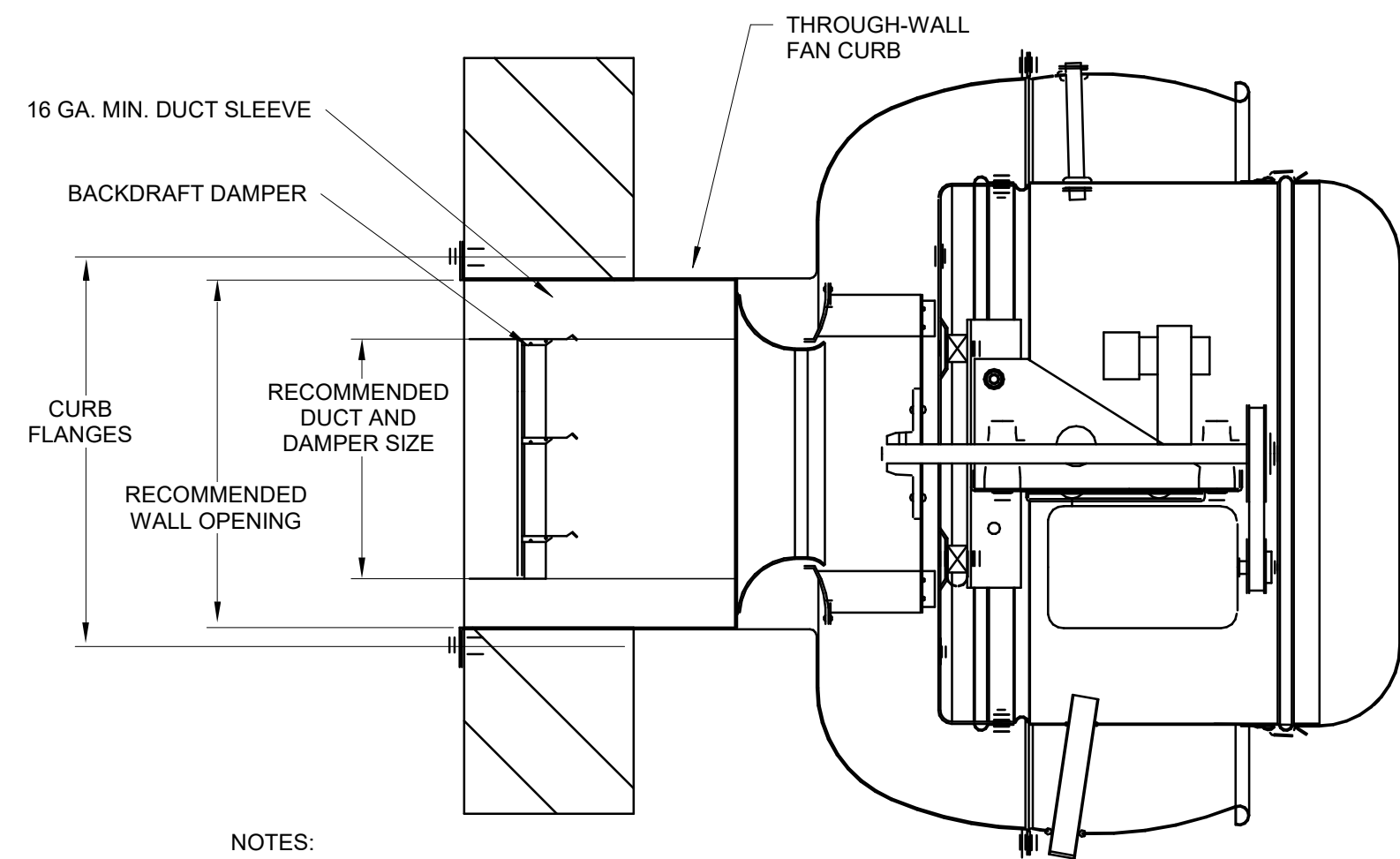


St. Johns County
Utility Department
1205 STATE ROAD 16
ST. AUGUSTINE, FL 32084
PHONE: (904) 209-2626 FAX: (904) 209-2627

CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

BOOSTER PUMP STATION HVAC PLAN

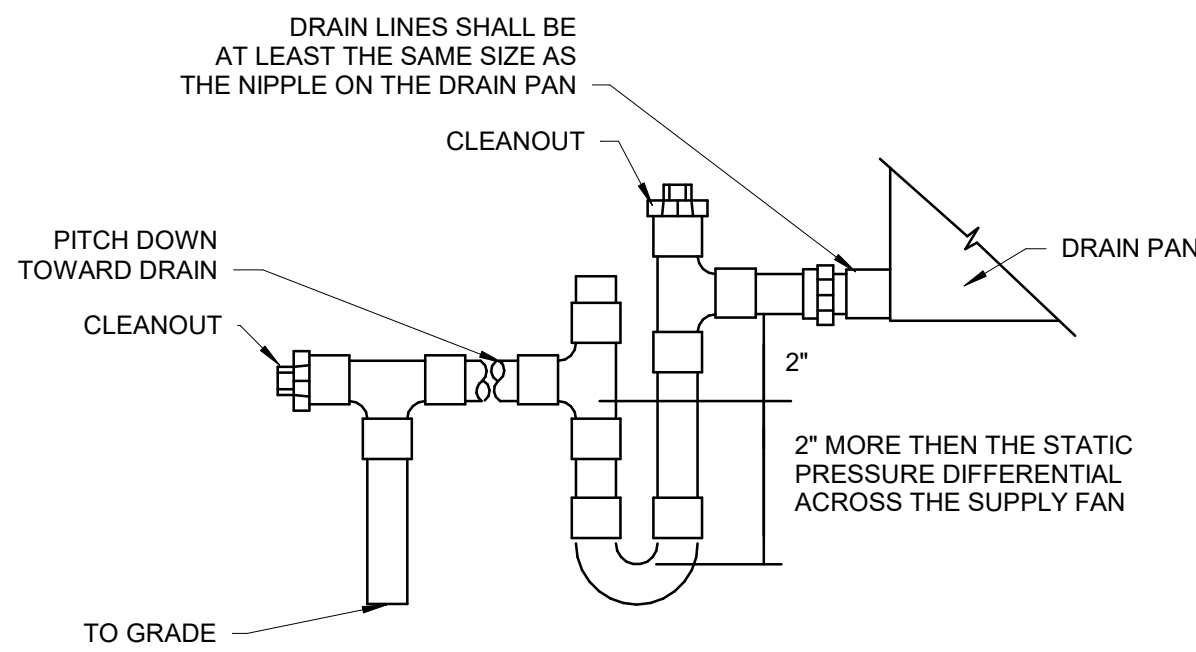
SHEET NO.
47
DWG NO.
H-2
ELECTRICAL
BID PACKAGE



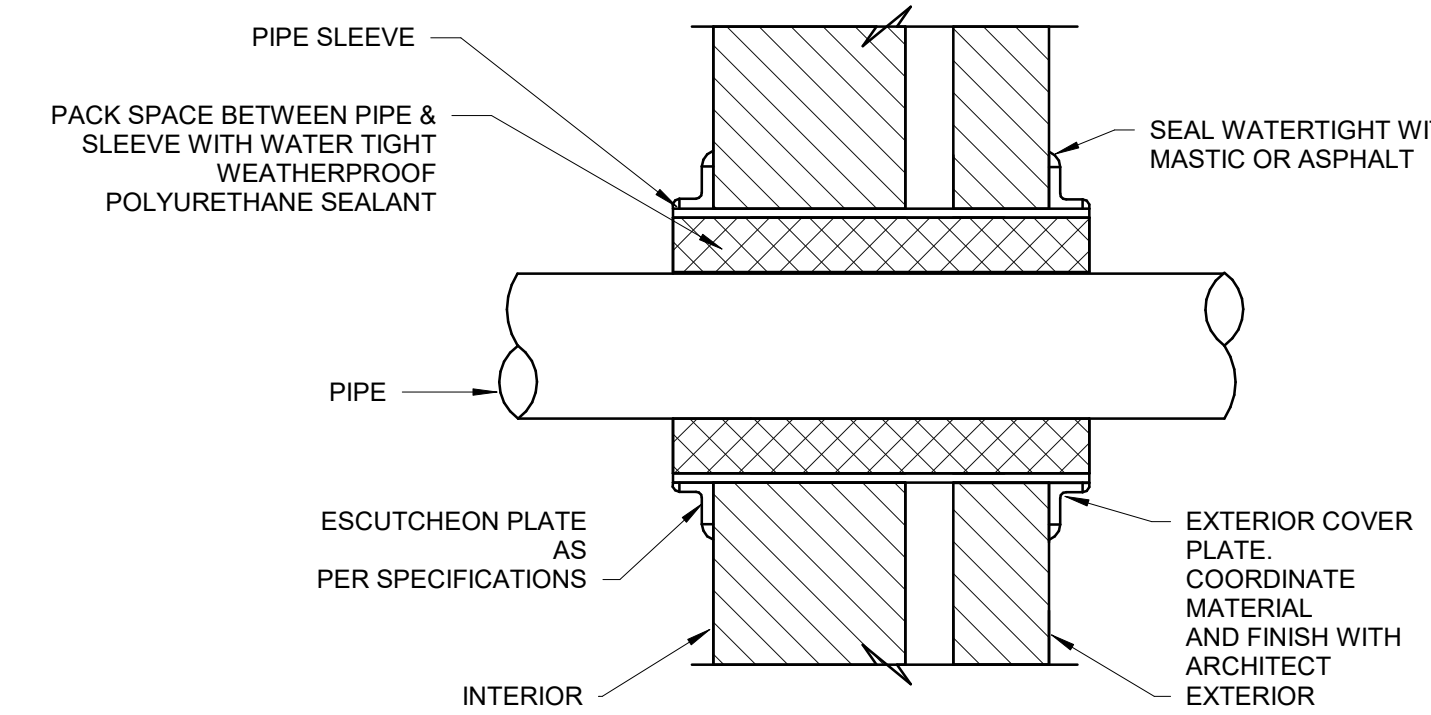
NOTES:

- ENTIRE ASSEMBLY SHALL BE WIND RATED WITH SIGNED/SEALED CALCULATIONS BY A LICENSED FL P.E. INCLUDING THE EQUIPMENT, MOUNTING, ATTACHMENTS, INSTALLATION, ETC. SHALL COMPLY WITH FLORIDA PRODUCT APPROVAL #FL13225.1 & MIAMI-DADE NOA #19-0717.02.

A WALL MOUNTED FAN DETAIL
NOT TO SCALE

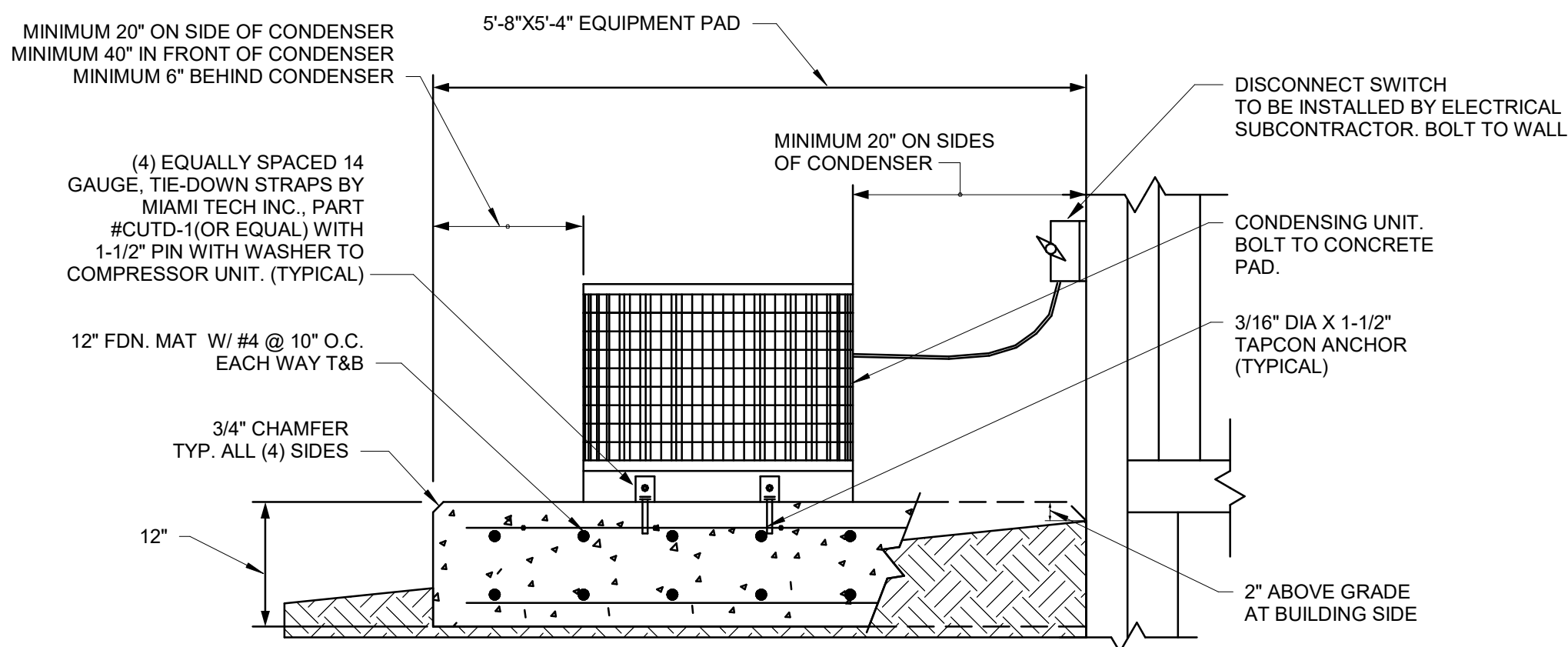


B AIR CONDITIONER UNIT DRAIN TRAP
NOT TO SCALE



- NOTE:
1. MODIFY AND COORDINATE PENETRATION AS NECESSARY

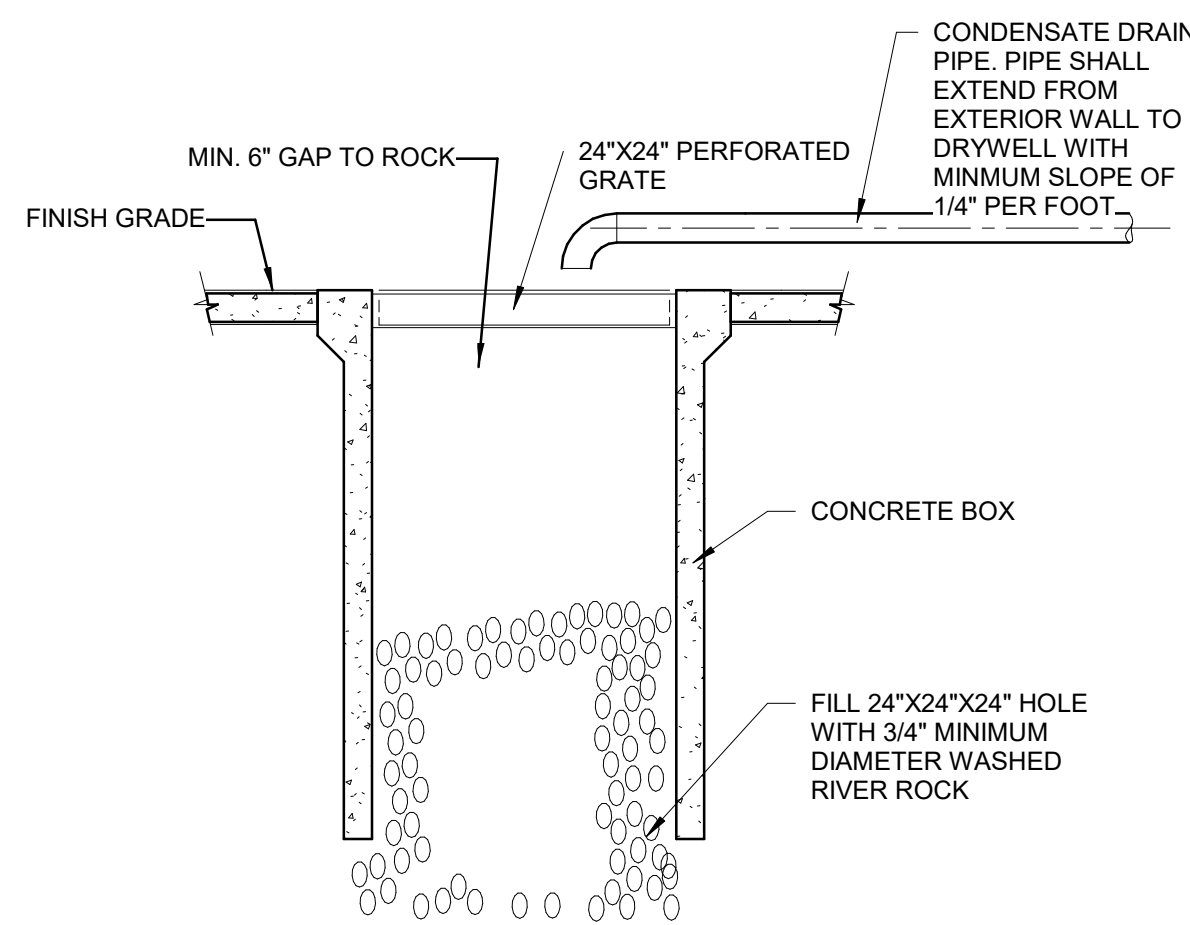
C PIPE PENETRATION THRU EXTERIOR WALL
NOT TO SCALE



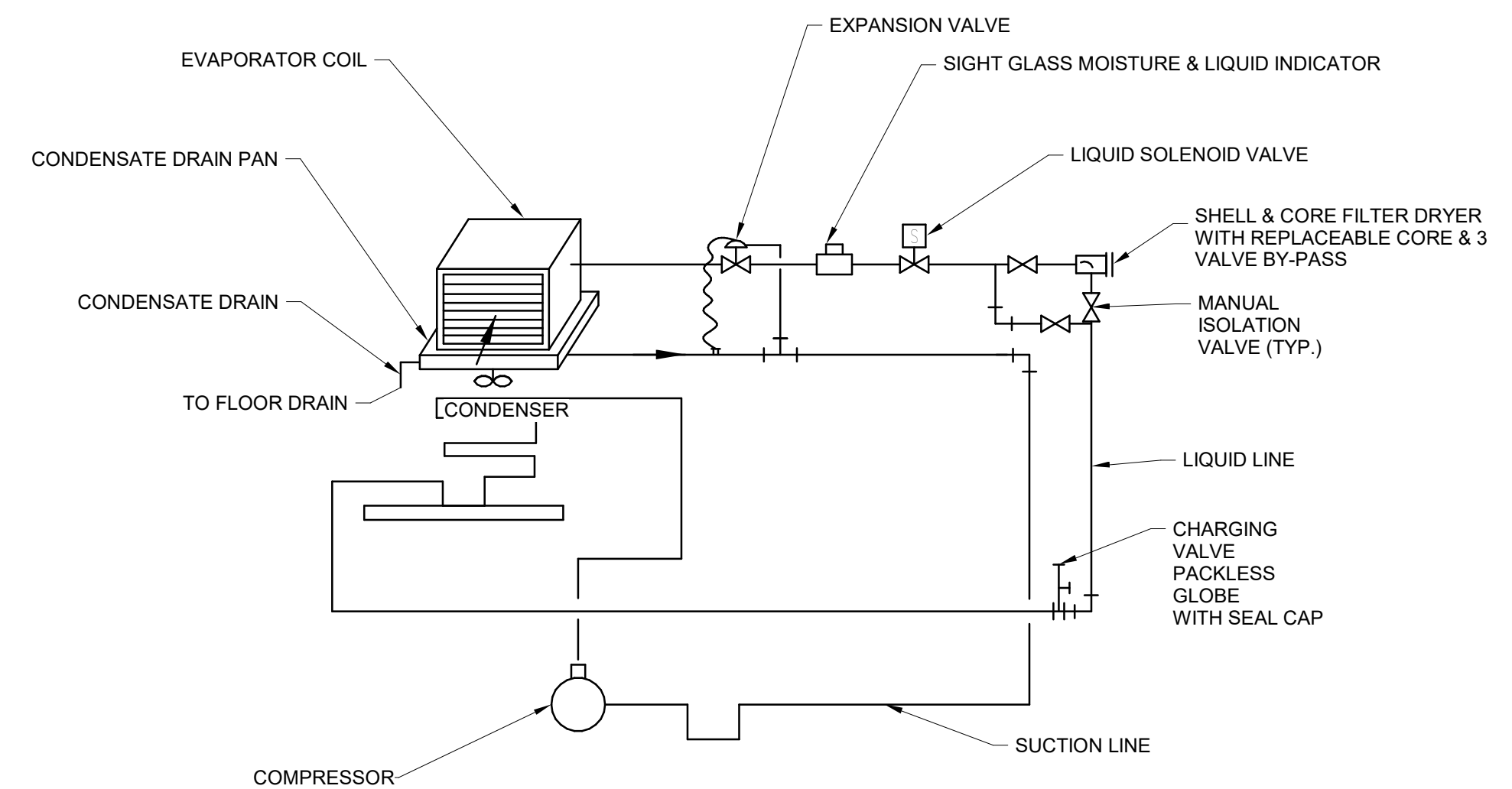
NOTES:

- CLEARANCE SHOWN ON DETAIL IS FROM BASIS OF DESIGN MANUFACTURER'S RECOMMENDATIONS.
- ENTIRE ASSEMBLY SHALL BE WIND RATED WITH SIGNED/SEALED CALCULATIONS BY A LICENSED FL P.E. INCLUDING THE EQUIPMENT, MOUNTING, ATTACHMENTS, INSTALLATION, ETC. SHALL COMPLY WITH FL19731-R3 OR APPROVED EQUAL.

