

INVITATION TO BID



CITY OF CALLAWAY S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION BID NO: CM2021-02

ADVERTISED: The Panama City News Herald, Monday, April 26, 2021

PREBID MEETING: 2:00 p.m., Thursday, May 6, 2021 (*Non-mandatory*)


BID DEADLINE: 2:00 p.m., Monday, May 17, 2021

BIDS/PROPOSALS ARE TO BE SUBMITTED TO:

CITY OF CALLAWAY
ATTN: JANICE L. PETERS, CITY CLERK
6601 EAST HWY. 22
CALLAWAY, FL 32404

BID OPENING: 2:15 p.m. Monday, May 17, 2021
Callaway Arts & Conference Center, 500 Callaway Park Way

ATTACHMENTS: Notice of Request for Bids/Proposals
General Instructions and Conditions
Special Instructions and Conditions
Minimum Technical Specifications
Sample Agreement
Bid Forms (**To be submitted with bid.**):
Bid/Certification Form
Conflict of Interest Form
Drug Free Workplace Certification
Public Entity Crimes Statement
Proprietary/Confidential Information Form
Certification Regarding Debarment
Trench Safety Compliance Form
Anti-Collusion Clause Form


Janice L. Peters, MMC, City Clerk

INSTRUCTIONS TO BIDDERS/PROPOSERS

Qualified firms are invited to submit a Bid/Proposal to the **CITY OF CALLAWAY** for the **S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION, BID NO: CM2021-02**, by replying to the enclosed specification. In order for the Bid/Proposal to be considered, complete all items in this specification.

All Bids/Proposals must include one **(1) unbound original** and **three (3) copies** and be addressed to:

CITY OF CALLAWAY
ATTN: CITY CLERK
6601 EAST HWY. 22
CALLAWAY, FL 32404

Proposals **must be received** at the address listed above no later than **2:00 p.m. on Monday, May 17, 2021**. Late Proposals will not be accepted, regardless of the reason.

Proposal envelopes must be **sealed and marked** with the Bid number, due date, and name of Proposer so as to identify the enclosed submittal. If more than one package is submitted, please mark "1 of 2", "2 of 2", etc.

INTERPRETATION OF SPECIFICATION

All questions pertaining to the terms and conditions of the scope of work of this Bid/Proposal must be submitted **in writing** via email or fax to the City Clerk as shown below:

Janice L. Peters, MMC, City Clerk
City of Callaway
6601 East Hwy. 22
Callaway, FL 32404
jlpeters@cityofcallaway.com

No oral interpretations will be made to any firm as to the meaning of specifications or any other contract documents. **In accordance with Florida Statutes 287.057(23), "Respondents to this solicitation or persons acting on their behalf may not contact, between the release of the solicitation and the end of the 72-hour period following the agency posting the notice of intended award, excluding Saturdays, Sundays, and state holidays, any employee or officer of the executive or legislative branch concerning any aspect of this solicitation, except in writing to the procurement officer or as provided in the solicitation documents. Violation of this provision may be grounds for rejecting a response."** Questions must be submitted as referenced above.

All questions must be received at least five (5) calendar days prior to the scheduled opening of Bids/Proposals. Any interpretation of the Bid/Proposal terms, conditions, and/or specification, if made, will be only by Addendum issued by the City Clerk. A copy of such Addendum will be posted to the City's website at www.cityofcallaway.com and mailed to each proposer that received a copy of the advertisement of the Request for Bids/Proposals. **IT IS THE RESPONSIBILITY OF THE BIDDER/PROPOSER TO CHECK THE CITY'S WEBSITE FOR ANY ADDENDUMS PRIOR TO SUBMITTING A BID/PROPOSAL.** No verbal instructions or interpretations of drawings and specifications will be made other than indicated above.

The City reserves the right to reject any or all proposals, to waive informalities in the Bids/Proposals and to re-advertise for Bids/Proposals. The City also reserves the right to separately accept or reject any item or items of a Bid/Proposal and to award and/or negotiate a contract in the best interest of the City.

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CITY OF CALLAWAY SPECIAL INSTRUCTIONS AND CONDITIONS

CITY OF CALLAWAY S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION BID NO: CM2021-02

* **Note:** The **GENERAL INSTRUCTIONS AND CONDITIONS** (attached hereto) apply, except as set forth below, for this Bid.

A. Description: () See Attached (X) As Follows

This project consist of constructing a new Lift Station, sewer rehabilitation, and a force main modification via horizontal directional drill (HDD) and open cut.

Bids will be received for a single prime Contract. Bids shall be on a lump sum and unit price basis, with additive alternate bid items as indicated in the Bid Form.

All questions shall be directed to Janice Peters, City Clerk at (850) 215-6694. Plans and specifications must be obtained from the City Clerk, 6601 East Highway 22, Callaway, FL 32404. Costs for plans and specifications on CD will be \$50.00 per set and is non-refundable. Checks should be made payable to Baskerville-Donovan, Inc.

All bidders shall be certified in the following major classes of work:

The person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid or a contract to provide any goods or services to a public entity, may not submit a bid on a contract on a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for Category Two for a period of 36 months from the date of being placed on the convicted vendor list.

Bidders must comply with federal requirements to check debarment and suspension status of contractors, subcontractors and vendors per 2 Code of Federal Regulations (CFR) 200, Appendix II (H) and 31 CFR Part 19.

B. Specifications: (X) See Attached () As follows:

See attached Minimum Technical Specifications

C. Contract/Agreement Required: () None (X) As follows: See enclosed Sample Contract

D. Items to be submitted with Bid: () None (X) As follows:

- One (1) unbound original with three (3) copies of the bid submittal,
- List of three (3) references for similar type work with contact information,
- List of Subcontractors, if applicable,
- Bid/Certification Form(s) with signature page(s),
- State of Florida License Copy
- Public Entity Crimes Statement
- Drug Free Workplace Certification
- Proprietary/Confidential Information Form
- Anti-Collusion Clause Form
- Sales Tax Exemption Purchasing Agreement

E. PRE-BID MEETING

2:00 p.m., THURSDAY, MAY 6, 2021, (Non-Mandatory)
City of Callaway ARTS & CONFERENCE CENTER - 500 CALLAWAY PARK WAY.

F. Deadline and place for submission of Bids:

2:00 p.m., MONDAY, MAY 17, 2021 (BID DEADLINE)
City Hall
6601 East Hwy. 22
Callaway, FL 32404

G. Time and place for OPENING of Bids:

2:15 p.m., MONDAY, MAY 17, 2021,
City of Callaway ARTS & CONFERENCE CENTER - 500 CALLAWAY PARK WAY.

H. Insurance Requirements: () None (X) As follows:

	<u>Minimum Coverage</u>
<u>Property Damage:</u>	\$ 500,000
<u>General Liability:</u>	\$ 1,000,000/2,000,000
<u>Automobile Liability:</u>	\$ 1,000,000/2,000,000
<u>Workers' Compensation:</u>	\$ Statutory Limit*

Note: Insurance Certificate must be provided by Successful Bidder upon execution of Agreement. City is to be listed on the bidder's/proposer's Certificate of Insurance as additionally insured and certificate holder in order for the City to be notified if the insurance is canceled or modified.

I. Bond Requirements: () None (X) As follows:

	<u>Amount of Bond</u>
Bid Bond	\$ ___ or <u>5</u> % of Bid
Performance Bond	\$ ___ or <u>100</u> % of Bid
Payment Bond	\$ ___ or <u>100</u> % of Bid
Construction Bond	\$ ___ or <u>N/A</u> % of Bid
Other: _____	\$ ___ or <u>N/A</u> % of Bid

Note: Bonds must be submitted on the issuing bonding company's forms.

J. Number of Copies of Bid Forms with original signature(s) Required:

One (1) unbound original, with notarized Signatures, plus three (3) copies

NOTICE: Proposals may be rejected if all documents are not complete and executed, and the numbers of copies specified/requested of each are not submitted with the proposal.

GENERAL INSTRUCTIONS AND CONDITIONS

(1) NOTICE TO BIDDERS/PROPOSERS

The following general instructions and conditions apply to all Requests for Bids/Proposals unless modified by the provisions set forth in the “**Special Instructions and Conditions**” attached hereto. If there is a conflict between the “Special Instructions and Conditions” and these “General Instructions and Conditions,” the provisions in the Special Instructions and Conditions will apply. **Note: the General Instructions and Conditions and the Special Instructions and Conditions are periodically revised; potential Bidders/Proposers should read both carefully prior to submitting a Bid/Proposal. The attached Special Instructions and Conditions apply only to this Bid/Proposal.**

(2) SUBMITTAL OF BIDS/PROPOSALS

Qualified businesses or individuals requesting consideration must submit a complete Bid/Proposal with any/all attachments in a sealed package clearly marked with the **name and number of the Bid/Proposal**, to the attention of the City Clerk, prior to closing time at the address shown in the **Special Instructions and Conditions** attached hereto. If not so marked as to this wording, sealed and/or received by the closing time, the Bid/Proposal will not be accepted. Bid/Proposal packages, additional information regarding this Bid/Proposal, or the bidding procedures may be obtained by contacting the City Clerk, 6601 East Hwy. 22, Callaway, FL 32404, (850) 215-6694.

It shall be the sole responsibility of the Bidders/Proposers to have their Bid/Proposal delivered on or before the closing time and date stated in the **Special Instructions and Conditions**. Any Bids/Proposals received after the stated time and/or due to delays caused by mail or courier delivery, or any other reason, shall not be opened or otherwise considered, and will be returned at the bidder's/proposer's expense.

Bids/Proposals shall be opened and publicly announced at the City Clerk's Office, City Hall, 6601 East Hwy. 22, Callaway, Florida, after closing of Bids/Proposals, unless otherwise specified in the Special Instructions and Conditions.

(3) SPECIFICATIONS AND REQUIREMENTS

The detailed specifications and additional requirements relating to this Bid/Proposal are set forth in the Special Instructions and Conditions attached hereto.

SILENCE OF SPECIFICATIONS: The apparent silence of any specification as to any details or any omission of a detailed description concerning any point shall be regarded as meaning that only the best construction practices are to prevail and that only new materials of first quality and correct type, size and design are to be used. All workmanship is to be first quality. All interpretations of specifications shall be made accordingly by the City.

(4) BID/PROPOSAL FORM

Bidders/Proposers shall complete, sign and furnish the “Bid Certification Form”, together with the forms, specifications and materials required in the “Special Instructions and Conditions” or any exhibits attached hereto. This will include a properly executed Drug-Free Workplace Certification, and a Sworn Statement on Public Entity Crimes Form, pursuant to Section 287.133(3)(a), Florida Statutes. The minimum number of complete Bid/Proposal packages to be submitted is set forth in the Special Instructions and Conditions.

If the "Special Instructions and Conditions" include a "Scope of Work" provision, and/or provide for a supplemental and or implementing agreement, the City reserves the right to modify the "Scope of Services." Further, the terms and conditions of any such agreement shall be modified prior to execution by the City, if such modifications are determined to be in the best interest of the City.

Bids/Proposals may be considered non-responsive, at the sole option of the City, and may be rejected if they include omissions, alterations of form, additions not called for, conditions or limitations, unauthorized alternate Bids/Proposals, submission of less than the number of bid packages requested, or other irregularities of any kind.

Unless otherwise stated, the price(s) set forth in the Bid/Proposal include(s) all costs and expenses for labor, equipment, materials, commissions, transportation charges and expenses, handling material inspection, and patent fees and royalties, together with any and all other costs and expenses for providing the service, equipment, materials or performing and completing the work as shown according to the plans and specifications herein.

If quotations are requested for the various items of work, they are intended to establish a total price for providing the materials, equipment, services, or completing the work in its entirety. If the Bidder/Proposer determines that the cost for any item of work has not been established by the Proposal Form, the cost for that work is to be included in other applicable Bid/Proposal item(s), so that the Bid/Proposal reflects the total price for completing that work in its entirety.

In the event of a discrepancy between a unit bid price and an extension, the unit bid price will govern. Written prices shall govern over figures.

(5) CLARIFICATION AND ADDENDA

Each Bidder/Proposer shall examine all Bid/Proposal documents and shall judge all matters relating to the adequacy and accuracy of such documents. Any inquiries, suggestions or requests concerning the interpretation, clarification or additional information pertaining to this Invitation to Bid/Request for Bid/Proposal will be accepted by the City Clerk up to and including five (5) working days prior to the closing date and time stated herein. The issuance of a written addendum signed by the City Clerk is the only official method whereby interpretation, clarification or additional information can be given. The City shall not be responsible for oral interpretations given by any City employee, representative or others. If any addenda are issued, the City will attempt to notify all known prospective Bidders/Proposers. However, it shall be the responsibility of each Bidder/Proposer, prior to submitting a Bid/Proposal, to contact the City Clerk's Office to determine if addenda were issued, and to make such addenda a part of the Bid/Proposal. If an addendum has been issued, and was not incorporated in the Bid/Proposal documents submitted by Bidder/Proposer, the Bid/Proposal may not be accepted or considered by the City.