D CONCRETE PAD DETAIL
NOT TO SCALE



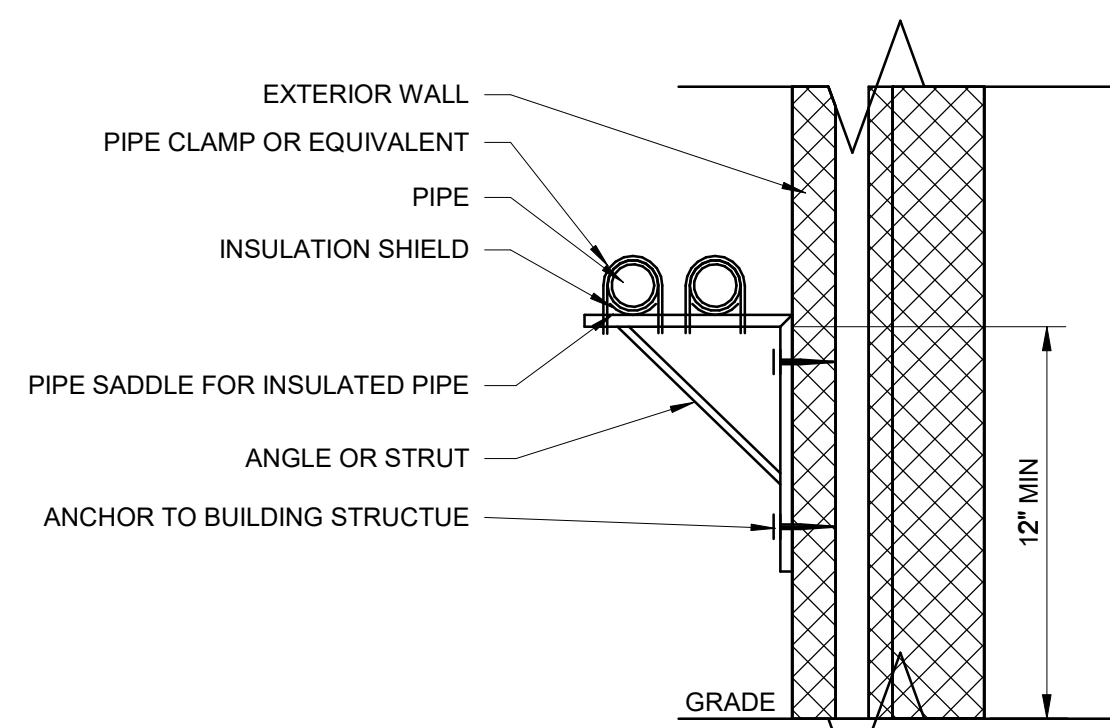
E CONDENSATE DRAIN DETAIL
NOT TO SCALE



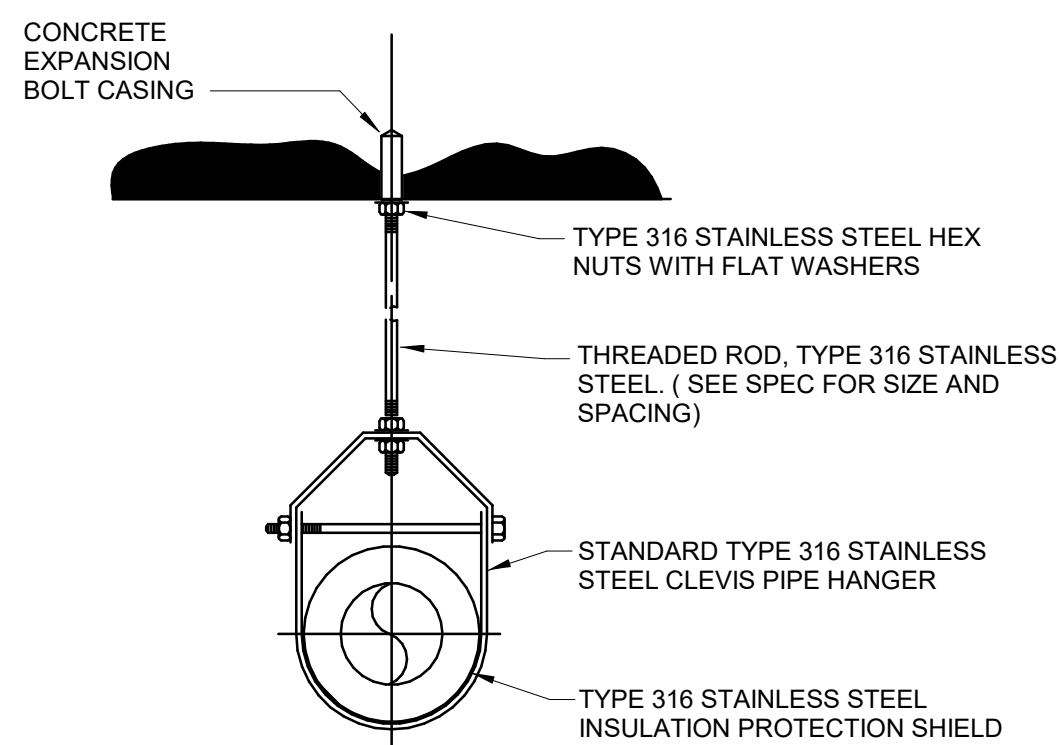
NOTE:

- MINIMIZE THE ACCUMULATION OF LIQUID REFRIGERANT IN THE COMPRESSOR CRANKCASE.
- RETURN OIL TO THE COMPRESSOR AT SAME RATE AT WHICH IT LEAVES

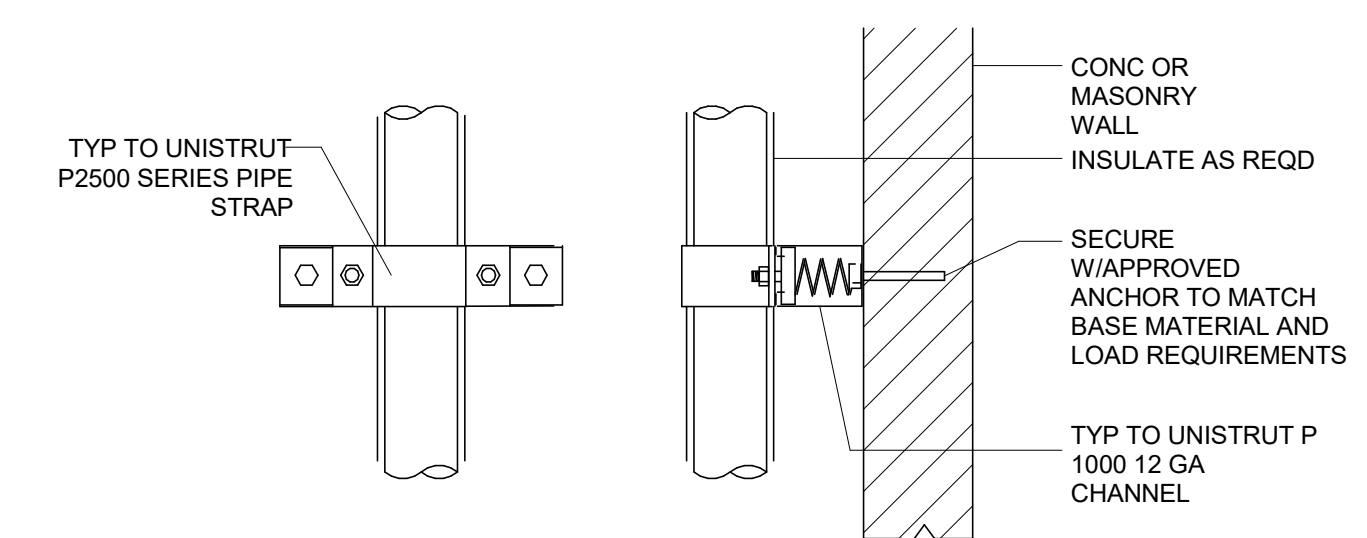
F REFRIGERANT PIPING DETAIL
(AC & ACCU UNITS)
NOT TO SCALE



G PIPE WALL SUPPORT DETAIL
NOT TO SCALE



H PIPE HANGING DETAIL
NOT TO SCALE



- NOTE: PROVIDE MIN ANCHOR SUPPORT SPACING EVERY 3' VERTICALLY

I VERTICAL PIPE BRACKET SUPPORT
NOT TO SCALE

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NO.	BY	DATE	SYMBOL	REVISIONS
6.				
5.				
4.				
3.				
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1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M
MOTT MACDONALD
Mott MacDonald Florida, LLC

Architects Engineers Surveyors
AA - C0000035 EB - 0000155 LB - 0006783
10245 Centurion Pkwy. N., Suite 320
Jacksonville, Florida 32256
Telephone: (904) 203-1090

DESIGNER: J. WANG
DRAWN BY: Z. CANDEROZZI
DATE: OCTOBER 2022
CHECKED BY: M. LAPLUSA
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FLORIDA REGISTRATION NO.
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CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

HVAC DETAILS

SHEET NO. 49
DWG NO. H-4
ELECTRICAL BID PACKAGE

FAN SCHEDULE

TAG	LOCATION	AREA SERVED	MANUFACTURER	MODEL	FAN TYPE	DRIVE	AIR FLOW CFM	ESP IN. WC.	FAN RPM	OPERATING POWER HP	MOTOR				WEIGHT LBS	NOTES
											TYPE	RPM	HP	V/PH/Hz		
EF-1	WALL	PUMP ROOM	GREENHECK	CUBE-300HP-30	CENTRIFUGAL	BELT	7,955	0.500	798	2.21	ODP	1,725	5	460/3/60	311	1-8

NOTES: 1. NEMA 12 HEAVY DUTY DISCONNECT
 2. THROUGH-WALL FAN CURB
 3. BACK DRAFT DAMPER
 4. ALUMINUM BIRDSCREEN
 5. WALL MOUNTED THERMOSTAT
 6. (2) SPARE BELTS
 7. PERMATECTOR COATING FOR FAN AND ACCESSORIES
 8. ENTIRE ASSEMBLY SHALL BE WIND RATED WITH SIGNED/SEALED CALCULATIONS BY A LICENSED FL P.E. INCLUDING THE EQUIPMENT, MOUNTING, ATTACHMENTS, INSTALLATION, ETC., SHALL COMPLY WITH FLORIDA PRODUCT APPROVAL #FL13225.1 & MIAMI-DADE NOA #19-0717.02 OR APPROVED EQUAL


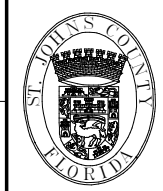
DUCTLESS HEAT PUMP UNIT SCHEDULE

INDOOR UNIT														OUTDOOR UNIT										NOTES	
TAG No.	LOCATION	BASIS OF DESIGN MANUFACTURER	MODEL	CFM	COOLING			HEATING		ELECTRICAL			WEIGHT LBS	TAG No.	MANUFACTURER	MODEL	ELECTRICAL				WEIGHT LBS	SEER	EER		HSPF
					TOTAL CAPACITY MBH MAX	SENSIBLE CAPACITY MBH MAX	CAPACITY MBH MIN	CAPACITY AT 47 F MBH MAX	CAPACITY AT 17 F MBH MAX	MCA	FLA	W					MCA	MOCP	W	V/PH/Hz					
HP-1	ELECTRICAL ROOM	mitsubishi	PKA-A30KA7	775	30.00	21.60	14.60	34.00	32.00	1.0	0.36	56	46	HPCU-1	MITSUBISHI	PUZ-HA30NKA	24	40	74	208/1/60	261	18.5	12.8	9.6	1-7
HP-2	ELECTRICAL ROOM	mitsubishi	PKA-A30KA7	775	30.00	21.60	14.60	34.00	32.00	1.0	0.36	56	46	HPCU-2	MITSUBISHI	PUZ-HA30NKA	24	40	74	208/1/60	261	18.5	12.8	9.6	1-7

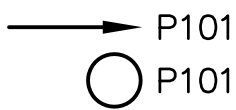
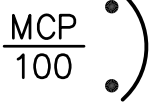
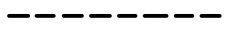



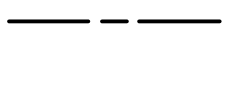
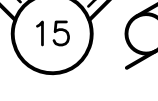
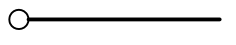

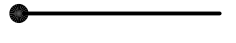

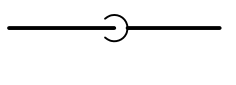

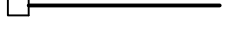

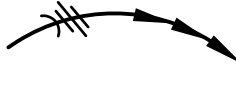
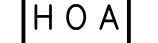

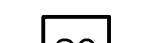





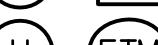


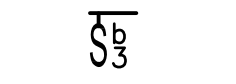



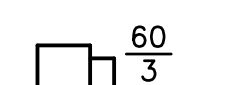



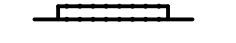





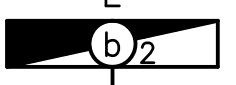



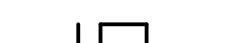




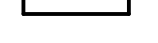
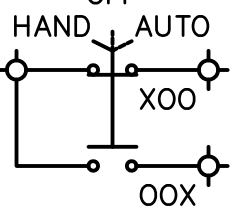
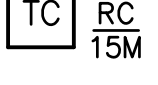

NOTES: 1. WITH CONDENSATE PUMP W/RESERVOIR AND SENSOR (BLUE DIAMOND X87-721)
 2. WITH NEMA 12 DISCONNECT SWITCH (EVAPORATOR)
 3. WITH ALL WIND BAFFLES, AIR OUTLET GUIDE, HAIL GUARD
 4. WITH WALL MOUNTED THERMOSTAT, WIRED
 5. WITH OPERATION RANGE WITH AMBIENT TEMPERATURES FROM 0 F TO 115 F
 6. WITH DIAMONDBACK DRAIN PAN LEVEL SENSOR/CONTROL (SS610E)
 7. ENTIRE ASSEMBLY SHALL BE WIND RATED WITH SIGNED/SEALED CALCULATIONS BY A LICENSED FL P.E. INCLUDING THE EQUIPMENT, MOUNTING, ATTACHMENTS, INSTALLATION, ETC., SHALL COMPLY WITH FL19731-R3 OR APPROVED EQUAL

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NO.	BY	DATE	SYMBOL	REVISIONS	 <p>MOTT MACDONALD Mott MacDonald Florida, LLC</p>	<p>Architects Engineers Surveyors AA - C0000035 EB - 0000155 LB - 0006783 10245 Centurion Pkwy. N., Suite 320 Jacksonville, Florida 32256 Telephone: (904) 203-1090</p>	<p>DESIGNER: J. WANG DRAWN BY: Z. CANDEROZZI DATE: OCTOBER 2022 CHECKED BY: M. LAPILUSA DATE: OCTOBER 2022</p>	<p>DESIGN ENGINEER JACK WANG, P.E. FLORIDA REGISTRATION NO. 81017</p>	 <p>St. Johns County Utility Department 1205 STATE ROAD 16 ST. AUGUSTINE, FL 32084 PHONE: (904) 209-2626 FAX: (904) 209-2627</p>	<p>CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION</p>	<p>HVAC SCHEDULES</p>	SHEET NO. 50
				DWG NO. H-5								
				ELECTRICAL BID PACKAGE								

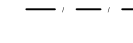
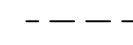
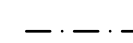


ELECTRICAL LEGEND

	P101 CONDUIT "P101" (SEE CONDUIT AND CABLE SCHEDULE)		MCP 100 CIRCUIT BREAKER (FRAME SIZE/TRIP RATING - "MCP" MOTOR CIRCUIT PROTECTOR) MAGNETIC TYPE COMBINATION MOTOR STARTER, NEMA
	CONDUIT RUNS CONCEALED		FVNR SIZE 3 SIZE AS INDICATED ("FV" FULL VOLTAGE, "RV" SOLID STATE REDUCED VOLTAGE, "NR" NON-REVERSING, "R" REVERSING, "2S" TWO SPEED, "1W" SINGLE WINDING "2W" TWO WINDING, "LC" LIGHTING CONTACTOR)
	CONDUIT RUNS EXPOSED		VFD VARIABLE FREQUENCY DRIVE
	CONDUIT RUNS IN DUCT BANKS OR BELOW GRADE		MOTOR (NUMERAL INDICATES HORSEPOWER - "H" SPACE HEATER, "T" WINDING THERMOSTAT, "M" MOISTURE DETECTOR)
	CONDUIT TURNING UP		POTENTIAL TRANSFORMER; CURRENT TRANSFORMER
	CONDUIT TURNING DOWN		PILOT LIGHT ("A" AMBER, "B" BLUE, "C" CLEAR, "G" GREEN, "R" RED, "W" WHITE)
	CHANGE IN CONDUIT ELEVATIONS USING CONDUIT OUTLET BODIES.		KIRK-KEY MECHANICAL INTERLOCK USING KEY "#"
	CONDUIT TERMINATED WITH WATERTIGHT CABLE CONNECTOR		ASSOCIATED DEVICE "REMOTE" FROM MOTOR CONTROL CENTER OR CONTROL PANEL
	BRANCH CIRCUIT HOMERUN (ARROWS INDICATE PANEL CIRCUITS, SHORT STROKES INDICATE PHASE OR SWITCHED CONDUCTORS, LONG STROKE DENOTES NEUTRAL, CURVED STROKE DENOTES GROUND. (NO STROKES INDICATES 3/4" CONDUIT WITH 3#12 PHASE/NEUTRAL/GROUND CONDUCTORS).		H O A HAND/OFF/AUTOMATIC SELECTOR SWITCH CONTROL STATION
	HANDHOLE, OR PULLBOX AS INDICATED ("E" ELECTRICAL, "C" COMMUNICATION)		SO SAFE OFF MOMENTARY PUSHBUTTON CONTROL STATION WITH LOCKING DEVICE
	TYPICAL WIRING DEVICE NOTATIONS ("W" WEATHERPROOF OR "X" EXPLOSION PROOF DEVICE CONNECTED TO PANEL "L" CIRCUIT "5". ENCLOSING SQUARE DENOTES FLOORBOX)		ES EMERGENCY STOP CONTROL STATION WITH SAFETY CABLES
	RECEPTACLE		A AS AMMETER AND AMMETER SWITCH
	SPECIAL PURPOSE OUTLET		H ETM HOURS OF OPERATION; ELAPSED TIME METER
	JUNCTION BOX, PULL BOX		V VS VOLTMETER AND VOLTMETER SWITCH
	SINGLE POLE SWITCH CONTROLS FIXTURES MARKED "b" ("2" 2 POLE, "3" 3 WAY, "T" TIME SWITCH, "M" MANUAL MOTOR STARTER)		CR ICR CONTROL RELAY, INTERPOSING CONTROL RELAY
	THERMOSTAT (LINE VOLTAGE TYPE WITH ON-OFF-AUTO SWITCH UNLESS NOTED).		GF GROUND FAULT PROTECTION SYSTEM
	SAFETY DISCONNECT SWITCH (AMPERAGE RATING/POLES/FUSE RATING - "NF" NON-FUSED, "DT" DOUBLE-THROW)		PM POWER MONITOR
	TELEPHONE OUTLET		TD TIME DELAY RELAY
	TELEPHONE BACKBOARD		PC PRESSURE CONTROLLER
	LOW VOLTAGE PANELBOARD (208/120V)		OL OVERLOAD DEVICE; SURGE CONTROL PANEL
	HIGH VOLTAGE PANELBOARD (480/277V)		LS LEVEL SWITCH
	TYPICAL LIGHTING FIXTURE NOTATIONS (TYPE "E" CONNECTED TO CIRCUIT "2" AND SWITCH "b". SHADING DENOTES EMERGENCY UNIT. BRACKET DENOTES WALL MOUNTING)		ZS ZERO SPEED SWITCH; POSITION SWITCH
	LINEAR/LAY-IN LIGHT FIXTURE		PS PRESSURE SWITCH
	WALL MOUNTED LIGHT FIXTURE		SV VC SOLENOID VALVE; VALVE CONTROL ACTUATOR
	CEILING/PENDANT MOUNTED LIGHT FIXTURE		ALARM HORN
	REFERENCE TO NOTE "#"		TVSS TRANSIENT VOLTAGE SURGE SUPPRESSION
	TYPICAL SELECTOR SWITCH CONFIGURATION "XOO" DENOTES SELECTOR SWITCH CONTACT CLOSED IN THE FIRST (HAND) POSITION "OOX" DENOTES SELECTOR SWITCH CONTACT CLOSED IN THE THIRD (AUTO) POSITION		TC TIME CLOCK (CYCLE TIME/TIME/MIN. SETTING - "AC" ADJUSTABLE CYCLE, "M" MOMENTARY, "P" PULSE, "RC" REPEAT CYCLE)
			MOV MOTOR OPERATED VALVE