(6) MANUFACTURER'S NAMES AND APPROVED EQUIVALENTS

Unless otherwise specifically stated in the Special Instructions and Conditions, any manufacturer's names, trade names, brand names, catalog numbers, or similar information listed in a specification, are for the purpose of information and illustration, and are not intended to restrict the submission of alternates meeting minimum specifications. The Bidder/Proposer may offer the same or any alternate for which the Bidder/Proposer is an authorized representative, which meets or exceeds the specifications for any item. If a manufacturer's name or model is included in the specification, and a Bid/Proposal is based on alternate products or services which Bidder/Proposer maintains is equivalent and meets or exceeds specifications, Bidder/Proposer is to indicate on the Bid/Proposal Form the manufacturer's name and related information of the alternate; including any

deviation from the specifications. Unless expressly noted on the Bid/Proposal that an alternate is being proposed, and the specification includes a specific manufacturer's model or brand, the Bid/Proposal will be considered as a quotation for the item(s) stated in the specifications.

(7) INFORMATION AND DESCRIPTIVE LITERATURE

Bidders/Proposers must furnish all information requested in the Bid/Proposal packet including but not limited to any sketches, plans, designs, specification, and descriptive literature regarding the product(s)/service(s) being offered. Bids/Proposals which do not comply with these requirements are subject to rejection. Reference to submission of documentation or materials with a previous Bid/Proposal will not satisfy this provision.

(8) BONDS/INSURANCE

If the Bid/Proposal is accepted by the City, it will become a binding contract on both parties. If a bond or cashiers/certified check is required as a bond, it shall be submitted with the Bid/Proposal. If the undersigned shall fail to deliver or perform, or if applicable, execute a contract if provided for herein, then the City may, at its option, determine that the undersigned has abandoned the award/contract, and thereupon such acceptance of the Bid/Proposal and/or award shall be null and void, and any cashiers/certified check or bond accompanying this Bid/Proposal shall be forfeited to and become the property of the City. The full amount of said check, or if a bond, the full amount of such bond, shall be paid to the City as partial liquidated damages; otherwise, any bond or cashiers/certified check accompanying this Bid/Proposal shall be returned to the undersigned within 30 calendar days from the date of award, or if provisions for a Notice to Proceed are included, from the date of the Notice to Proceed.

If a bid or proposal bond is required, the bonds of unsuccessful Bidders/Proposers will be returned within 30 calendar days of the Bid/Proposal due date, except as set forth below.

If a proposal is subject to the Competitive Negotiations Act, the bonds will be returned within 60 days of the proposal due date, except for the bond of the 3 highest ranked proposers. Within 30 days of execution of a contract, bonds from the remaining unsuccessful proposers will be returned.

Bid bond, if required, will be returned within 30 calendar days of delivery/acceptance of the item(s) bid or service(s) provided, unless a standard payment and performance bond is required. When a standard Payment and Performance Bond is required, the bid bond of the successful Bidder/Proposer will be returned within 30 calendar days from the date of the Notice to Proceed.

In the event a bid is awarded, a proposal is accepted, and/or a contract is executed, and the Bidder/Proposer chooses not to proceed, or fails to perform for any reason, the bond will be forfeited and retained by the City as partial liquidated damages. Future Bids/Proposals will not be accepted for consideration from the Bidder/Proposer for five (5) years, or such shorter period as the City Commission may determine.

In the event an award/selection is not made within 90 days after the Bid/Proposal due date and the City does not return all bonds, upon 30 business days written request, a bidders/proposer may withdraw their bid or proposal from consideration, and obtain a refund of the Bid/Proposal bond.

All Awards will be subject to presentation of any required performance bond or certificate of insurance prior to any purchase authorizations, agreements, contract documents, or delivery. The Bidder/Proposer shall maintain any performance bonds or insurance coverage set forth in the Special Instructions and Conditions, at its own expense. If insurance is required, the City is to be listed on the bidder/proposer's Certificate of Insurance as an additional insured and certificate holder in order that the City will be notified if the insurance is canceled or

modified. The certificate shall also list the name of the project/service/equipment purchased, and the expiration date of the policy. At the City's option, an award may be canceled and any bid bond forfeited if any required performance bond or insurance certificate is not delivered within 21 calendar days of the date of award.

***Note:** The provisions of this section are in addition to and not a replacement for, any Bid/Proposal and/or performance bond required in the Special Instructions and Conditions. The foregoing provisions are intended to be in addition to any other legal remedy available to the City for non-performance by a Bidder/Proposer subsequent to the acceptance and/or award of a bid or proposal.*

(9) SERVICE AND WARRANTY

If any warranty repair or replacement service is requested in the Special Instructions and Conditions, any deviation or limitation from the requirements is to be expressly stated on the Bid Request for Proposal Certification Form.

If the service or product provided to the City pursuant to the bid consists of computer hardware, software or firmware, the Bidder/Proposer warrants that said product will accurately process/or reflect data from, into and between the twentieth and twenty-first centuries, including leap-year calculations.

(10) CONTRACT FORMS

Any agreement or contract resulting from the acceptance of a Bid/Proposal shall be on forms either supplied by or approved by the City, and shall contain, as a minimum, applicable provisions of the Invitation to Bid/Request for Proposal, and the Bid/Proposal documents to be submitted by Bidder/Proposer, including the Special Instructions and Conditions, General Instructions and Conditions, and all attachments therewith. The City reserves the right to reject any Bid/Proposal or resulting agreement which does not conform to the Invitation to Bid/Proposal and, if applicable, any City requirement relating to such an Agreement.

The City reserves the right to extend any contract or agreement for an additional period of not more than ninety (90) days beyond the original expiration date. Prices in effect on the last day of the contract shall remain in effect for the contract extension period. Additional extensions shall be subject to agreement of both parties.

The successful Bidder/Proposer will be required to execute any resulting agreement and provide any bonds or insurance certificates required within 10 days of contract execution. Failure to timely execute the necessary bond or insurance certificate will result in cancellation of an award, with no further obligation by the City.

This Bid/Proposal is subject to the appropriation of funds in an amount sufficient to allow continuation of the City's performance in accordance with the terms and conditions of this Bid/Proposal for each and every fiscal year in which this Bid/Proposal is executed and entered into. If funds are not appropriated/available, the City shall provide prompt written notice to the selected Bidder/Proposer that effective thirty (30) days after giving such notice, or upon the expiration of the time for which funds were appropriated, whichever occurs first, the City will thereafter be released of all further obligations related to the Bid/Proposal and/or award.