INSTRUMENTATION LEGEND

	FIELD MOUNTED INSTRUMENT		PANEL MOUNTED INSTRUMENT		BACK OF PANEL MOUNTED DEVICE
---	--------------------------	---	--------------------------	---	------------------------------

P&ID SIGNAL DESIGNATIONS

	DISCRETE INPUT SIGNAL
	DISCRETE OUTPUT SIGNAL
	ANALOG INPUT SIGNAL
	ANALOG OUTPUT SIGNAL
	MODBUS TCP COMMUNICATIONS

"XY"	FIRST LETTER	SUCCEEDING LETTERS
A	ANALYTICAL	ALARM
B	BURNER, COMBUSTION	
C		CONTROLLER
D	DIFFERENTIAL	
E	VOLTAGE	SENSOR, PRIMARY ELEMENT
F	FLOW	
G		GLASS, VIEWING DEVICE
H	HAND	HIGH
I	CURRENT	INDICATE
J	POWER	
K	TIME	CONTROL STATION
L	LEVEL	LOW
M		MIDDLE, INTERMEDIATE
N		
O		ORIFICE
P	PRESSURE, VACUUM	POINT
Q	QUANTITY	
R	RADIATION	RECORDER
S	SPEED, FREQUENCY	SWITCH
T	TEMPERATURE	TRANSMITTER
U	MULTIVARIABLE	MULTIFUNCTION
V	VIBRATION	VALVE, DAMPER, LOUVER
W	WEIGHT, FORCE	WELL
X		
Y	EVENT	RELAY, COMPUTE, CONVERTER
Z	POSITION	ACTUATOR

"XYZ"	MISCELLANEOUS ABBREVIATIONS
ACM	ANALOG CONTROL MODULE
AI	ANALOG INPUT SIGNAL
AMM	ANALOG MONITOR MODULE
AO	ANALOG OUTPUT SIGNAL
ARV	AIR RELEASE VALVE
CL	CHLORINE RESIDUAL MEASUREMENT
DCM	DIGITAL CONTROL MODULE
DI	DIGITAL INPUT SIGNAL
DO	DIGITAL OUTPUT SIGNAL
FOR	FORWARD-OFF-REVERSE SELECTOR SWITCH
HOA	HAND-OFF-AUTOMATIC SELECTOR SWITCH
ICP	INSTRUMENTATION/CONTROL PANEL
MCC	MOTOR CONTROL CENTER
MIP	MAIN INSTRUMENTATION PANEL
OI	OPERATOR INTERFACE
PCM	PUMP CONTROL MODULE
PLC	PROGRAMMABLE LOGIC CONTROLLER MODULE
PSM	POWER SUPPLY MODULE
RIM	RADIO INTERFACE MODULE
RTU	REMOTE TELEMETRY UNIT
S/C	SIGNAL CONVERTER
S/I	SIGNAL ISOLATOR
S/P	SURGE PROTECTOR
VFD	VARIABLE FREQUENCY DRIVE
XLPE	CROSS-LINKED POLYETHYLENE

ELECTRICAL CONNECTED LOAD CALCULATIONS

BOOSTER PUMP 1	100 HP	124 AMPS
BOOSTER PUMP 2	100 HP	124 AMPS
BOOSTER PUMP 3	100 HP	124 AMPS
BOOSTER PUMP 4	100 HP	124 AMPS
EXHAUST FAN	5 HP	8 AMPS
GST FAN 1 (FUTURE)	5 HP	8 AMPS
GST FAN 2 (FUTURE)	5 HP	8 AMPS
GST FAN 3 (FUTURE)	5 HP	8 AMPS
GST FAN 4 (FUTURE)	5 HP	8 AMPS
TOTAL CONNECTED MOTOR LOAD		536 AMPS
MOTOR DEMAND FACTOR		100 %
TOTAL MOTOR DEMAND LOAD		536 AMPS
LIGHTING PANEL L	30 KVA	36 AMPS
TOTAL CONNECTED LOAD		572 AMPS

NON-COINCIDENTAL LOAD CALCULATIONS

BOOSTER PUMP	100 HP	124 AMPS
NON-COINCIDENTAL MOTOR LOAD		124 AMPS
MOTOR DEMAND FACTOR		100 %
NON-COINCIDENTAL MOTOR DEMAND		124 AMPS
LIGHTING PANEL L	5 KVA	6 AMPS
TOTAL NON-COINCIDENTAL LOAD		130 AMPS

ELECTRICAL SERVICE LOAD CALCULATIONS

TOTAL CONNECTED LOAD	572 AMPS
TOTAL NON-COINCIDENTAL LOAD	130 AMPS
PEAK DEMAND LOAD	442 AMPS
0.25 X LARGEST MOTOR	31 AMPS
MIN SERVICE AMPACITY	473 AMPS
ELECTRICAL SERVICE:	
800 AMP, 480 VOLT, 3 PHASE	

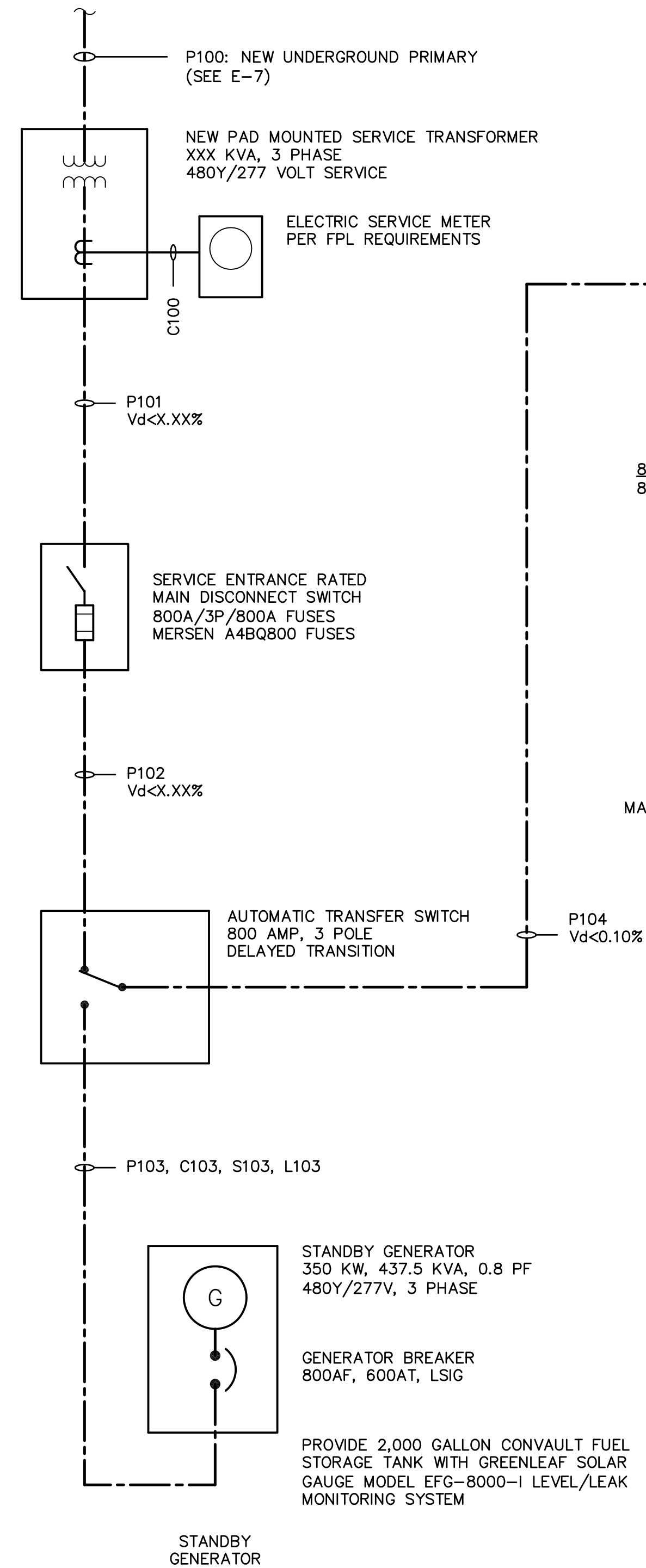
NEW ELECTRICAL SERVICE TRANSFORMER

FPL SERVICE TRANSFORMER	XXX KVA
FPL FAULT CURRENT LETTER	XX,XXX AMPS

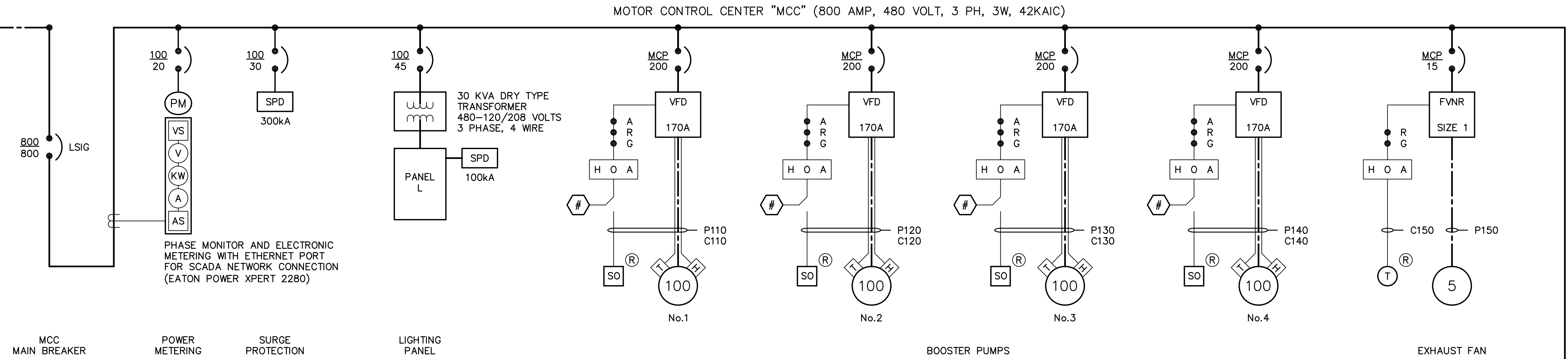
FLORIDA BUILDING CODE-ENERGY CONSERVATION, 7TH EDITION (2020) LIGHTING POWER ALLOWANCES - REDUCED LIGHTING POWER

INTERIOR LIGHTING	501 WATTS
BUILDING AREA METHOD	869 SF
TABLE C405.3.2(1)	
BUILDING AREA TYPE	MAX W/FT ² ACTUAL W/FT ²
MANUFACTURING FACILITY	0.90 0.58
EXTERIOR LIGHTING	
TABLE C405.4.2(2)	
LIGHTING ZONE 2	MAX WATTS ACTUAL WATTS
	400 94

FAULT CURRENT NOTE: THE PRELIMINARY CALCULATED MAXIMUM AVAILABLE FAULT CURRENT IS < XX kA. FINAL AVAILABLE FAULT CURRENT SHALL BE PROVIDED BY THE SHORT CIRCUIT STUDY SPECIFIED IN SECTION 16015 ELECTRICAL SYSTEM ANALYSIS.

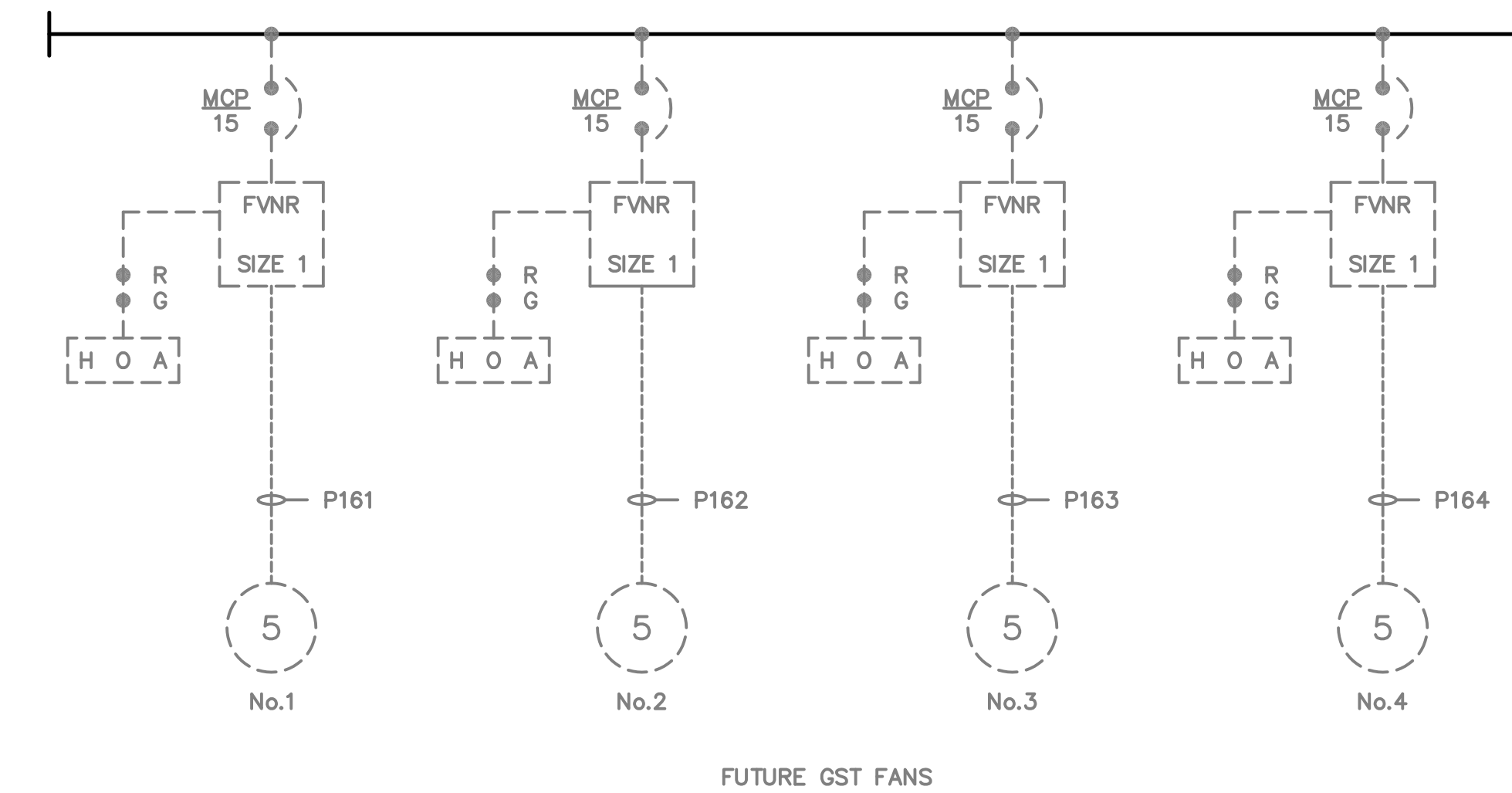


THE ELECTRICAL SERVICE EQUIPMENT SHALL BE LEGIBLY MARKED IN THE FIELD WITH THE MAXIMUM AVAILABLE FAULT CURRENT PER NEC 110.24. AS INDICATED ON E-1, THE FAULT CURRENT LETTER RECEIVED FROM FPL INDICATES A MAXIMUM AVAILABLE FAULT CURRENT OF XX,XXX AMPS. HOWEVER, THIS VALUE DOES NOT INCLUDE MOTOR CONTRIBUTION. THE MAXIMUM AVAILABLE FAULT CURRENT VALUE TO BE USED FOR THE SERVICE EQUIPMENT FIELD MARKING SHALL BE PROVIDED BY THE SHORT CIRCUIT STUDY SPECIFIED IN SECTION 16015 ELECTRICAL SYSTEM ANALYSIS.



LIGHTING PANEL L									
110 AMP MCB					NEMA 1 WITHIN MCC 120/208 VOLTS/ 3 PH/ 4 W				
CKT	LOAD DESCRIPTION	POLE	TRIP	KVA	CKT	LOAD DESCRIPTION	POLE	TRIP	KVA
1	ELECTRICAL RM LIGHTS	1	20	0.2	2	ICP/RTU	1	20	1.0
3	ELECTRICAL RM RCPTS	1	20	0.6	4	IRRIGATION CONTROLLER	1	20	0.1
5	PUMP ROOM LIGHTS	1	20	0.5	6	SPARE	1	20	--
7	PUMP ROOM RCPTS	1	20	0.8	8	SPARE	1	20	--
9	PUMP BLDG EXT LTGS	1	20	--	10	SPARE	1	20	--
11	GST LIGHTS & RCPT	1	20	0.3	12	SPARE	1	20	--
13	SPARE	1	20	--	14	SPARE	1	20	--
15	SPARE	1	20	--	16	SPARE	1	20	--
17	SPARE	1	20	--	18	SPARE	1	20	--
19	SPARE	1	20	--	20	SPARE	1	20	--
21	HPCU-1	2	35	5.0	22	HPCU-2	2	35	5.0
23	HPCU-1	--	--	--	24	HPCU-2	--	--	--
25	SPACE	--	--	--	26	SPD	3	30	--
27	SPACE	--	--	--	28	SPD	--	--	--
29	SPACE	--	--	--	30	SPD	--	--	--

BUS MOUNTED SURGE PROTECTION DEVICE MINIMUM 100kA



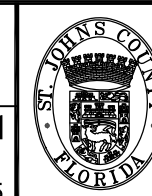
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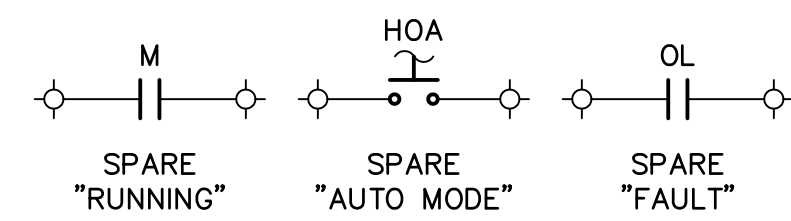
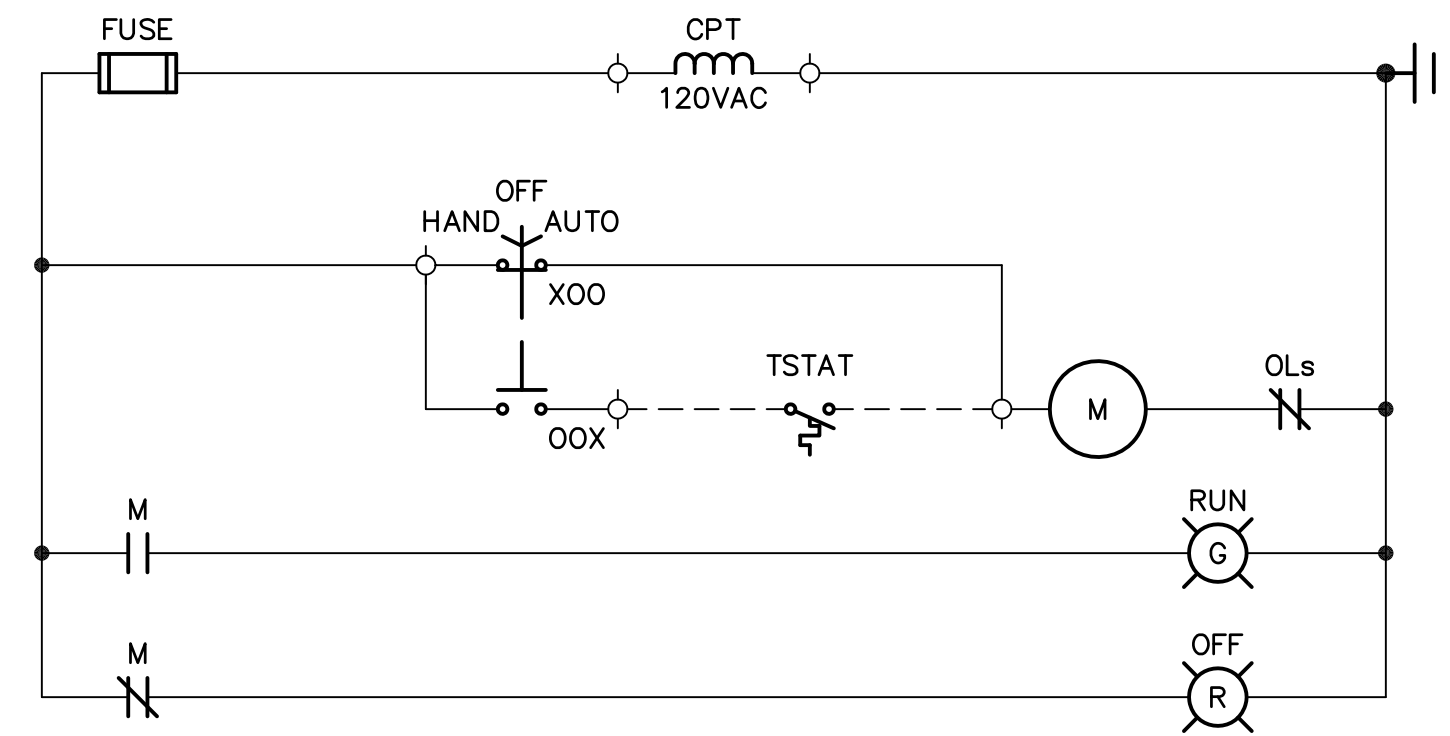