(11) BID/PROPOSAL EXPENSES

All expenses for preparing and submitting Bids/Proposals to the City are to be borne by the Bidder/Proposer.

(12) VARIANCES

Any variance whatsoever from the Bid/Proposal Specifications are to be clearly identified on the Bid/Proposal form. Acceptance of any proposed variations will be at the sole discretion of the City.

(13) CONFLICT OF INTEREST

The award of a bid or acceptance of proposal is subject to Chapter 112, Florida Statutes. All Bidders/Proposers must disclose with their Bid/Proposal the name of any officer, director, or agent who is a city official or employee, or a member of an official's or employee's immediate family. Further, Bidders/Proposers must disclose the name of any city official or employee, or a member of an official's or employee's immediate family, who owns directly or indirectly an interest of ten percent (10%) or more in the bidder's/proposer's firm or related business.

(14) DELIVERY

All items provided pursuant to an award are to be delivered prepaid to the City Clerk's Office, 6601 East Hwy. 22, Callaway, Florida 32404-2041, unless a different location is specified in the Special Instructions and Conditions. All delivery charges are to be included in the Bid/Proposal price. No Collect on Delivery (C.O.D.) will be accepted. Title and risk of loss or damage to all items shall be the responsibility of the Bidder/Proposer until delivered to the City.

(15) INSPECTION, ACCEPTANCE AND TITLE

All items delivered pursuant to an award are subject to inspection and review prior to acceptance by the City. Acceptance, evidenced by separately written Notice of Acceptance or full payment, will be made only after verification of compliance with all specifications. Acknowledgment of delivery and/or partial payment does not constitute acceptance.

(16) OWNERSHIP RIGHTS AND PUBLIC RECORDS LAW

Public Records Law. Bidder/Proposer acknowledges that they are familiar with the provisions of the Public Records Law of the State of Florida.

Bidder/Proposer agrees to comply with Chapter 119, Florida Statutes, and specifically per Florida Statute 119.0701, Bidder/Proposer agrees to keep and maintain public records that would be required by the City of Callaway in order to perform the services provided for in this agreement; Bidder/Proposer agrees to provide public access to any required public records in the same manner as a public agency; Bidder/Proposer agrees to protect exempt or confidential records from disclosure; Bidder/Proposer agrees to meet public records retention requirement; and Bidder/Proposer agrees that at the end of the term of this agreement, to transfer all public records to the City of Callaway and destroy any duplicate, exempt or confidential public records.

All products generated by the Bidder/Proposer for the City become the property of the City. The City may require submission of any electronic file version of reports, data, maps, or other submission of documentation produced for or as a result of this Bid/Proposal in addition to paper documents.

Further, in accordance with the Public Records Laws of the State of Florida, Section 119.0701, (2013), Contractor must:

- A. Keep and maintain public records that ordinarily and necessarily would be required by the public agency in order to perform the service.
- B. Provide the public with access to public records on the same terms and conditions that the public agency would provide the records and at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law.
- C. Ensure that public records that are exempt or confidential and exempt from public records are not disclosed except as authorized by law.
- D. Meet all requirements for retaining public records and transfer, at no cost, to the public agency all public records in possession of the contractor upon termination of the contract and destroy any duplicate public records that are exempt or confidential and exempt from public record disclosure requirements. All records stored electronically must be provided to the public agency in a format that is compatible with the information technology systems of the public agency.
- E. If a contractor does not comply with a public records request, the public agency shall enforce the contract provision in accordance with the contract.

(17) RESERVED RIGHTS

The City reserves the right to reject any and all Bids/Proposals, with or without statement of cause, request resubmissions, or to waive any irregularities or technicality or negotiate modifications to any Bid/Proposal which may be in the best interest of the City.

Bidders/Proposers which do not normally engage in providing the types of commodities/services specified herein may be required to demonstrate they have sufficient financial support, equipment, and organization to ensure they can satisfactorily perform if awarded a bid/contract under the terms and conditions herein stated.

The City reserves the right to make such investigations as it deems necessary to determine the ability of any Bidder/Proposer to perform the work or service requested. Any information the City deems necessary to make such determinations shall be provided by the Bidder/Proposer upon request as a condition of further consideration of the Bid/Proposal. The applicability of all information obtained and the City's decision shall be final. By submitting a bid or proposal, Bidder/Proposer authorizes such investigation.

If the contract awarded as a result of this bid is terminated prior to the end of the term, the City reserves the right to award the balance of the contract to the next lowest responsive and responsible bidder.

(18) ADVERTISING

In submitting a Bid/Proposal, Bidder/Proposer agrees not to use the results therefrom as a part of any commercial advertising or marketing purposes without written approval of the City Manager.

(19) GOVERNMENTAL RESTRICTIONS/REQUIREMENTS

In the event any governmental restrictions are imposed which would necessitate alteration of the material, quality, workmanship, or performance of the items offered in a Bid/Proposal, it shall be the responsibility of the successful Bidder/Proposer to immediately notify the City of the specific regulation which required an

alteration, and the specific alterations that will be made to the item(s) bid/proposed. The City reserves the right to accept any such alteration/substitution, including any price adjustments resulting therefrom, or to cancel the award at no expense to the City.

(20) NON-DISCRIMINATION

There shall be no discrimination as to race, sex, color, creed, handicap, or national origin in the selection, award, or operations conducted, or performance related to any bid or proposal.

(21) UNAUTHORIZED EMPLOYEES OR AGENTS

Employment of unauthorized aliens by Bidder/Proposer is considered a violation of Section 274A(e) of the Immigration and Nationality Act. If selected Bidder/Proposer knowingly employs unauthorized aliens, such action shall be cause for unilateral cancellation of this agreement and the City may recover damages from selected Bidder/Proposer resulting from such cancellation. The selected Bidder/Proposer shall be responsible for including this provision in any context with, and requiring compliance by any/all subcontracts performing for selected Bidder/Proposer relating to this agreement.

(22) OTHER GOVERNMENTAL ENTITIES - OPTIONAL APPLICATION

In the State of Florida, other Florida public entities may “piggy-back” on competitive Bid/Proposal awards under the same terms and conditions, if all parties are in agreement.

(23) LEGAL NAME

Bids/Proposals shall clearly indicate the legal name and organizational structure, business address, telephone number, and email address of the Bidder/Proposer. Bids/Proposals shall be signed above the typed or printed name and title of the individual submitting the Bid/Proposal. The signer shall warrant he/she has the authority to bind the Bidder/Proposer to the terms and conditions of the submitted Bid/Proposal.

(24) WAGES

State and Federal minimum wage and hour regulation (including the Davis-Bacon Act) apply to Bidder/Proposer and all subcontractors. If the contract price is in excess of \$100,000, provisions of the Contract Work Hours and Safety Standards Act of 29 CFR 5.5(b) apply.

(25) SELECTION

The City intends to award this bid to the lowest responsive and responsible bidder or bidders. However, the City reserves the right to reject any and all Bids/Proposals. The procedures for the selection/award of Bids/Proposals are provided for by Florida Statutes and the City’s Charter, Code of Ordinances, and Administrative Policies. Generally, all Bids/Proposals are reviewed by City staff and evaluated by the City Manager, and if required by law, by a Selection Advisory Committee appointed by the City Manager. The type and price of the product(s) or service(s) being acquired determines if an award or selection may be made by the City Manager or requires City Commission approval. For information on which procedure applies to a particular Bid/Proposal contact the City Clerk.

Bids/Proposals will be evaluated based on, but not limited to, one or more of the following criteria as appropriate:

- compliance with specifications,
- price (if applicable),
- capability/adequacy of Bidder/Proposer,
- past and current projects, services or equipment provided to the City,
- delivery schedule,
- prior government projects, services or equipment provided to other jurisdictions, and
- general reputation, location and references.

Separate procedures and requirements relating to Requests for Bids/Proposals/Qualifications apply for certain grant programs and for professional services, for example the Consultants' Competitive Negotiation Act (Florida Statute 287.055), and by the City's Code. When the City initiates such a Request for Proposals/Qualifications, the selection process and related procedures are included in the Special Instructions and Conditions.

Pursuant to Chapter 287.087 Florida Statutes, in the event two (2) or more bids are equal with respect to price, quantity, and services, preference will be given to Bidders/Proposers which have implemented Drug-Free Workplace Programs.

Further, per 287.087(11) "If two equal responses to a solicitation or a request for quote are received and one response is from a certified minority business enterprise, the agency shall enter into a contract with the certified minority business enterprise." In addition, at the sole discretion of the City, payment terms, conditions, and other consequential information may be utilized in resolving apparent tie Bids/Proposals.

NOTE: For consideration, Bidder/Proposer must return the Bid Certification Form included in the Bid/Proposal package.

(26) INDEMNIFY

After notification of award, the successful Bidder/Proposer agrees to defend, indemnify and hold harmless the City and its officials, officers, employees, agents, and invites, from and against all claims, suits, sections, damages, or causes of action arising from any personal injury, loss of life or damage to property, sustained by reason of, or as a result of constructing, manufacturing, processing, delivery, or performance of the services or work for which the Bid/Proposal was awarded or any resulting agreement executed, and from and against any orders, judgments, or decrees which may be entered thereto, and from and against all costs, attorney's fees, expenses, and liabilities incurred in or by reason of the defense of any such claim, suit or action, and the investigation thereof. Nothing in any resulting agreement shall be deemed to affect the rights, privileges and immunities of the City of Callaway.

The selected Bidder/Proposer, without exception, shall also indemnify and hold harmless the City and its officials, employees, agents, and invites from liability of any nature or kind, including cost and expenses for or on account of any copyrighted, patented or unpatented invention, process or article manufactured or used in the performance of the contract, including its use by the City. If the selected Bidder/Proposer uses any design, device or materials covered by patent or copyright, it is mutually agreed and understood that the Bid/Proposal prices include all royalties or costs arising from the use in any way of such design, device or materials involved in the product and/or services provided to the City.

(27) MODIFICATION - AFTER AWARD

Any changes proposed by a Bidder/Proposer after an award in (a) materials used, (b) manufacturing process, (c) construction or (d) specifications, are to be submitted in writing to the City Manager prior to delivery. No

changes shall be approved and binding upon the City unless evidenced by a Change Order issued and signed by the City Manager.

(28) ASSIGNMENT

Any purchase order issued pursuant to this bid invitation/request for proposal and the funds which may become due hereunder, are not assignable, except with the prior written approval of the City Manager.

(29) DISCLOSURE

Bidder/Proposer acknowledges by submitting a Bid/Proposal that all information provided to the City is part of the public domain as defined by Florida Statutes and is considered a public record. Information should not be labeled “confidential,” unless specifically exempted under said Statutes, and exempts the City from any liability for releasing all information to the public, including inadvertently releasing information deemed confidential by the Bidder/Proposer.

(30) TAXES

The City is a tax-exempt Florida municipality, Federal Employment Identification Number 59-6000-284, Florida State Tax Number 37-02-008131-54C. Copies of Exemption Certificate and related information may be obtained by contacting the City Clerk, City of Callaway, 6601 East Hwy. 22, Callaway, Florida 32404-2041 or (850) 215-6694.

(31) APPLICABLE LAWS/LEGAL VENUE

All applicable laws, regulations and ordinances of the State of Florida, Bay County and the City of Callaway will apply to consideration and award of any Bid/Proposal and the performance of the Bidder/Proposer pursuant thereto, and shall be governed by the laws of the State of Florida both as to intention and performance. The venue for any action arising from the award or subsequent performance shall lie exclusively in the Circuit Court of Bay County, Florida, or the United States District Court for the Northern District of Florida, as applicable.

NOTE: ANY AND ALL PROVISIONS SET FORTH IN THE SPECIAL INSTRUCTIONS AND CONDITIONS ATTACHED HERETO, WHICH VARY FROM THESE GENERAL INSTRUCTIONS AND CONDITIONS, SHALL HAVE PRECEDENCE.

**CITY OF CALLAWAY
S. BERTHE AVENUE LIFT STATION & SEWER
REHABILITATION
BID NO: CM2021-02**

**MINIMUM TECHNICAL
SPECIFICATIONS**

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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Owner-Purchased Material
4. Access to site.
5. Work restrictions.
6. Specification and drawing conventions.

- B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: S. Berthe Avenue Lift Station & Sewer Rehabilitation, project number 27656.01.

1. Project Location: S. Berthe Avenue, Callaway, FL

- B. Owner: City of Callaway
6601 East Highway 22
Callaway, Florida 32404

1. Owner's Representative: Mr. Eddie Cook, Callaway City Manager

- C. Engineer: Jeffrey Petermann P.E., Regional Manager, 850-438-9661,
jpetermann@baskervilledonovan.com.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 1. This project consist of constructing a new Lift Station, sewer rehabilitation, and a force main modification via horizontal directional drill (HDD) and open cut.