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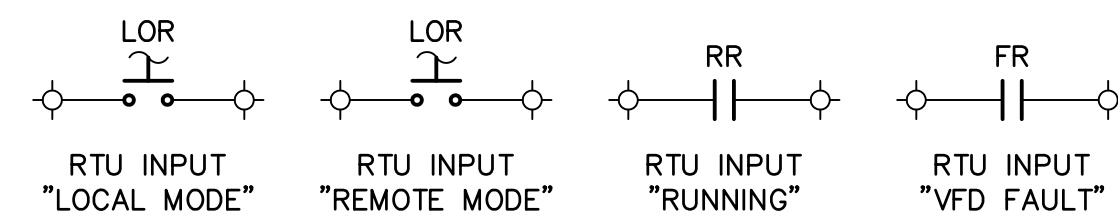
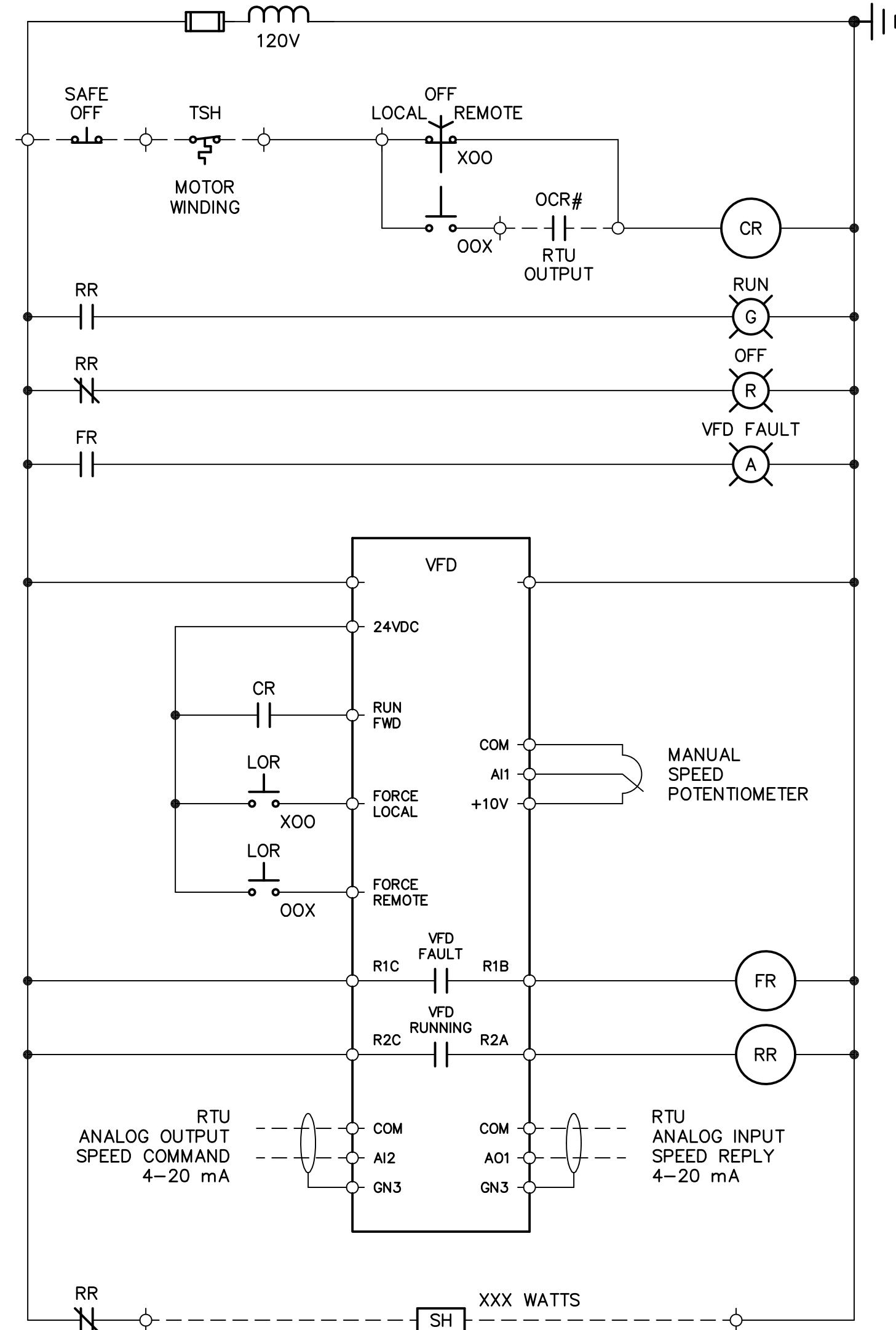
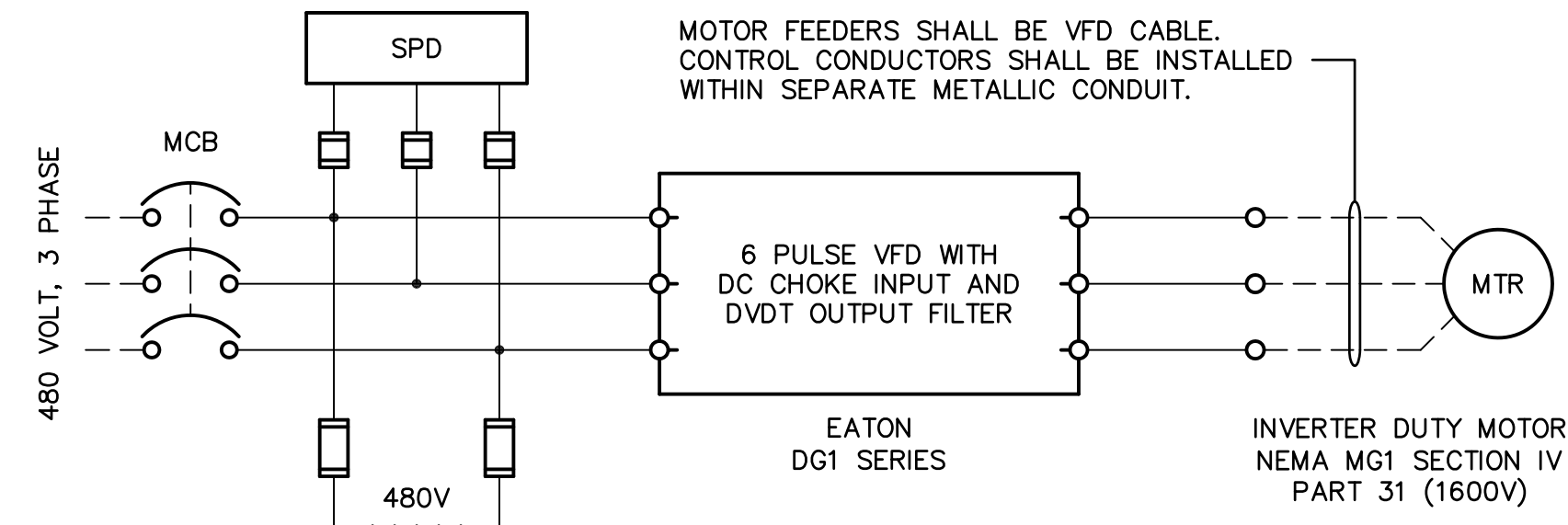
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

SINGLE LINE DIAGRAM

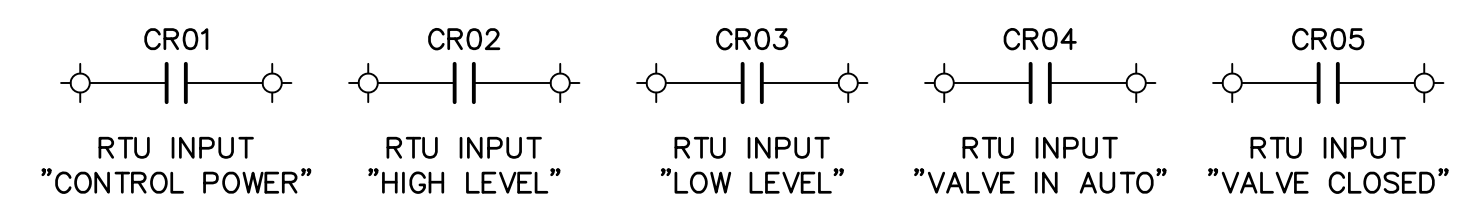
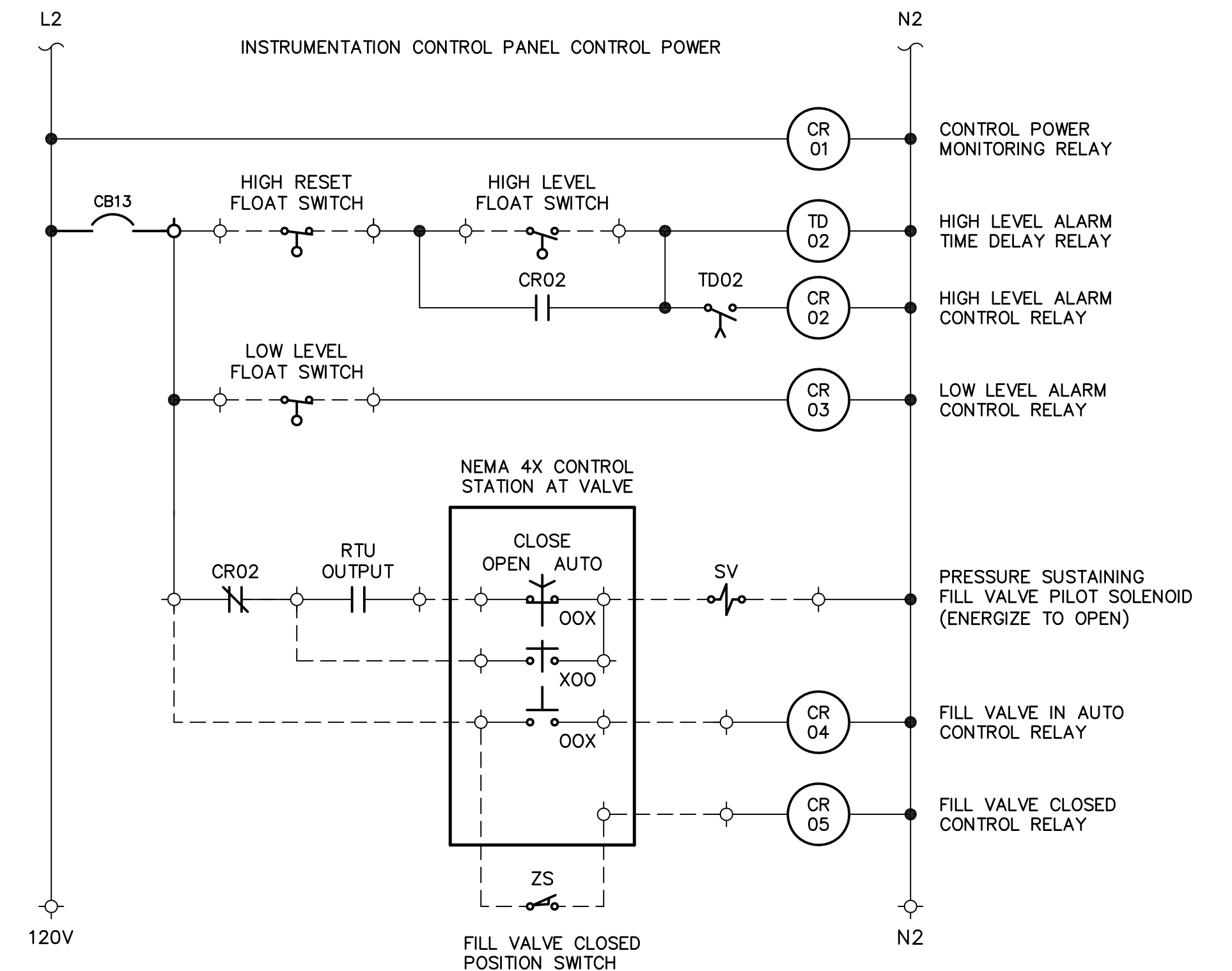
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DWG NO.
E-2
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EXHAUST FAN CONTROL WIRING DIAGRAM



TYPICAL BOOSTER PUMP CONTROL WIRING DIAGRAM



GST & FILL VALVE CONTROL WIRING DIAGRAM
CONTROLS TO BE LOCATED WITHIN THE ICP

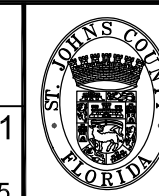
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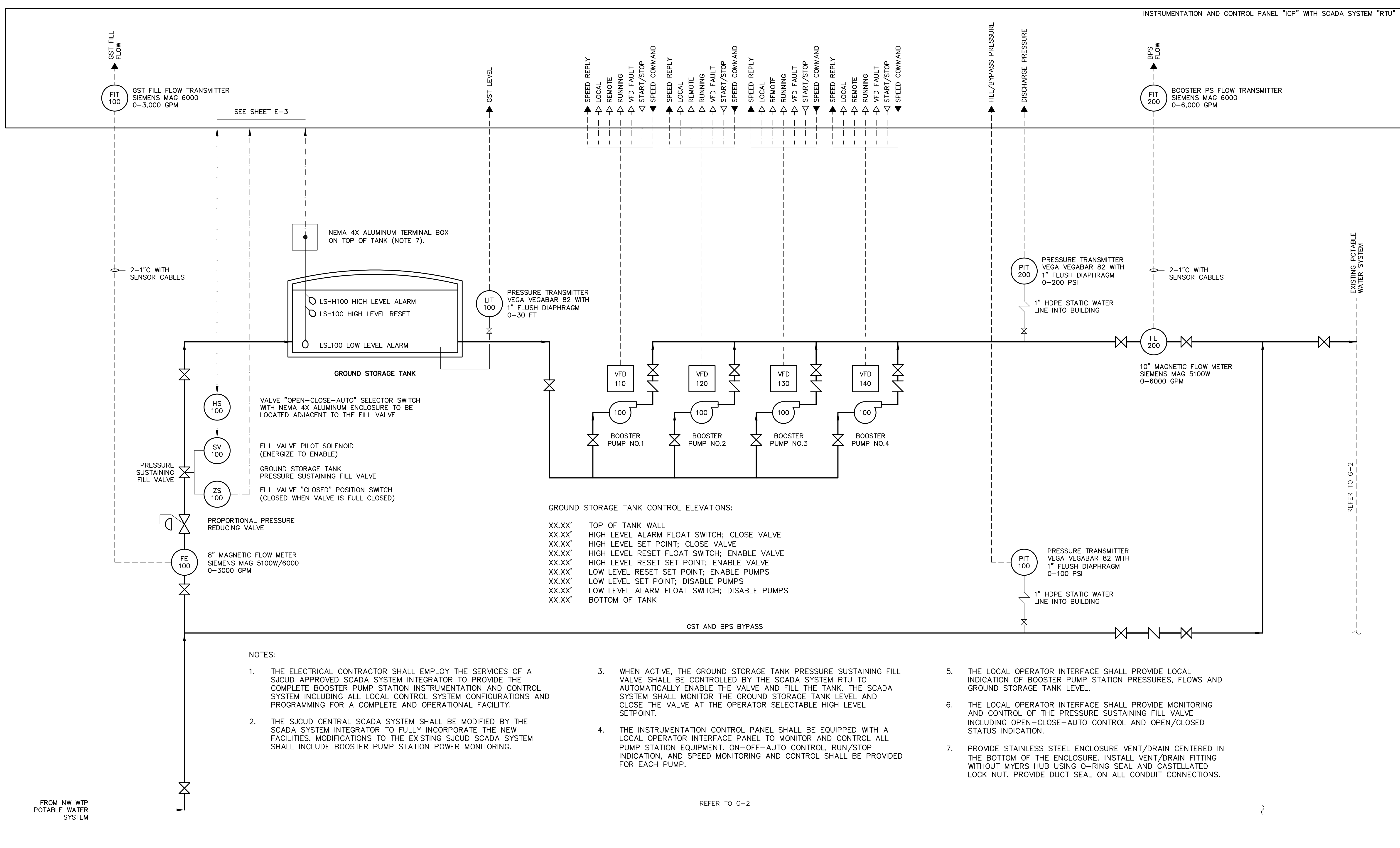


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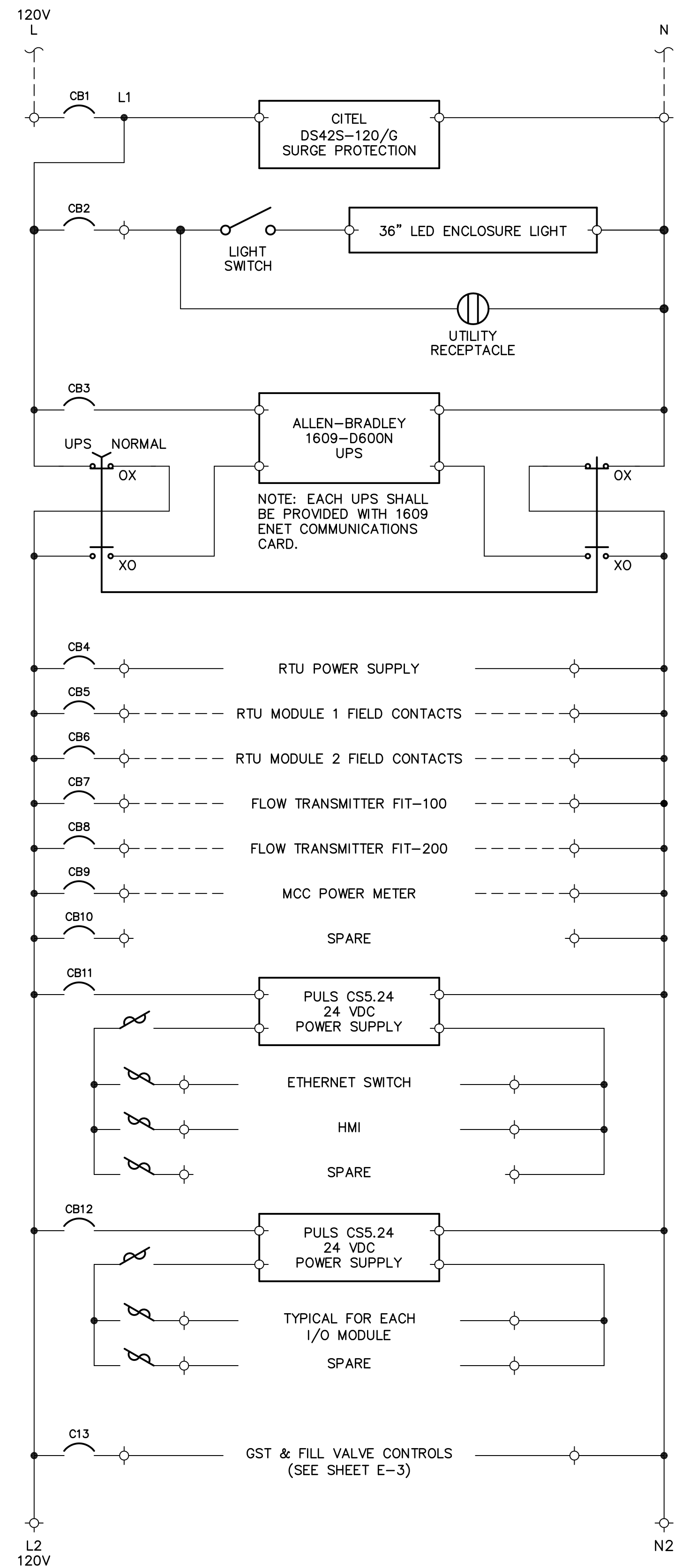
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

CONTROL WIRING DIAGRAMS

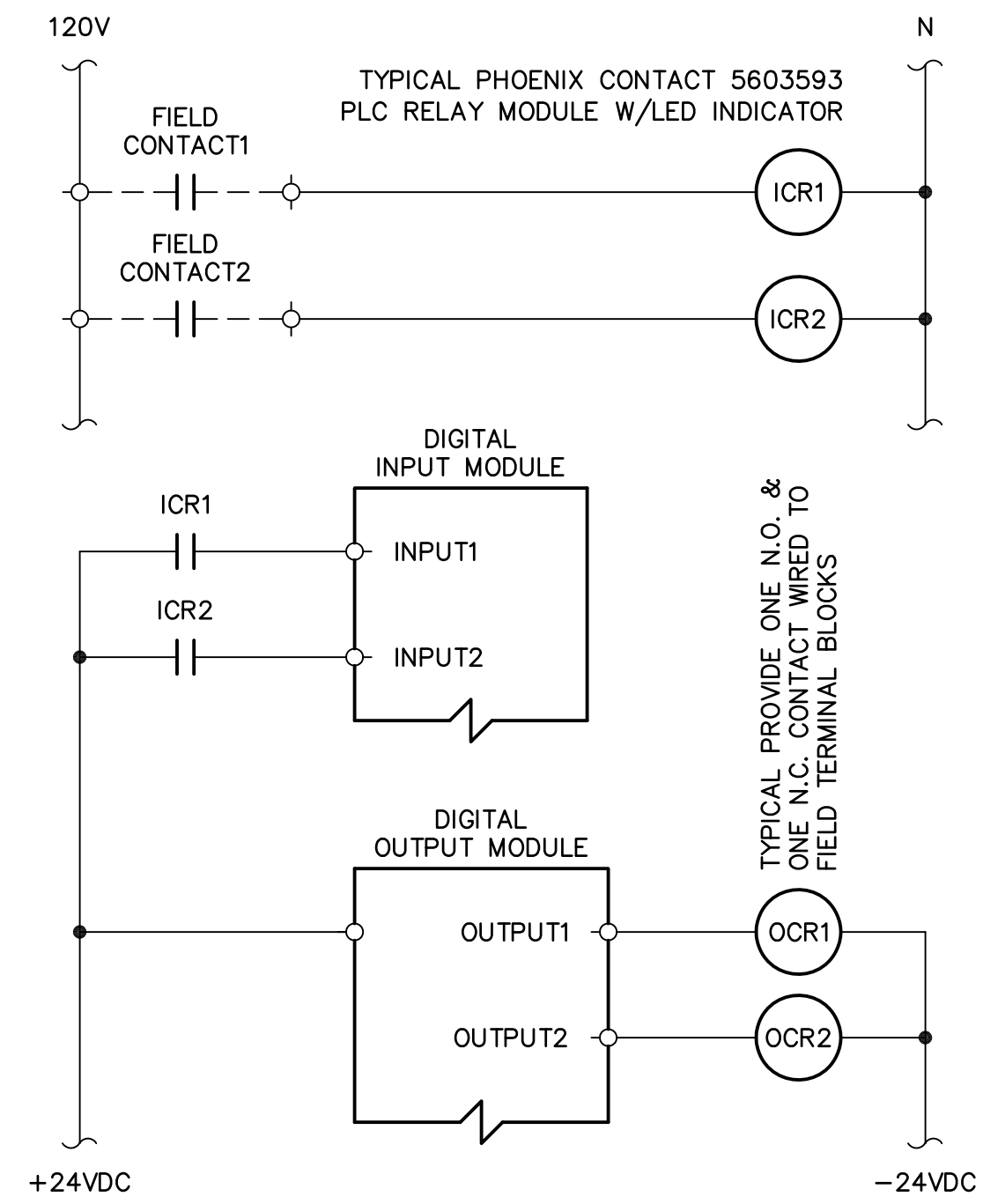
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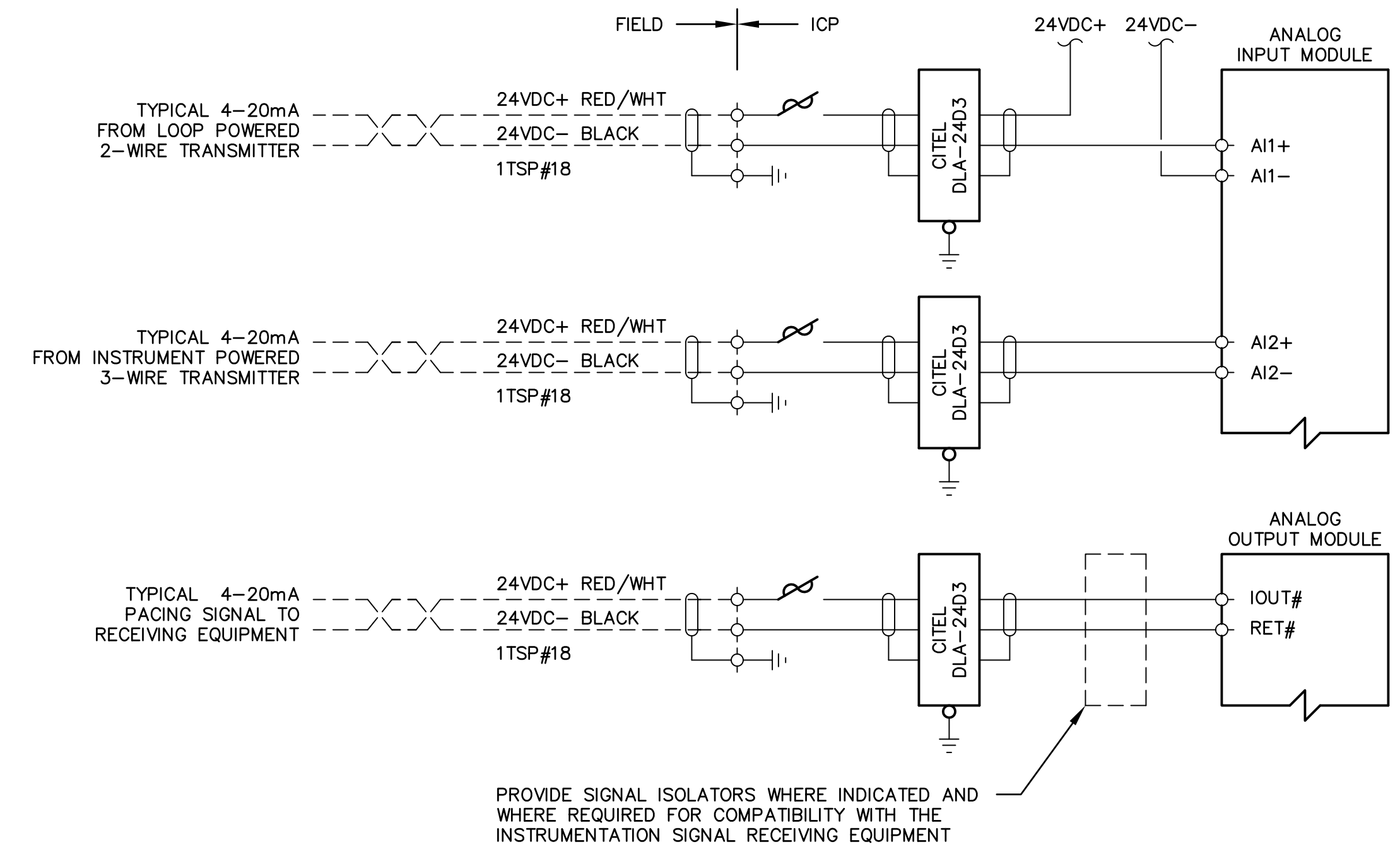
NO.	BY	DATE	SYMBOL	REVISIONS	 MOTT MACDONALD Mott MacDonald Florida, LLC	Architects Engineers Surveyors AA - C0000035 EB - 0000155 LB - 0006783 10245 Centurion Pkwy, N., Suite 320 Jacksonville, Florida 32256 Telephone: (904) 203-1090	DESIGNER: D. LASSETTER	DESIGN ENGINEER	 St. Johns County Utility Department 1205 STATE ROAD 16 ST. AUGUSTINE, FL 32084 PHONE: (904) 209-2626 FAX: (904) 209-2627	GR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION	INSTRUMENTATION SCHEMATIC DIAGRAM	SHEET NO. 54
6.				DRAWN BY: B. LEE			W. DAVID LASSETTER, P.E.	DWG NO. E-4				
5.				DATE: OCT 2022			FLORIDA REGISTRATION NO. 37971	ELECTRICAL BID PACKAGE				
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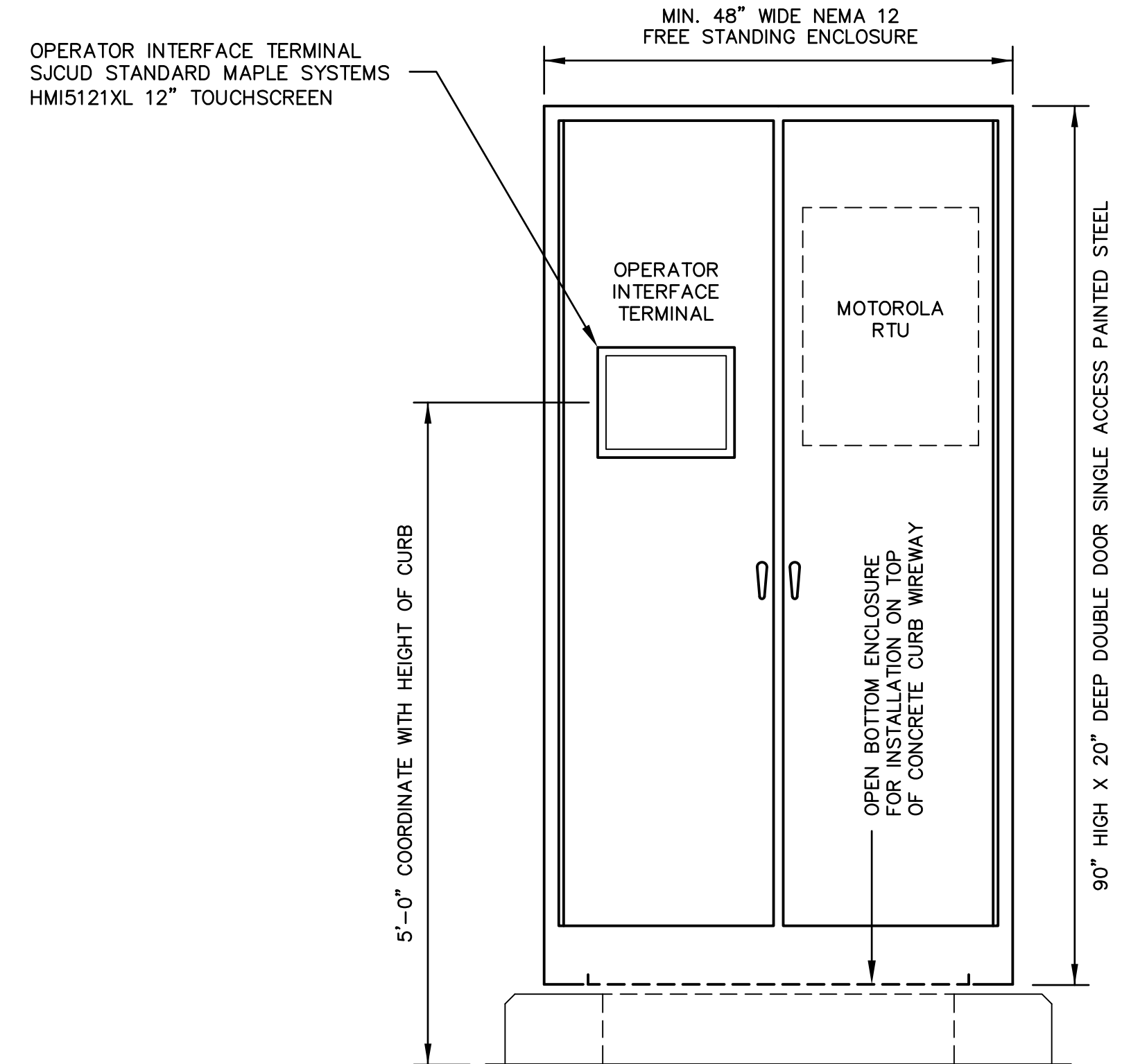
INSTRUMENTATION CONTROL PANEL "ICP" POWER DISTRIBUTION



TYPICAL RTU DIGITAL I/O SIGNAL CONNECTIONS



TYPICAL RTU ANALOG I/O SIGNAL CONNECTIONS



INSTRUMENTATION CONTROL PANEL "ICP" DETAIL
NOT TO SCALE

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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

INSTRUMENTATION
CONTROL PANEL DETAILS

SHEET NO.
55
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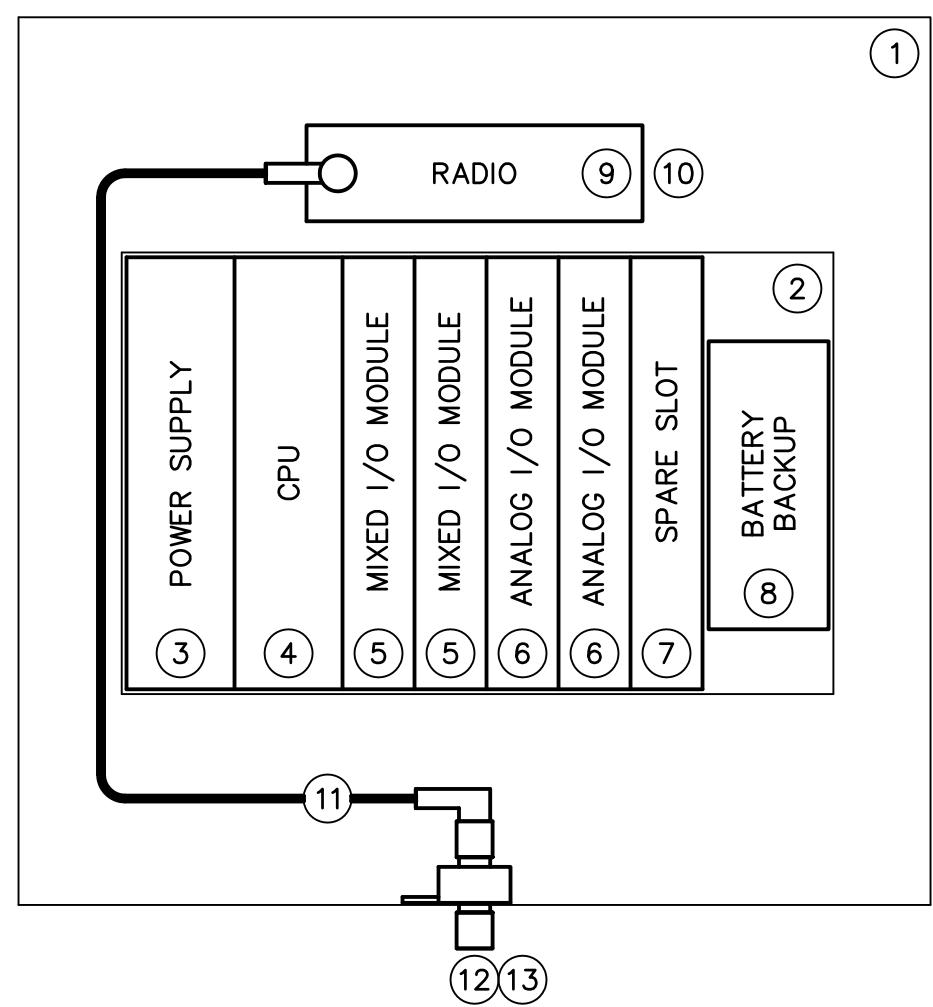
MOTOROLA ACE RTU I/O SCHEDULE

MIXED I/O MODULE		MIXED I/O MODULE		ANALOG MIXED I/O MODULE		ANALOG MIXED I/O MODULE		SPARE SLOT
DI	SIGNAL DESCRIPTION	DI	SIGNAL DESCRIPTION	AI	SIGNAL DESCRIPTION	AI	SIGNAL DESCRIPTION	
01	BOOSTER PUMP 1 IN LOCAL	01	BOOSTER PUMP 3 IN LOCAL	01	BOOSTER PUMP 1 VFD SPEED REPLY	01	BOOSTER PUMP 3 VFD SPEED REPLY	
02	BOOSTER PUMP 1 IN REMOTE	02	BOOSTER PUMP 3 IN REMOTE	02	BOOSTER PUMP 2 VFD SPEED REPLY	02	BOOSTER PUMP 4 VFD SPEED REPLY	
03	BOOSTER PUMP 1 RUNNING	03	BOOSTER PUMP 3 RUNNING	03	STORAGE TANK FILL LINE PRESSURE	03	BOOSTER PUMP PRESSURE	
04	BOOSTER PUMP 1 VFD FAULT	04	BOOSTER PUMP 3 VFD FAULT	04	STORAGE TANK FILL LINE FLOW	04	BOOSTER PUMP FLOW	
05	BOOSTER PUMP 2 IN LOCAL	05	BOOSTER PUMP 4 IN LOCAL	05	STORAGE TANK LEVEL	05	SPARE	
06	BOOSTER PUMP 2 IN REMOTE	06	BOOSTER PUMP 4 IN REMOTE	06	SPARE	06	SPARE	
07	BOOSTER PUMP 2 RUNNING	07	BOOSTER PUMP 4 RUNNING	07	SPARE	07	SPARE	
08	BOOSTER PUMP 2 VFD FAULT	08	BOOSTER PUMP 4 VFD FAULT	08	SPARE	08	SPARE	
09	MCC POWER FAILURE	09	ATS NORMAL POWER AVAILABLE	AO	SIGNAL DESCRIPTION	AO	SIGNAL DESCRIPTION	
10	CONTROL POWER FAILURE	10	ATS EMERGENCY POWER AVAILABLE	01	BOOSTER PUMP 1 PACING SIGNAL	01	BOOSTER PUMP 3 PACING SIGNAL	
11	GROUND STORAGE TANK HIGH LEVEL	11	ATS IN NORMAL	02	BOOSTER PUMP 2 PACING SIGNAL	02	BOOSTER PUMP 4 PACING SIGNAL	
12	GROUND STORAGE TANK LOW LEVEL	12	ATS IN EMERGENCY	03	SPARE	03	SPARE	
13	FILL VALVE IN AUTO	13	GENERATOR RUNNING	04	SPARE	04	SPARE	
14	FILL VALVE CLOSED	14	GENERATOR FAULT					
15	SPARE	15	SPARE					
16	SPARE	16	SPARE					
DO	SIGNAL DESCRIPTION	DO	SIGNAL DESCRIPTION					
01	BOOSTER PUMP 1 START/STOP	01	BOOSTER PUMP 1 START/STOP					
02	BOOSTER PUMP 1 START/STOP	02	BOOSTER PUMP 1 START/STOP					
03	FILL VALVE ENABLE	03	ATS GO TO GENERATOR					
04	SPARE	04	SPARE					
AI	SIGNAL DESCRIPTION	AI	SIGNAL DESCRIPTION					
01	SPARE	01	SPARE					
02	SPARE	02	SPARE					
03	SPARE	03	SPARE					
04	SPARE	04	SPARE					