B. Type of Contract:

1. Project will be constructed under a single prime contract.
 - a. S. Berthe Avenue Lift Station & Sewer Rehabilitation Project.

1.5 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.6 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of Project site to the right-of-ways of City, County and State roadways as indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 6:00 p.m. local time, Monday through Friday, unless otherwise indicated.
1. Weekend Hours: Two weeks advance written notice by Owner, times limited to regular weekday work hours unless approved otherwise
 2. Hours for Utility Shutdowns: Arrange two weeks in advance with Owner, time specified by Owner with no additional costs to the Owner. Contractor responsible for notify residents that shall be impacted by shutdown.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to area residents with Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
- D. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- E. Employee Identification: Provide identification Employee Roster Badges for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

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SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Owner's Change Order, Owner's Work Change Directive, or Engineer's Field Order for minor changes in the Work.
 - b. Use product specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Engineer will consider requests for substitution if received within 60 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Engineer.
1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.

J. Petermann, P.E.
BDI/PCY

- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with line items in the bid form, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - 2. Submit the schedule of values to Engineer at earliest possible date, but no later than ten days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual Bid Proposal form as a guide to establish line items for the schedule of values.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Engineer.
 - c. Engineer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.

2. Arrange schedule of values consistent with format of EJCDC Document C-620.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Engineer by the 25th day of the month. The period covered by each Application for Payment is one month, ending on the 20th day of the month.
 1. Submit draft copy of Application for Payment two days prior to due date for review by Engineer.
- D. Application for Payment Forms: Use EJCDC Document C-620 as form for Applications for Payment.

- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 48 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 3. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of values.
 - 3. Contractor's construction schedule (preliminary if not final).
 - 4. Submittal schedule (preliminary if not final).
 - 5. Copies of building permits.
 - 6. Initial progress report.
 - 7. Certificates of insurance and insurance policies.

- J. Application for Payment at Substantial Completion: After Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Evidence of completion of Project closeout requirements.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request to Engineer from Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A r approved equivalent. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Key Personnel Names: Contractor shall have employees complete City of Callaway ID Badge process before starting construction operations. Submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows (where applicable):
 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.

4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Engineer determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Engineer will so inform Contractor, who shall make changes as directed and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 2. File Preparation Format: DWG Autocad, operating in Microsoft Windows operating system.
 3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
 4. Engineer will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in Autocad.

- c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Engineer.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Engineer.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's narrative statement of requested information of problem statement.
 12. Contractor's suggested resolution for problem statements. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 13. Contractor's signature.
 14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Engineer.
 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.
 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.

- b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Engineer's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
 3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
 - b. Engineer's RFI response shall not be construed as authorization of actions requiring a contract cost or time change. Such Authorization is reserved to the Owner.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Engineer.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Engineer's response was received.
- F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.
1. Identification of the need for a related Engineer's Field Order, Owner's Work Change Directive, or a Proposal Request, as appropriate.
- 1.8 PROJECT MEETINGS
- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within seven days of the meeting.
- B. Preconstruction Conference: Engineer will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Contractor, but no later than 15 days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Contractor, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Sustainable design requirements.
 - m. Preparation of record documents.
 - n. Use of the premises and existing building.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
 4. Minutes: Engineer will record and distribute meeting minutes.
- C. Preinstallation Conferences: Contractor shall conduct any required preinstallation conferences at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and

- installations that have preceded or will follow, shall attend the meeting. Advise Engineer of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.
 - k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Engineer shall schedule and conduct a project closeout conference, at a time convenient to Owner and Contractor, but no later than 30 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Contractor, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for completing sustainable design documentation.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Coordination of separate contracts.
 - l. Owner's partial occupancy requirements.
 - m. Installation of Owner's furniture, fixtures, and equipment.
 - n. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Contractor shall conduct progress meetings at monthly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Identify whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule Identify how construction behind schedule will be expedited and if commitments from parties involved to do so have been secure. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Status of sustainable design documentation.
 - 6) Deliveries.

- 7) Off-site fabrication.
 - 8) Access.
 - 9) Site utilization.
 - 10) Temporary facilities and controls.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Status of RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
 - 21) Record Drawings
4. Minutes: Contractor is responsible for conducting the meeting, recording and distributing the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Contractor's Coordination Meetings: Conduct Project coordination meetings at regular intervals in advance of and in preparation for the Project Progress Meetings. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: Include each contractor, subcontractor, supplier, and other entity concerned with current progress exclusive of the Owner and Engineer's representatives. Also those involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.

- 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting exclusive of the Owner and Engineer's representatives. Include in the Progress Meetings the reporting of relevant components of the Coordination Meetings to the Owner and Engineer's representatives.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

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SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's construction schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Special reports.
- B. Related Requirements:
 - 1. Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
 - 2. Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Engineer.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF electronic file.
 - 3. Three paper copies.
- B. Startup construction schedule.
 - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.

3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at monthly intervals.
- H. Material Location Reports: Submit at monthly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Special Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Engineer's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss constraints, including phasing work stages area separations interim milestones and partial Owner occupancy.
 4. Review delivery dates for Owner-furnished products.
 5. Review schedule for work of Owner's separate contracts.
 6. Review submittal requirements and procedures.
 7. Review time required for review of submittals and resubmittals.
 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 10. Review and finalize list of construction activities to be included in schedule.
 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Engineer.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. Major pieces of equipment.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 60 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Section 01 29 00 "Payment Procedures" for cost reporting and payment procedures.

- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and Contract Time.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within 14 days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Accidents.
 - 8. Meetings and significant decisions.
 - 9. Unusual events (see special reports).
 - 10. Stoppages, delays, shortages, and losses.
 - 11. Meter readings and similar recordings.
 - 12. Emergency procedures.
 - 13. Orders and requests of authorities having jurisdiction.
 - 14. Change Orders received and implemented.
 - 15. Work Change Directives received and implemented.

16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. **Material Location Reports:** At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. **Site Condition Reports:** Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- A. **General:** Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. **Reporting Unusual Events:** When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. **Contractor's Construction Schedule Updating:** At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.

- B. Distribution: Distribute copies of approved schedule to Engineer Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final completion construction photographs.
- B. Related Requirements:
 - 1. Section 01 33 00 "Submittal Procedures" for submitting photographic documentation.
 - 2. Section 01 77 00 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
 - 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
 - 3. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Engineer.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.