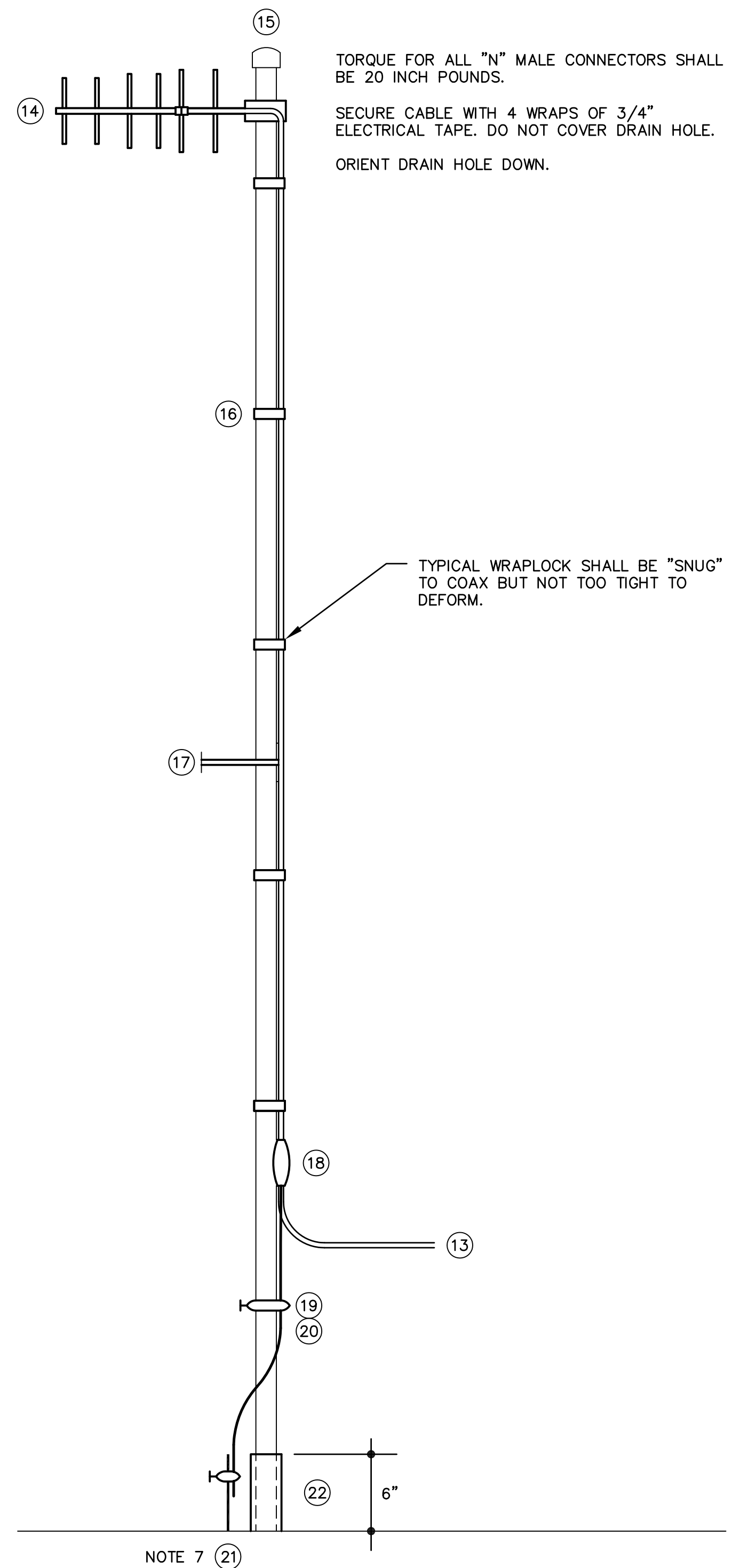
SCADA SYSTEM EQUIPMENT SCHEDULE		
ITEM	DESCRIPTION	
1	MOTOROLA ACE3600 METAL CHASSIS	V056
2	MOTOROLA ACE3600 5 I/O SLOT FRAME	V105
3	MOTOROLA ACE3600 AC POWER SUPPLY WITH BATTERY CHARGER	V261
4	MOTOROLA ACE3600 RTU WITH UPGRADE TO CPU3680 AND SECURITY ENABLE OPTION	F7509/V448/VA00360AA
	MOTOROLA CPU PLUG-IN ETHERNET 10/100 M PORT	V212
5	MOTOROLA ACE3600 MIXED I/O MODULE 16DI, 4DO EE, 4AI, ±20 mA WITH FLOATING POWER SUPPLY	V245/V260
6	MOTOROLA ACE3600 ANALOG MIXED I/O MODULE 4AO, 8AI, ±20 mA	V562
7	MOTOROLA ACE3600 BLANK I/O MODULE	V20
8	MOTOROLA BATTERY POWER CABLE	FKN8376
	BATTERY BACKUP 12V, 7AH, SEALED RECHARGEABLE SLA BATTERY, TOYO-USP 6FMS7	
9	4RF DIGITAL RADIO MODEL APSQ-N220-SSC-HD-22-ENAA	
	4RF DIGITAL RADIO DIN RAIL MOUNTING BRACKET APSB-MBRK-DIN (NOTE 13)	
10	RADIO POWER CABLE 12VDC WITH PLUG COMPATIBLE WITH MOTOROLA POWER SUPPLY	
11	RADIO COMMUNICATION CABLE TYPE 568B ETHERNET CABLE, 1M	
12	LMR-195 FLEXIBLE COAX, RIGHT ANGLE N MALE/RIGHT ANGLE TNC MALE CONNECTORS, 36" LONG	
13	TIMES MICROWAVE LP-HBX-NFF COAX SURGE ARRESTER	
14	TIMES MICROWAVE LMR-400-DB COAX, TYPE N MALE CONNECTORS EZ-400-NMH-D	
15	SAMCO ANTENNAS MODEL SAM-260	
16	ANTENNA MAST 2" x 20' LONG SCHEDULE 40 ALUMINUM PIPE, TOP WELDED CLOSED	
17	1/2" SS WRAPLOCK BANDS, 3' ON CENTER. TIE WRAPS ARE NOT ACCEPTABLE.	
18	TYPE 316 STAINLESS STEEL STANDOFF SUPPORT BRACKET	
19	TESSCO GK-S38 COAX GROUND KIT	
20	GROUNDING CLAMP RATED FOR DIRECT BURIAL	
21	NO.2 AWG SOLID TINNED COPPER CONDUCTOR	
22	COPPER CLAD STEEL GROUND ROD, 3/4" DIAMETER, 20' LONG	
23	2.5" SCHEDULE 40 GRAY PVC CONDUIT SLEEVE THROUGH SLAB	

SCADA SYSTEM NOTES:

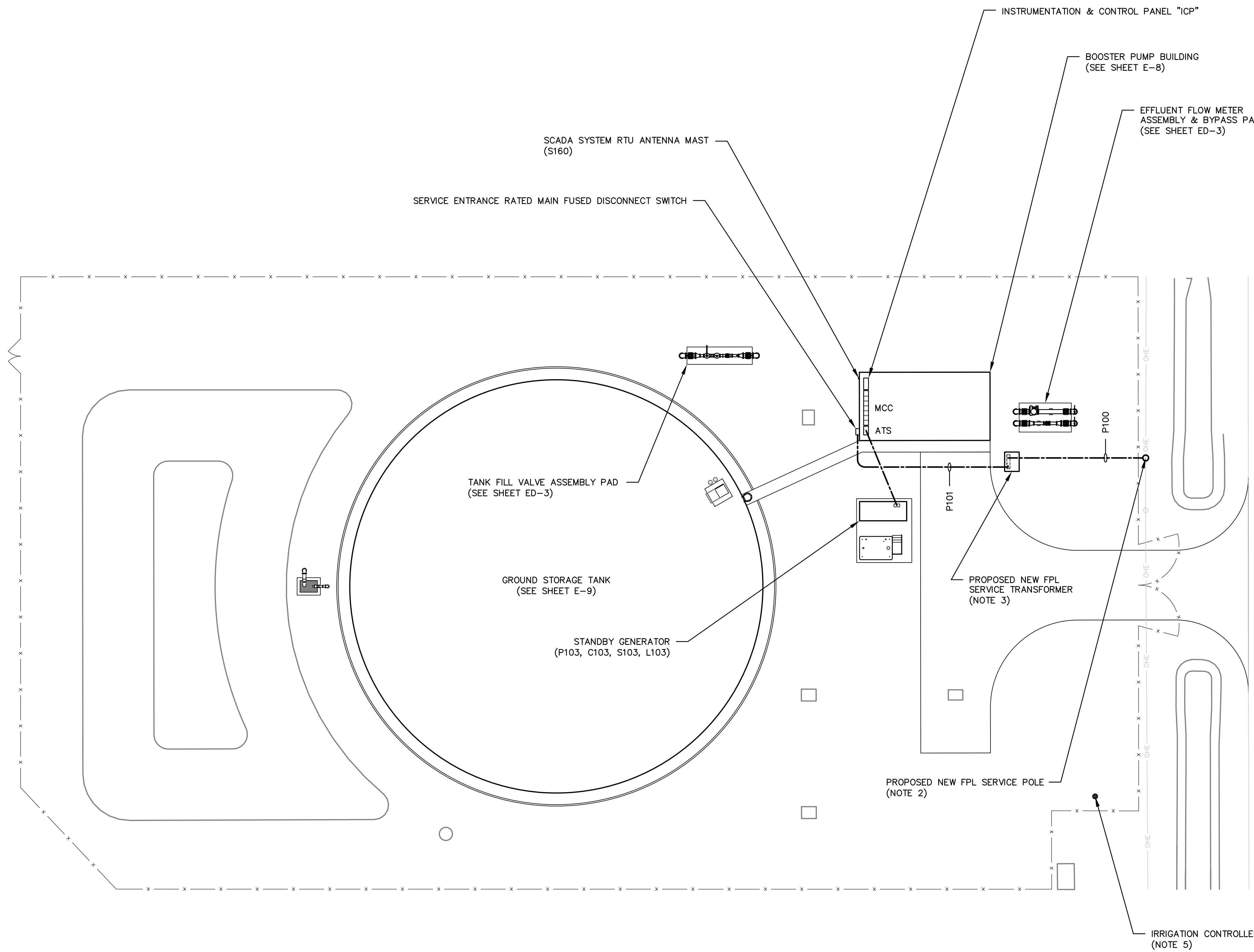
- THE ELECTRICAL CONTRACTOR SHALL EMPLOY THE SERVICES OF A SJUCD PRE-APPROVED SCADA SYSTEM INTEGRATOR TO PROVIDE THE COMPLETE BOOSTER PUMP STATION LOCAL INSTRUMENTATION AND CONTROL SYSTEM INCLUDING: NEW SCADA SYSTEM RTU, ANTENNA, AND ANTENNA MAST.
- THE EXISTING SJUCD NW WTP SCADA SYSTEM, AND THE CENTRAL SCADA SYSTEM, SHALL BE MODIFIED BY THE SCADA SYSTEM INTEGRATOR TO FULLY INCORPORATE THE NEW FACILITIES.
- THE ELECTRICAL CONTRACTOR AND THE SCADA SYSTEM INTEGRATOR SHALL COORDINATE THE SCADA SYSTEM RTU, RADIO AND ANTENNA INSTALLATION WITH THE SJUCD SCADA SYSTEM SUPERVISOR.
- THE SCADA SYSTEM RTU SHALL BE A SJUCD STANDARD MOTOROLA ACE3600 RTU CONFIGURED WITH I/O MODULES AS INDICATED. PROVIDE POWER AND SIGNAL LINE SURGE PROTECTION.
- PRIOR TO SHOP DRAWING SUBMITTALS, THE INSTRUMENTATION SYSTEM INTEGRATOR SHALL CONFIRM RADIO/ANTENNA SELECTION WITH THE SJUCD SCADA SYSTEM SUPERVISOR.
- IN ORDER TO MAINTAIN FCC PART 15 COMPLIANCE, ALL ANTENNA WORK MUST BE PERFORMED OR CERTIFIED BY AN FCC CERTIFIED TECHNICIAN.
- ANTENNA MAST GROUND ROD SHALL BE BONDED (UNDERGROUND) TO THE STATION ELECTRICAL SYSTEM GROUNDING GRID.
- ALL GROUNDING CONDUCTORS SHALL HAVE AN EVEN SLOPE FROM POINT OF CONTACT TO THE GROUND ROD (NO 90° BENDS).
- ALL GROUND CONTACT POINTS SHALL BE PROTECTED BY AN ANTI-OXIDATION COMPOUND.
- ALL RF CONNECTORS SHALL BE TIGHTENED TO MANUFACTURER SPECIFICATIONS, AND SHALL BE PROPERLY SEALED. COLD SHRINK IS NOT ACCEPTABLE.
- DRAIN HOLES ON ANTENNAS MUST BE ORIENTED DOWN.
- ALL THREADED CONNECTIONS, EXCEPT ANTENNA CONNECTIONS, SHALL BE PROTECTED WITH ANTI-SEIZE TREATMENT.
- PROVIDE DIN RAIL ON BACK PLANE AT THE RTU RADIO MOUNTING LOCATION FOR THE 4RF RADIO MOUNTING BRACKET. MOUNT THE DIN RAIL USING EXISTING TAPPED SCREW HOLES. DO NOT DRILL AND TAP NEW HOLES.



SCADA SYSTEM RTU DETAIL
NOT TO SCALE



SCADA SYSTEM ANTENNA DETAIL
NOT TO SCALE

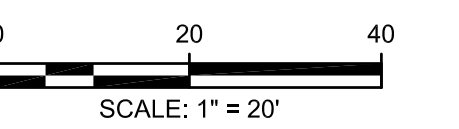
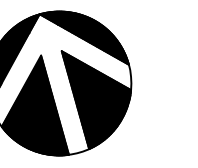


NOTES:

1. PROVIDE NEW ELECTRICAL SERVICE IN ACCORDANCE WITH ALL FPL REQUIREMENTS, INCLUDING NEW SERVICE METERING, METER ENCLOSURE, METER MOUNTING SYSTEM, ETC.
2. THE ELECTRICAL CONTRACTOR SHALL PROVIDE NEW UNDERGROUND PRIMARY SERVICE CONDUITS FROM THE NEW SERVICE POINT OF CONNECTION AT THE PROPOSED NEW FPL IN-LINE SERVICE POLE TO THE NEW FPL SERVICE TRANSFORMER IN ACCORDANCE WITH ALL FPL REQUIREMENTS. FPL SHALL PROVIDE THE PRIMARY SERVICE CONDUITS. NEW UNDERGROUND PRIMARY SERVICE CONDUITS SHALL BE 2-5" SCH 40 PVC, LONG RADIUS GRS ELLS, MIN. 36" COVER. FPL SHALL FURNISH THE CONDUIT FOR INSTALLATION BY THE ELECTRICAL CONTRACTOR.
3. THE NEW ELECTRICAL SERVICE PAD MOUNTED TRANSFORMER AND THE PRE-CAST CONCRETE TRANSFORMER PAD SHALL BE PROVIDED BY FPL. THE ELECTRICAL CONTRACTOR SHALL INSTALL THE TRANSFORMER PAD AND SHALL PROVIDE BOLLARDS, IN ACCORDANCE WITH FPL REQUIREMENTS.
4. ALL EXTERIOR MATERIAL AND INSTALLATION SHALL BE SUITABLE FOR AND IN ACCORDANCE WITH THE SPECIFICATIONS FOR "CORROSIVE ATMOSPHERES".
5. IRRIGATION CONTROLLER: PROVIDE CONCRETE PEDESTAL WITH DUPLEX TYPE GFI RECEPTACLE WITH WP WHILE IN-USE COVER (L-4, 3/4"C, 3#12).

GROUNDING NOTES:

1. GROUNDING ELECTRODE SYSTEM: PROVIDE A GROUND RING PER NEC 250.52, ENCIRCLING THE BOOSTER PUMP STATION BUILDING, CONSISTING OF A CONTINUOUS #4/0 TINNED COPPER CONDUCTOR AT 30" BELOW FINISHED GRADE.
2. PROVIDE GROUND RODS (MINIMUM 3/4" DIAMETER, 20' LONG COPPER CLAD STEEL) BONDED TO EACH CORNER OF THE GROUND RING, AND BETWEEN CORNERS AT MAXIMUM 30' ON CENTER. GROUND ROD SECTIONS SHALL BE COUPLED AND DRIVEN TO ESTABLISH A MAXIMUM RESISTANCE TO GROUND OF 5 OHMS THROUGHOUT THE GROUNDING ELECTRODE SYSTEM.
3. BOND THE GROUND RING TO THE STEEL REINFORCEMENT IN EACH CORNER OF THE BUILDING FOUNDATION WITH MINIMUM #1/0 TINNED COPPER CONDUCTOR.
4. GROUNDING ELECTRODE CONDUCTOR: PROVIDE MINIMUM #2 TINNED COPPER GROUNDING ELECTRODE CONDUCTOR FROM THE GROUND RING TO THE POWER DISTRIBUTION EQUIPMENT (METER, DISCONNECT SWITCH, FUTURE ATS, MCC, AND ICP. INSTALL EACH GROUNDING ELECTRODE CONDUCTOR IN 3/4" SCH 80 PVC CONDUIT SLEEVE FOR MECHANICAL PROTECTION.
5. DRIVE GROUND RODS AT 45° AWAY FROM CENTER OF THE GROUND RING.
6. UPON COMPLETION OF THE ELECTRICAL SERVICE, THE ELECTRICAL CONTRACTOR SHALL MEASURE AND RECORD THE GROUNDING ELECTRODE SYSTEM RESISTANCE TO REMOTE EARTH USING A CLAMP-ON GROUND RESISTANCE TESTER (AMEC 3711, OR APPROVED EQUAL). THE ELECTRICAL CONTRACTOR SHALL MEASURE AND RECORD THE GROUND RESISTANCE OF A SINGLE TEST GROUND ROD CONNECTED TO THE SERVICE NEUTRAL, STARTING AT A DRIVEN DEPTH OF 20', AND AT ADDITIONAL 10' INCREMENTS UNTIL A MAXIMUM VALUE OF 10 OHMS IS OBTAINED.
7. ALL GROUND RODS IN THE GROUNDING ELECTRODE SYSTEM SHALL BE DRIVEN TO THE SAME DEPTH. THE GROUND RODS SHALL BE BONDED TO THE TINNED COPPER GROUNDING ELECTRODE CONDUCTOR TO CREATE THE GROUNDING ELECTRODE SYSTEM. MEASURE AND RECORD THE GROUND RESISTANCE AT EACH EQUIPMENT CONNECTION TO THE GROUNDING ELECTRODE SYSTEM AND CONFIRM GROUND RESISTANCE OF ALL EQUIPMENT GROUNDING CONNECTIONS ARE A MAXIMUM OF 5 OHMS.
8. IF NECESSARY PROVIDE SUPPLEMENTAL GROUNDING, INCLUDING INCREASING THE DRIVEN DEPTH OF ALL GROUND RODS, TO MEET THE 5 OHM MAXIMUM REQUIREMENT.
9. PROVIDE GROUND RODS BONDED TO THE GROUND STORAGE TANK LADDER, MAGNETIC FLOW METER, AND SCADA SYSTEM ANTENNA TOWER. BOND EACH GROUND ROD TO THE GROUND RING WITH MINIMUM #1/0 TINNED COPPER CONDUCTOR.
10. EXTEND THE PUMP BUILDING COUNTERPOISE AND BOND TO THE NEAREST FENCE POST.
11. PROVIDE UL MASTER LABEL LIGHTNING PROTECTION SYSTEM FOR THE BOOSTER PUMP STATION BUILDING. PROVIDE 1" SCH 40 PVC CONDUIT SLEEVES CONCEALED INSIDE THE WALLS AT EACH CORNER OF THE BUILDING FOR INSTALLATION OF THE DOWNLEAD CONDUCTORS.



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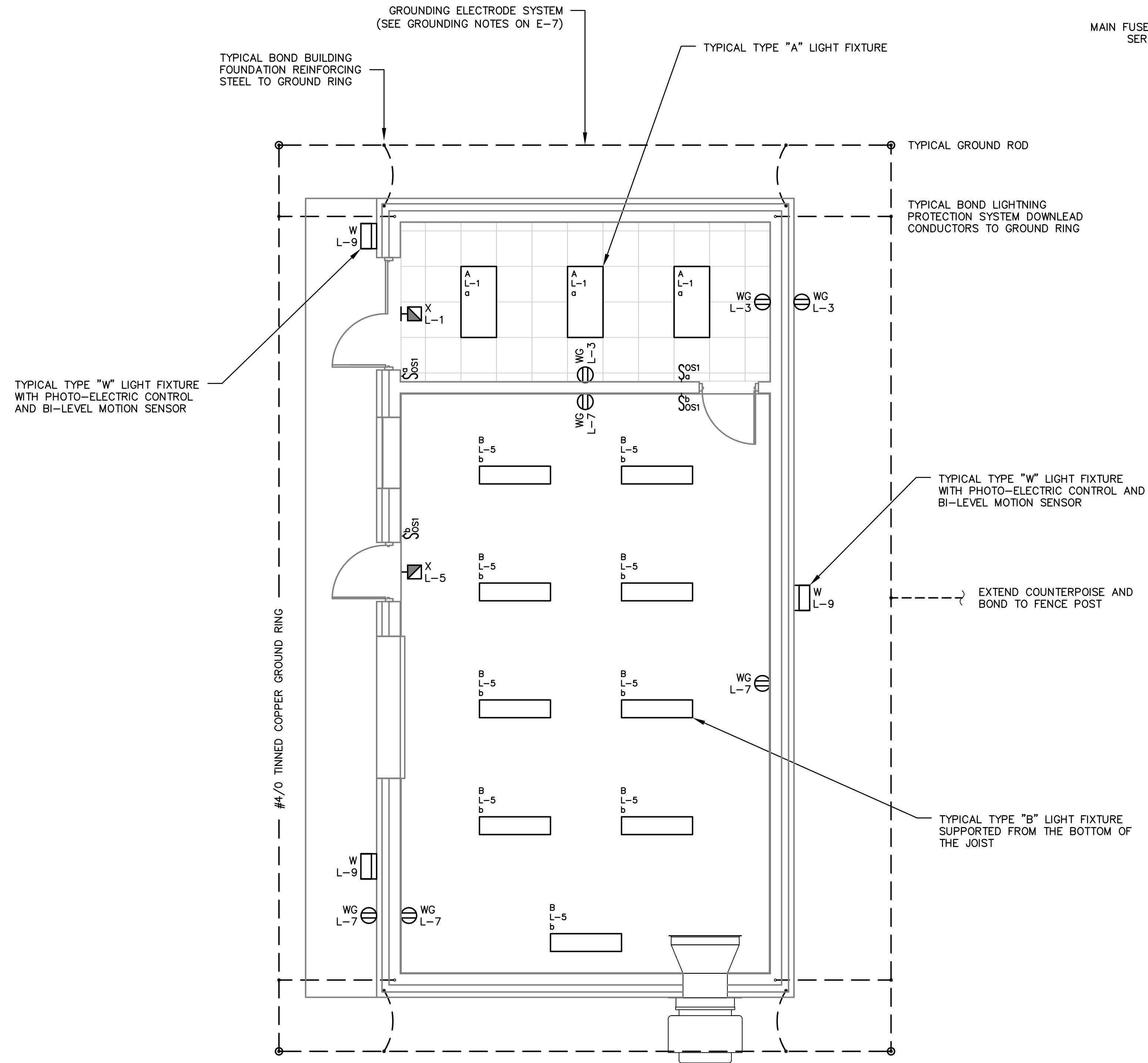
CR-208 GROUND STORAGE TANK AND BOOSTER PUMP STATION