- C. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.
 - 1. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte prints on single-weight, commercial-grade photographic paper punched for standard three-ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Engineer.
 - d. Name of Contractor.
 - e. Date photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.

1.4 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.
- B. Digital Video Recordings: Provide high-resolution, digital video disc in format acceptable to Engineer.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in file name for each image.

2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Engineer.
- C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Engineer.
1. Take **20** photographs to show existing conditions adjacent to property before starting the Work.
 2. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take 5 photographs each day that construction is in progress with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Engineer-Directed Construction Photographs: From time to time, **Engineer** will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.
- F. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Engineer will inform photographer of desired vantage points.
1. Do not include date stamp.

END OF SECTION 01 32 33

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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making

corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Engineer's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Engineer and to Engineer's consultants, allow 15 days for review of each submittal. Submittal will be returned to Engineer before being returned to Contractor.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Indication of full or partial submittal.
 - n. Transmittal number, numbered consecutively.

- o. Submittal and transmittal distribution record.
 - p. Other necessary identification.
 - q. Remarks.
- E. Options: Identify options requiring selection by Engineer.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

- E. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."
- F. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."
- G. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

- A. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Engineer without action.

END OF SECTION 01 33 00

SECTION 01 35 13 - SPECIAL CONDITIONS

The following Special Conditions take precedence over Plans and Specifications:

1. The Engineer's review of Shop Drawings and Samples submitted by the Contractor in accordance with General Conditions Subsection 6.17 shall be reviewed without expense to the Contractor for the original submittal and first resubmittal, in response to the Engineer's review of the original submittal, only. However, beginning with the second resubmittal, and for each subsequent resubmittal thereafter, the Contractor shall pay the cost of the Engineer's review. Payment shall be made in the form of a check, made payable to the Engineer in the amount of \$500.00 and submitted with each required resubmittal. Second and subsequent resubmittals made without payment shall be returned to the Contractor without review and marked as incomplete.
2. Sufficient precautions shall be taken during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other polluting materials harmful to humans, fish, or other life, into the supplies and surface waters of the state. Control measures must be adequate to assure that turbidity in the receiving water will not be increased more than 10 nephelometric turbidity units (NTU), or as otherwise required by the state or other controlling body, in water used for public water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 NTU unless otherwise permitted. Special precautions shall be taken in the use of construction equipment to prevent operations which promote erosion.
3. Erosion evident within the limits of construction shall be the responsibility of the CONTRACTOR during the full term of the contract and for the full (1) year guarantee period. Areas subject to erosion during this time shall be fully restored to original or design conditions (as applicable) within 10 days of notice to the CONTRACTOR.
4. Within 20 days of the date of Notice to Proceed, the CONTRACTOR shall submit to the ENGINEER and OWNER a Hurricane Preparedness Plan. The plan should outline the necessary measures which the CONTRACTOR proposes to perform at no additional cost to the OWNER in case of a hurricane warning. Such measures shall be in accordance with local and state requirements

In the event of inclement weather, CONTRACTOR will, and will cause Subcontractors to protect carefully the Work and materials against damage or injury from the weather. If, in the opinion of ENGINEER, any portion of Work or materials shall have been damaged or injured by reason of failure on the part of the CONTRACTOR or Subcontractors to so protect the Work, such Work and materials shall be removed and replaced at the expense of CONTRACTOR

5. Any disturbance by the Contractor beyond the limits of construction shall be repaired to original condition or better at the Contractor's expense.
6. The Contractor shall maintain prominent and clear labeling of its company name and its local phone number at each project site. The Contractor and each of its major subcontractors shall provide two points of contact with 24-hour phone numbers to Owner prior to beginning construction.
7. **PROGRESS MEETINGS**
 - A. Contractor shall schedule progress meetings recognized as "Project Status Meetings" not more than 30 calendar days after the initial progress meeting and at least ONCE EACH MONTH thereafter. Owner, Engineer, Contractor, and any Subcontractor active on the site shall be represented at each meeting.

- B. Any single meeting may be cancelled with permission of the Owner and Engineer.
- C. At each meeting, agenda shall include
 - 1. Contractor's report of current status of all major work items, status of project schedule, and anticipated modifications.
 - 2. Contractor's outline of the schedule of needed inspections for the next two week period.
 - 3. Discussion of current status of all outstanding information requests, resolution status of known conflicts and any anticipated information requests.
 - 4. Engineer's status report of submitted shop drawings.
- D. Contractor shall keep minutes of the significant points of progress meetings and distribute to the Owner and Engineer within one week of each meeting for concurrence by Engineer and Owner.

8. ARCHEOLOGICAL FINDS

During any activities which involve excavation or ground disturbance, Contractor shall monitor all construction activities. In the event that fortuitous finds or unexpected discoveries, such as prehistoric or historic artifacts, including pottery or ceramics, stone tools or metal implements, or other physical remains that could be associated with North American cultures or early colonial or American settlement are encountered at any time within the project areas, the Contractor should cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. If the excavation process uncovers items, or evidence thereof, which might be of archaeological, historic, or architectural interest, Contractor shall to stop work immediately and take all reasonable measures to protect the items in a manner sufficient to avoid additional harm until the significance of the discovery can be determined. If items of significance are discovered, the Owner will contact the appropriate agencies for a determination of required actions. Project activities should not resume in the area without written authorization from the Owner.

In the event that any human remains are unearthed, all work shall stop immediately and the area shall be secured in accordance with local, state, and federal statutes.

9. The procedure below explains the City of Callaway's consideration of claims for a contract time extension due to abnormal weather. All days shall be considered as calendar days.
- A. Any time there is a documented rainfall of 0.1" or greater, this is counted as a rainfall day. The official measurement used is rainfall at the Northwest Florida Beaches International Airport. If another measurement location is desired, this must be proposed and accepted by the Owner at the beginning of the project.
 - B. Each month the number of rainfall days is determined by the Contractor and verified by the Engineer. This information shall be submitted with each pay application for the last full calendar month (e.g., the pay application is for the period November 22, 2019 through December 21, 2019, the rainfall data submitted would be the month of November 2019).
 - C. Upon reaching Substantial Completion for the project, all recorded rainfall days for each individual month of the project will be added together for a total number of rainfall days for the project.
 - D. This final rainfall day number can be used for Contract Time extensions, if necessary.
 - E. The time period for which rainfall days will be considered shall coincide with the dates for commencement of work and Substantial Completion, as defined in the Standard Form of Agreement of the Contract.