ELECTRICAL SITE PLAN

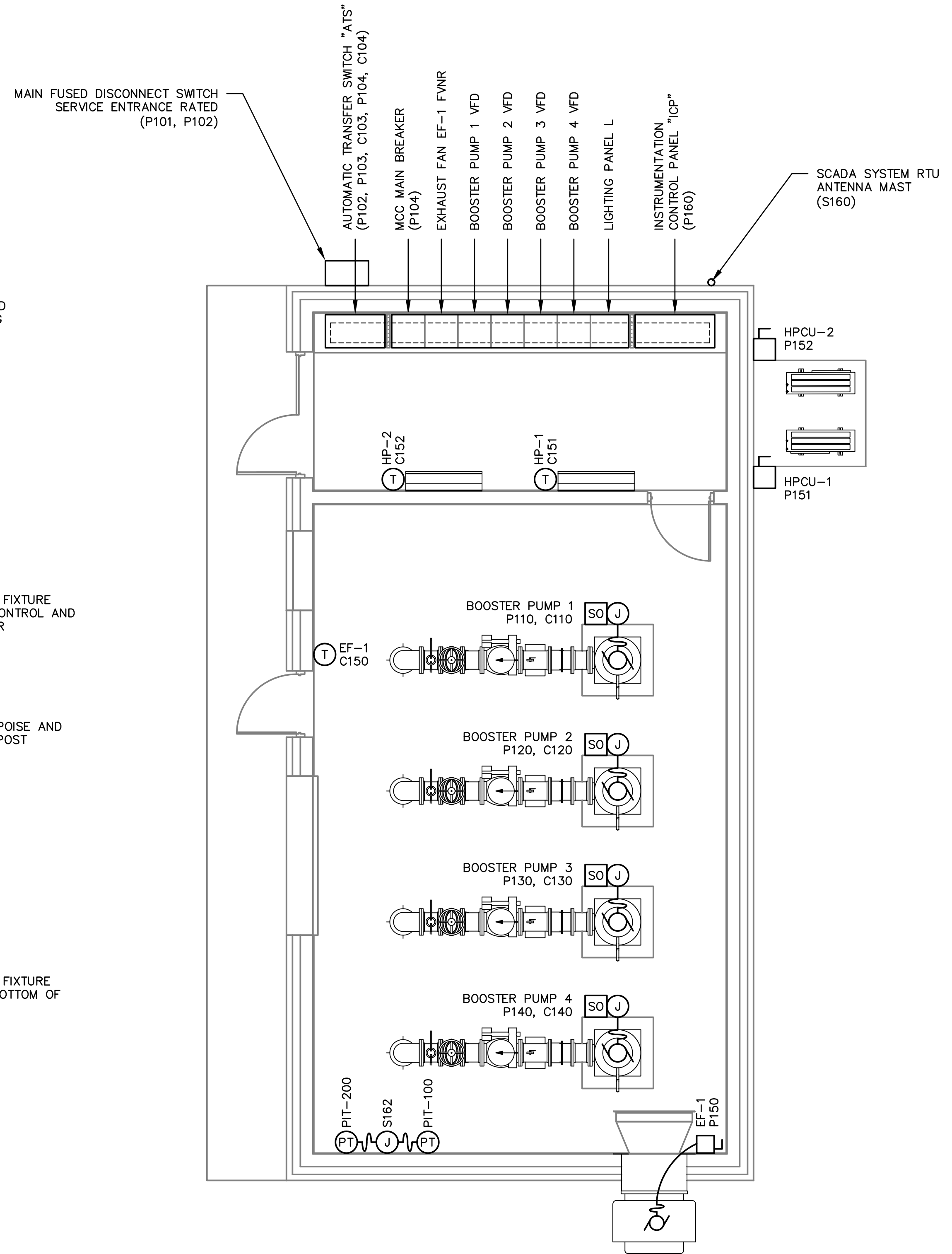
SHEET NO. 57
 DWG NO. E-7
 ELECTRICAL BID PACKAGE

LIGHTING CONTROL DESCRIPTIONS:

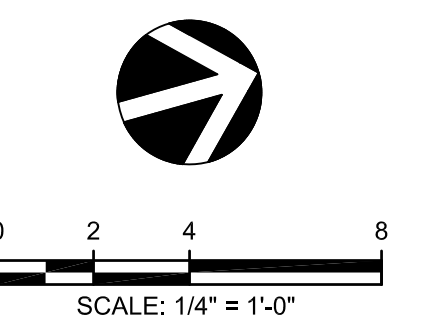
- OS1: MANUAL ON, FULL AUTOMATIC OFF VIA OCCUPANCY SENSOR. LINE VOLTAGE PIR OCCUPANCY SENSOR WALL SWITCH WITH ON/OFF CONTROL.



LIGHTING PLAN
1/4" = 1'-0"



POWER PLAN
1/4" = 1'-0"



NO.	BY	DATE	SYMBOL	REVISIONS
6.				
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1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE



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DRAWN BY: B. LEE
DATE: OCT 2022
CHECKED BY: L. SAMEL
DATE: OCT 2022

DESIGN ENGINEER
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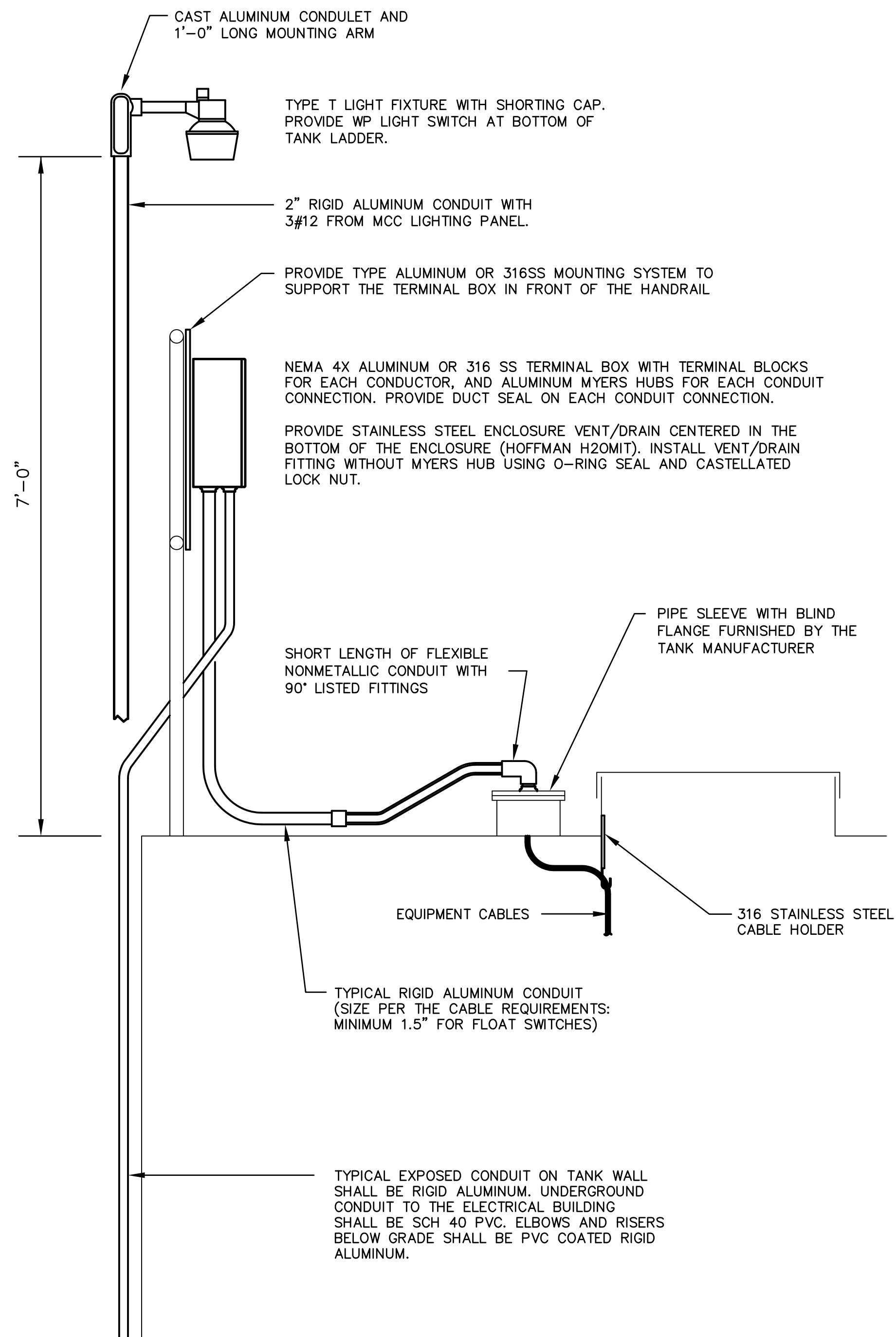
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

ELECTRICAL PLAN
BOOSTER PUMP STATION

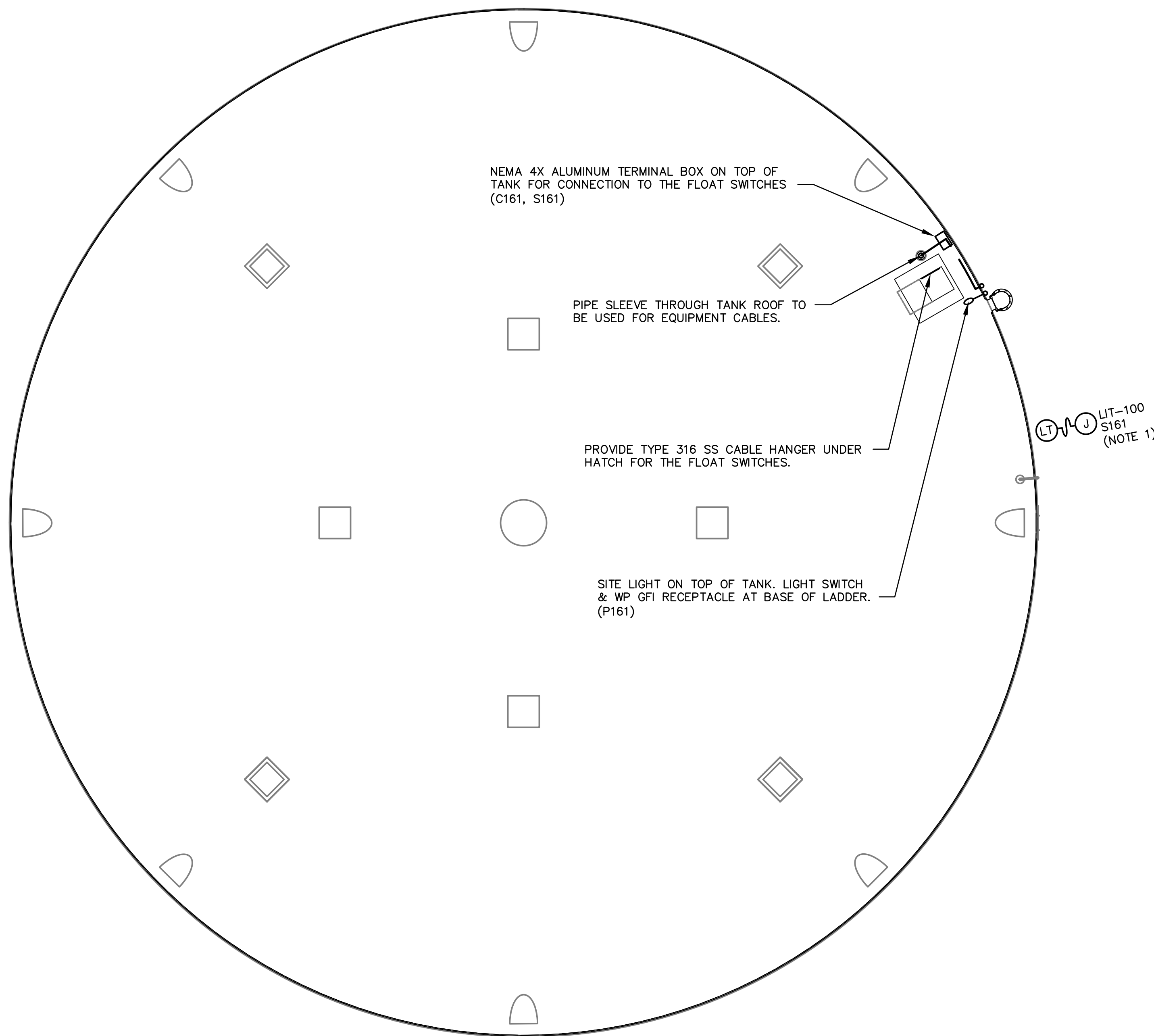
SHEET NO. 58
DWG NO. E-8
ELECTRICAL
BID PACKAGE

NOTES:

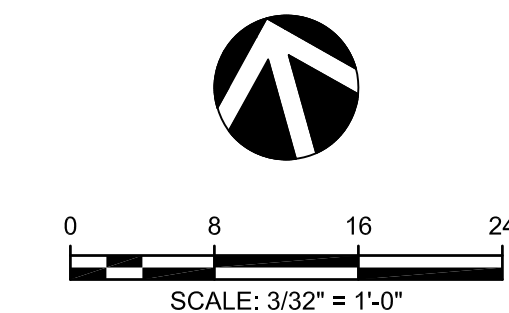
- GROUND STORAGE TANK LEVEL TRANSMITTER: PROVIDE NEMA 4X ALUMINUM TERMINAL BOX WITH ANALOG SURGE PROTECTION FOR THE TANK LEVEL TRANSMITTER. PROVIDE SUPPLEMENTAL GROUND ROD ADJACENT TO THE TERMINAL BOX BONDED TO THE TANK COUNTERPOISE, TERMINAL BOX AND SURGE PROTECTION.



GST LEVEL SWITCH TERMINAL BOX INSTALLATION DETAIL
NOT TO SCALE



GROUND STORAGE TANK ELECTRICAL PLAN
3/32" = 1'-0"



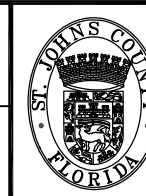
NO.	BY	DATE	SYMBOL	REVISIONS
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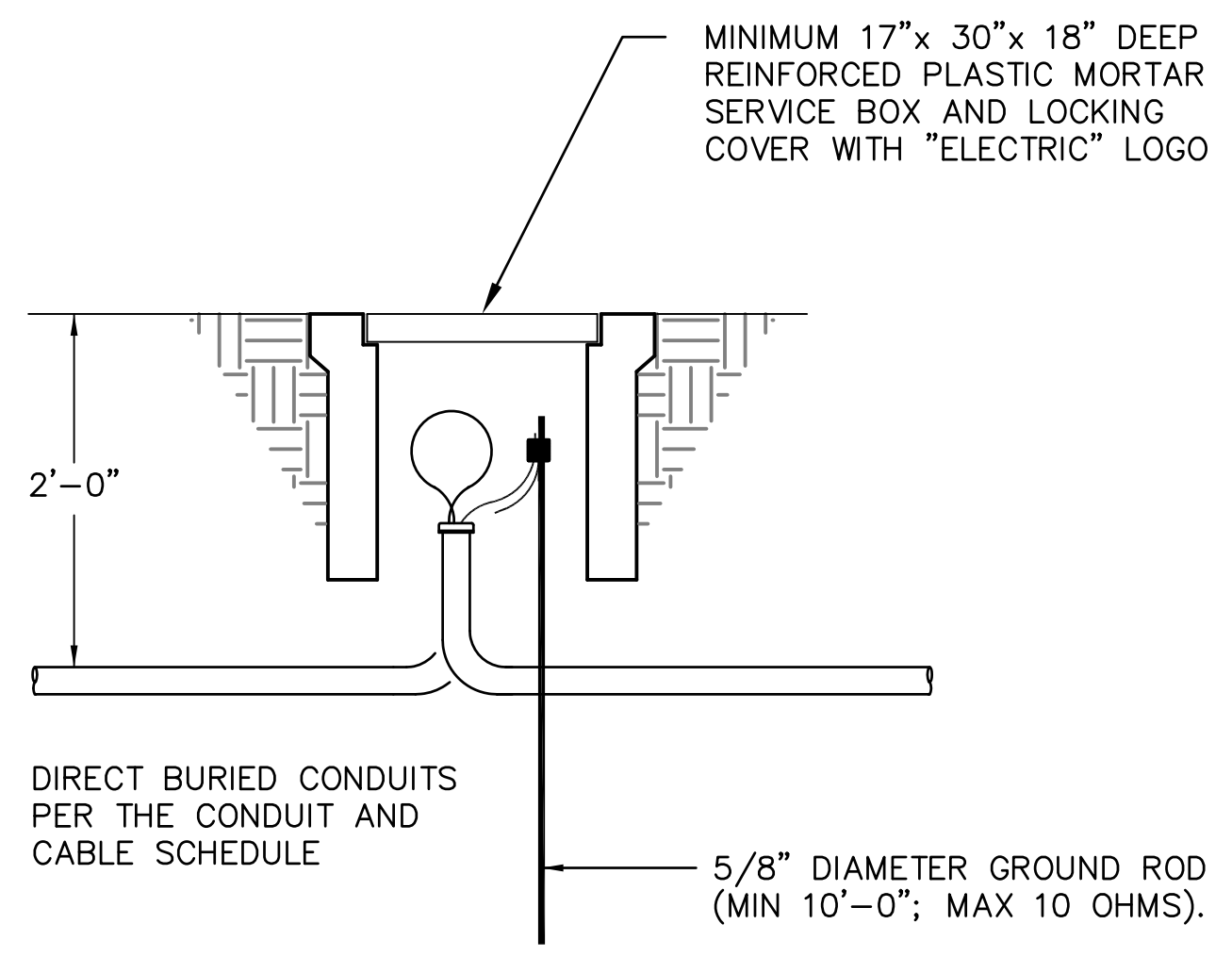


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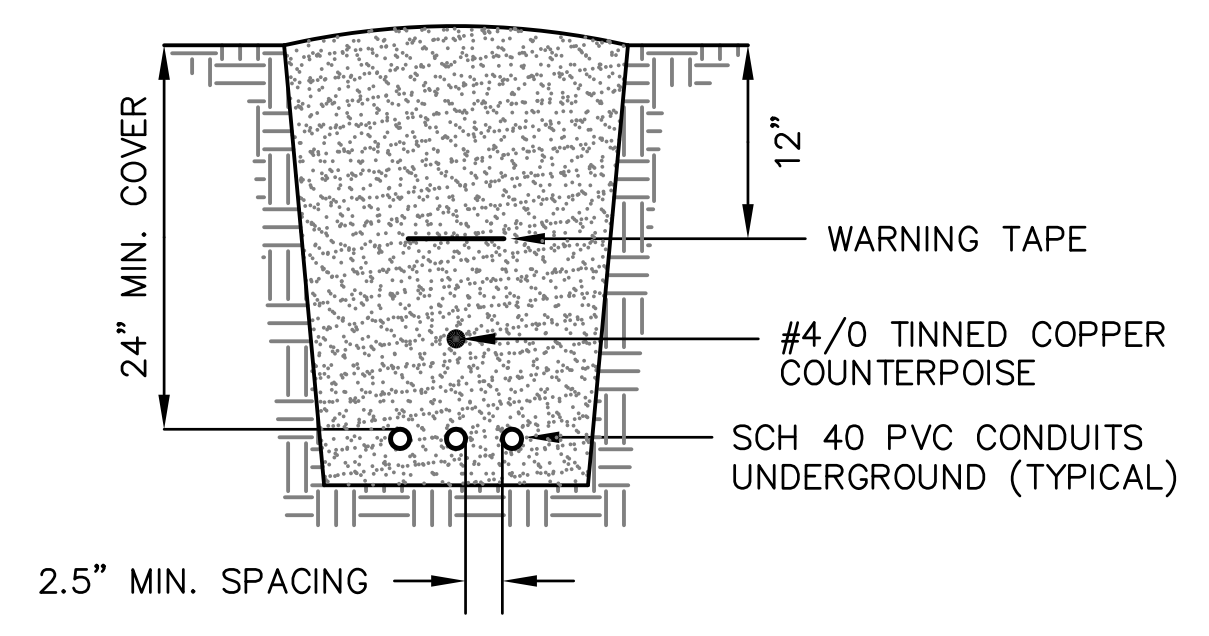
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

ELECTRICAL PLAN
GROUND STORAGE TANK

SHEET NO. 59
DWG NO. E-9
ELECTRICAL BID PACKAGE

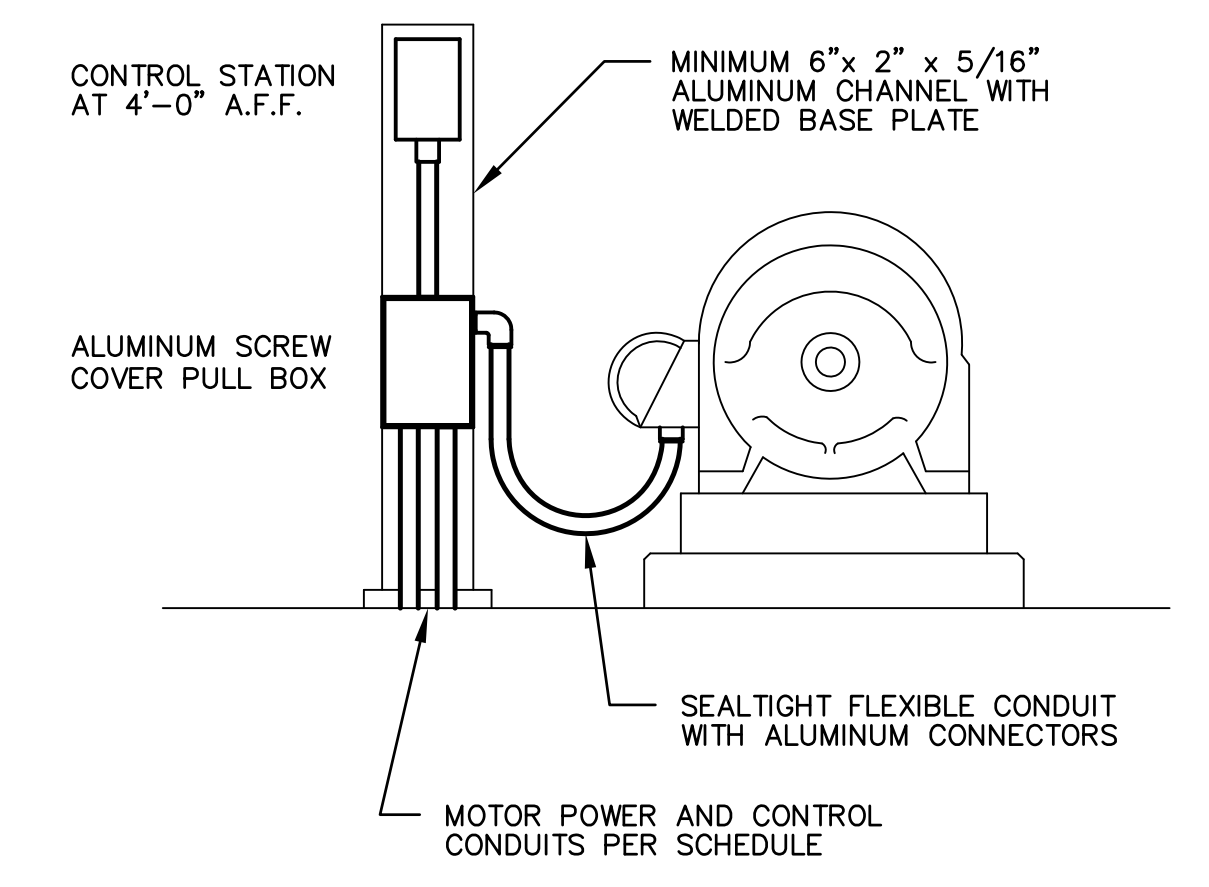


TYPICAL UNDERGROUND PULL BOX DETAIL
NOT TO SCALE

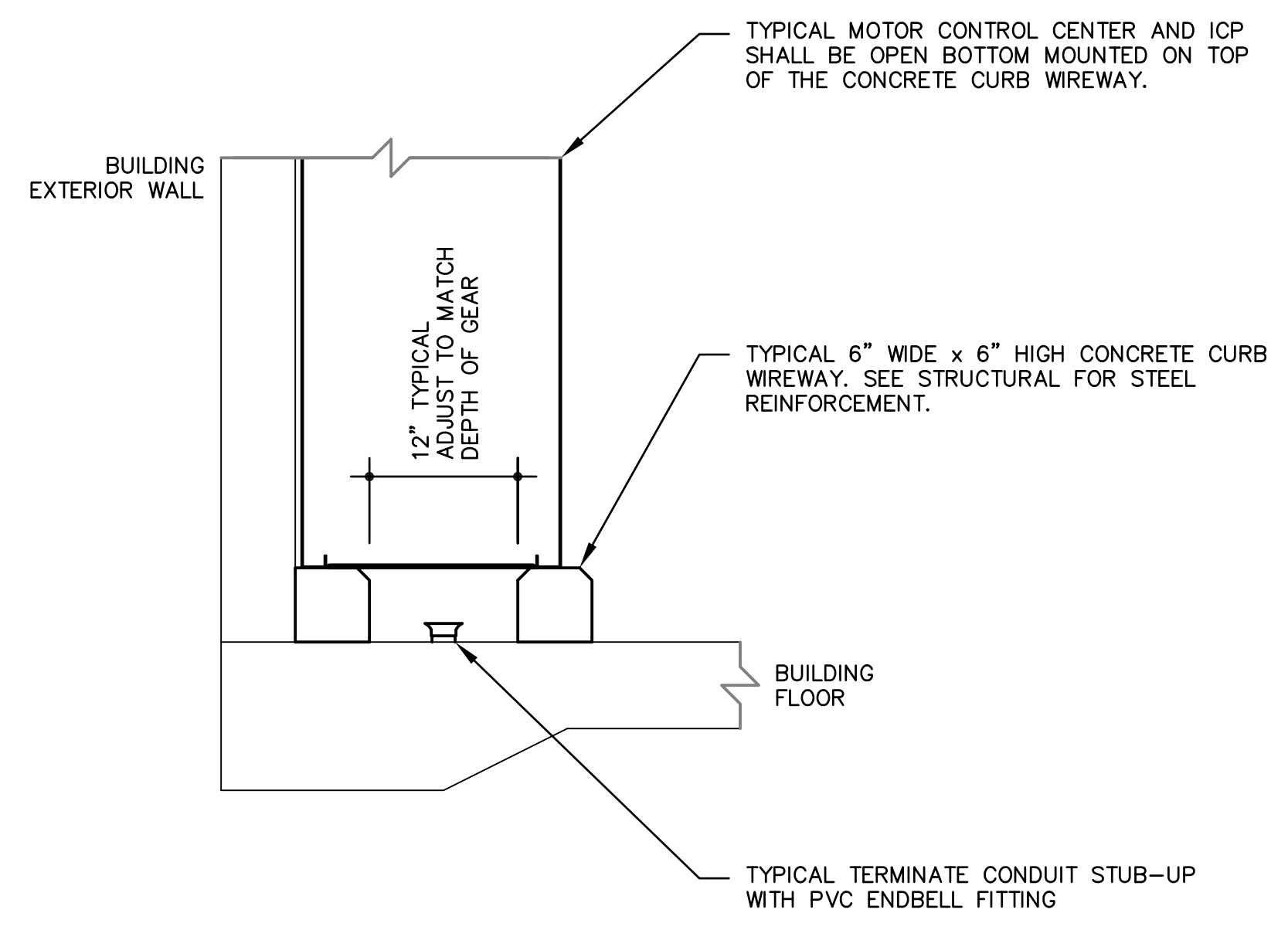


TYPICAL DIRECT BURIED CONDUIT DETAIL
NOT TO SCALE

NOTE: SEE ELECTRICAL SITE PLAN AND CONDUIT AND CABLE SCHEDULE FOR NUMBER AND SIZE OF CONDUITS

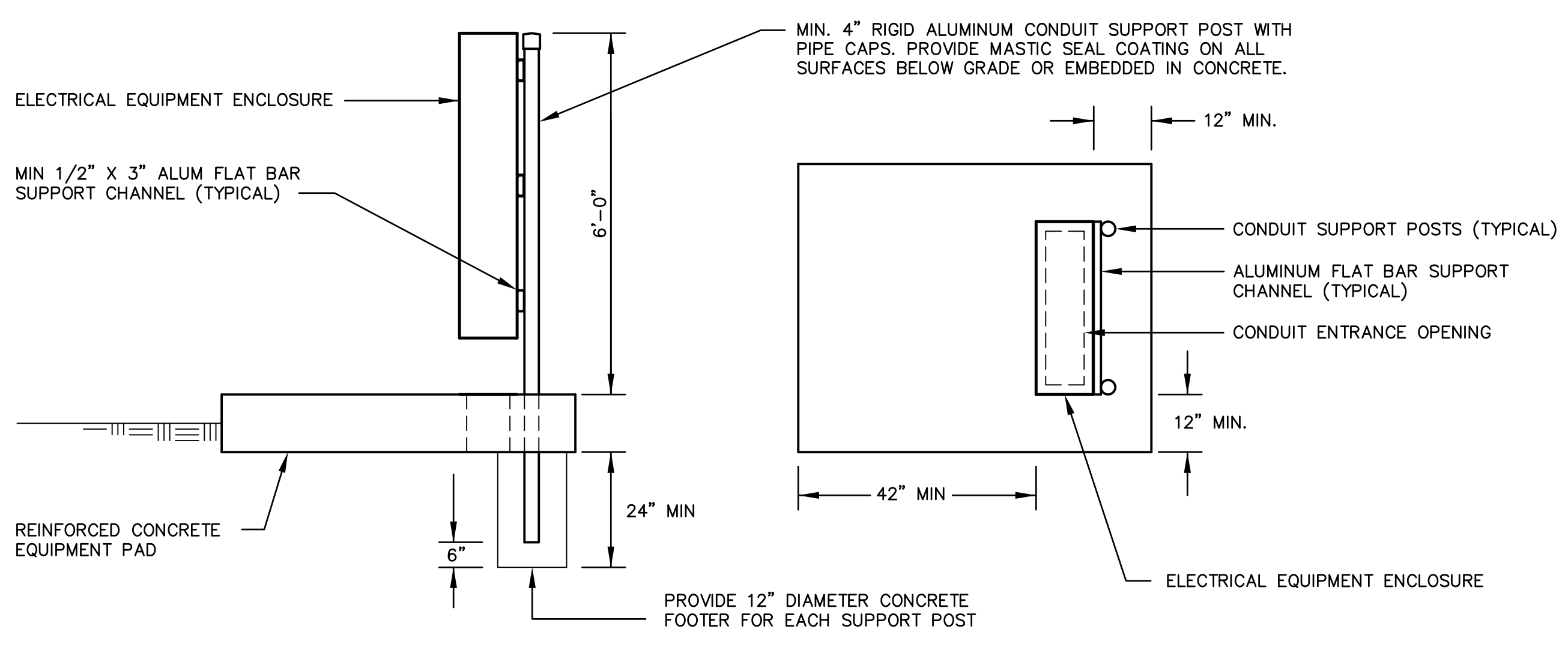


TYPICAL MOTOR CONNECTION
NOT TO SCALE



TYPICAL CONCRETE CURB WIREWAY DETAIL
NOT TO SCALE

- NOTES:
1. PROVIDE ALUMINUM CHECKERED PLATE COVER ON TOP OF THE OPEN AREAS OF THE CONCRETE CURB WIREWAY.



TYPICAL ELECTRICAL EQUIPMENT MOUNTING DETAIL
NOT TO SCALE

NO.	BY	DATE	SYMBOL	REVISIONS
6.				
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2.				
1.	MM	10/2022		ELECTRICAL CONTRACTOR BID PACKAGE

M
MOTT MACDONALD
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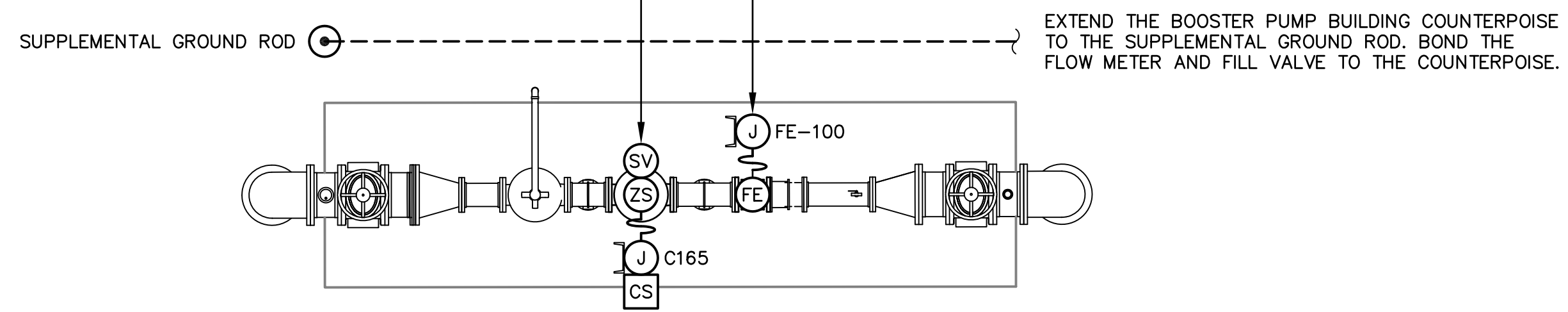
CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

ELECTRICAL DETAILS

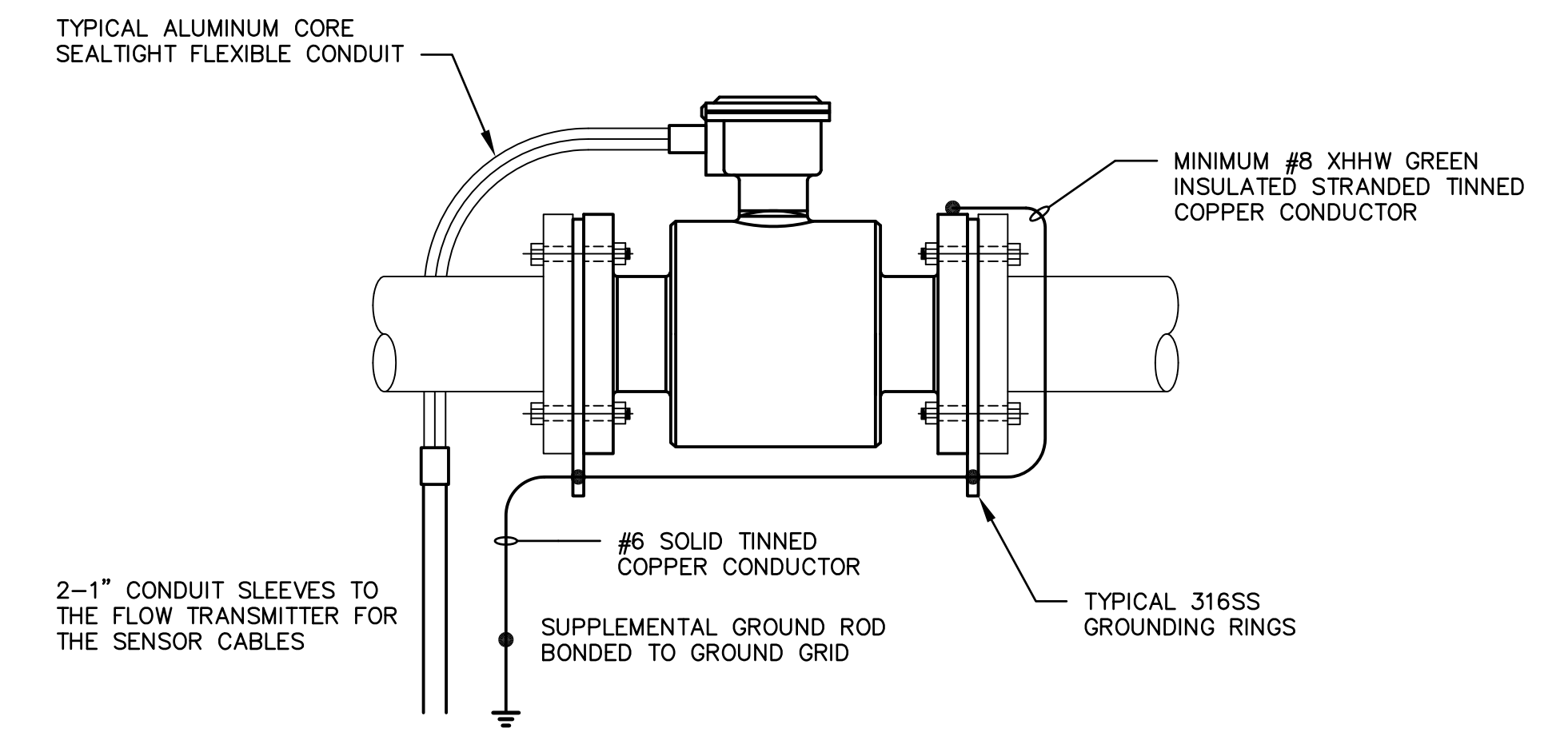
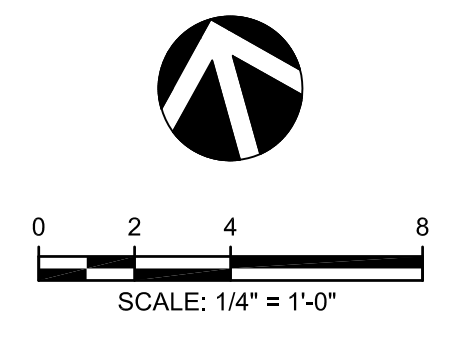
SHEET NO. 61
DWG NO. ED-2
ELECTRICAL BID PACKAGE

GST FILL VALVE PILOT CONTROL SOLENOID VALVE, CLOSED POSITION SWITCH, AND OPEN-CLOSE-AUTO CONTROL STATION. PROVIDE NEMA 4X ALUMINUM PULL BOX WITH SEALTIGHT CONNECTIONS TO THE FILL VALVE COMPONENTS.

GST FILL FLOW METER: PROVIDE NEMA 4X ALUMINUM PULL BOX WITH CARFLEX CONNECTIONS TO THE FLOW TUBE. PROVIDE 2-1" CONDUIT SLEEVES TO THE ICP/RTU PANEL FOR THE SENSOR CABLES.



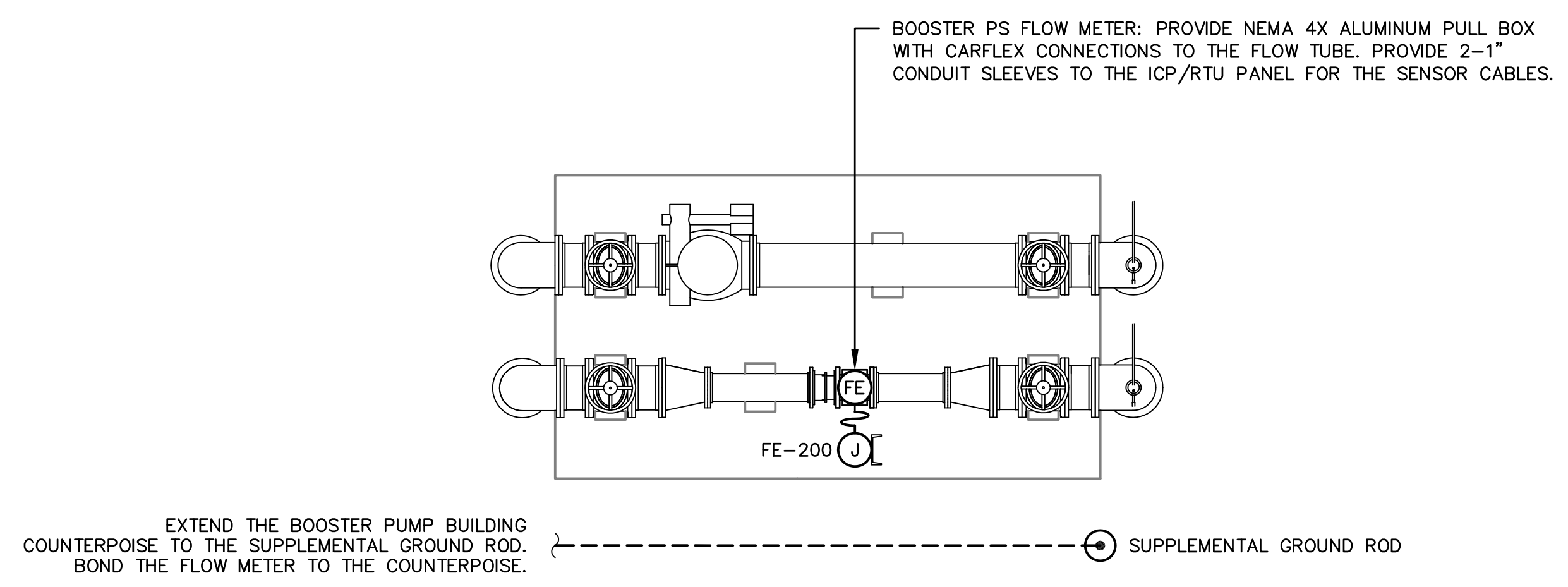
TANK FILL VALVE ASSEMBLY PAD DETAIL
1/4" = 1'-0"



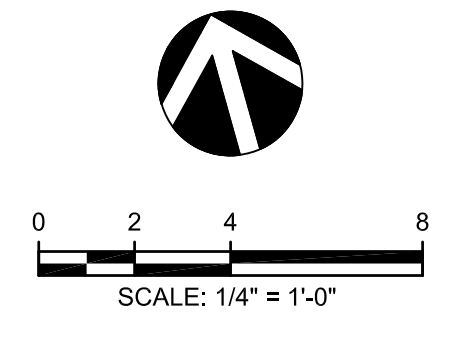
TYPICAL MAGNETIC FLOW METER DETAIL
NOT TO SCALE

NOTES:

1. FLOW TUBE SHALL HAVE A MINIMUM OF 5 STRAIGHT PIPE DIAMETERS UPSTREAM AND 2 STRAIGHT PIPE DIAMETERS DOWNSTREAM.
2. PROVIDE GROUNDING RINGS (BOTH SIDES).



EFFLUENT FLOW METER ASSEMBLY & BYPASS PAD DETAIL
1/4" = 1'-0"



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CR-208 GROUND STORAGE TANK
AND BOOSTER PUMP STATION

ELECTRICAL DETAILS

SHEET NO. 62
DWG NO. ED-3
ELECTRICAL BID PACKAGE