- F. If there is a significant, recorded, rainfall event in one, or more, consecutive day(s), the Contractor may submit a claim for additional delay. The Owner will review any such timely filed claim and determine (at the Owner's sole discretion) if an additional equitable Contract Time extension is warranted. A decision by the Owner of such adjustments will occur within a reasonable time of the submission of the claim; the Owner will not wait until Substantial Completion of the project as described in Item G above.
 - G. Other than precipitation, the Owner may, in its sole discretion, consider on a case-by-case basis other abnormal weather conditions (e.g., temperature, tropical storm activity) that the Contractor can affirmatively demonstrate have had an impact on construction. If the Contractor believes such an event has occurred, the Contractor may submit a claim for additional delay in accordance with the time-frames delineated in paragraph 12.01 of the Standard General Conditions of the Construction Contract. The Owner will review any such timely filed claim and determine (at the Owner's sole discretion) if an equitable Contract Time extension is warranted. A decision by the Owner of such adjustments will occur within a reasonable time of the submission of the claim; the Owner will not wait until Substantial Completion of the project as described in Item G above.
- 10. Upon final payment to the Contractor by the Owner, the Contractor's one year warranty period will begin.
 - 11. All internal combustion-powered equipment and/or standby power generators shall have, as a minimum, a residential grade silencer (muffler) for equipment to be operating beyond the hours of operation allowed by local Noise Attenuation Ordinance requirements. The equipment shall be noise attenuated to emit a maximum noise level of 80 dBA at 30 feet from the equipment, unless otherwise required by local ordinance.
 - 12. It is the Contractor's responsibility to satisfy any and all requirements as specified by the Florida Department of Environmental Protection (FDEP), or any other regulatory agency relative to Federal, State or County agencies. Contractor shall be liable for and pay fines or penalties associated with his activities as may be levied by authorities having jurisdiction.

END OF SECTION 01 35 13

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
 2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as

appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Engineer.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Engineer.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be

used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

- B. **Quality-Control Personnel Qualifications:** Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. **Submittal Procedure:** Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. **Testing and Inspection:** In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. **Continuous Inspection of Workmanship:** Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. **Monitoring and Documentation:** Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. **Test and Inspection Reports:** Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

- e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Engineer, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Engineer.
 2. Notify Engineer seven days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Engineer's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed unless otherwise indicated.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- D. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. **Testing Agency Responsibilities:** Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- G. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify

agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Engineer.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.
 - 2. Section 31 23 18 "Dewatering" for disposal of ground water at Project site.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner, Engineer, testing agencies, and authorities having jurisdiction.
- B. Water Service from Existing System: Water from Owner's existing water system is available for use without charge as long as Contractor arranges to have the use metered.

1.4 INFORMATIONAL SUBMITTALS

- A. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.

1.5 QUALITY ASSURANCE

- A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary or permanent services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner.
- D. At Substantial Completion, restore these facilities to condition existing before initial use.
 - 1. Perform daily construction cleanup and final cleanup.

3.2 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Dewatering Facilities: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
- D. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

3.4 OPERATION, TERMINATION, AND REMOVAL

- A. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- B. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

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SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

- B. Related Requirements:

1. Section 01 10 00 "Summary" for limits on use of Project site.
2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Engineer for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of water-service piping and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels to locate each element of Project.
 2. Establish limits on use of Project site.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Engineer.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."
- F. Existing Utility Services: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 3. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
- D. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements Section 01 74 19 "Construction Waste Management and Disposal."
- E. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- F. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- G. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

END OF SECTION 01 73 00

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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Disposing of nonhazardous construction waste.
- B. Related Requirements:

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

- A. General: Provide handling, containers, storage, signage, transportation, and other items as required to accomplish waste management during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."
- B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

3.2 DISPOSAL OF WASTE

- A. General: Remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site for more than seven days.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 01 32 33 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 01 73 00 "Execution" for progress cleaning of Project site.
 - 3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Complete testing of systems and equipment.
 3. Terminate and remove temporary facilities from Project site.
 4. Complete final cleaning requirements.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 29 00 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Engineer will return annotated file.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored,

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provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION 01 77 00

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
- B. Related Requirements:
 - 1. Section 01 73 00 "Execution" for final property survey.
 - 2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints.
 - 2) Submit record digital data files and one set of plots.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints.
 - 2) Include each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Locations and depths of underground utilities.
 - d. Revisions to routing of piping and conduits.
 - e. Changes made by Change Order or Work Change Directive.
 - f. Changes made following Engineer's written orders.
 - g. Details not on the original Contract Drawings.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Engineer determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Format: Annotated PDF electronic file.
2. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Engineer.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. Note related Change Orders and record Drawings where applicable.
- B. Format: Submit record Specifications as scanned PDF electronic file(s) of marked-up paper copy of Specifications.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

END OF SECTION 01 78 39

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. Comply with the following sections of ACI 301 unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."
 - 2. "Formwork and Formwork Accessories."

3. "Reinforcement and Reinforcement Supports."
4. "Concrete Mixtures."
5. "Handling, Placing, and Constructing."

B. Comply with ACI 117.

2.2 STEEL REINFORCEMENT

- A. Recycled content of steel products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- C. Plain-Steel Wire: ASTM A 1064, as drawn.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.
- E. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064, flat sheet.

2.3 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer throughout the project.
- B. Cementitious Materials:
 1. Portland Cement: ASTM C 150 Type II
- C. Normal-Weight Aggregate: ASTM C 33, 1-1/2-inch nominal maximum aggregate size.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494, Type A.
 2. Retarding Admixture: ASTM C 494, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
- F. Water: ASTM C 94.

2.4 RELATED MATERIALS

- A. Vapor Retarder: Plastic sheet, ASTM E 1745, Class A or B.
- B. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 CONCRETE MIXTURES

- A. Comply with ACI 301.
- B. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum W/C Ratio: 0.50.
 - 3. Slump Limit: 5 inches, plus or minus 1 inch.
 - 4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches and seal with manufacturers recommended adhesive or joint tape.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

3.6 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment according to ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding 1/2 inch.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.
 - 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301, to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-rubbed finish.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

- E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- F. Slip-Resistive Broom Finish: Apply a slip-resistive finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301.

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

END OF SECTION 03 30 00

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CAST-IN-PLACE CONCRETE

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SECTION 03 30 53 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Section 32 31 13 "Chain Link Fences and Gates" for Chain Link Fences and Gates.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. Comply with the following sections of ACI 301 unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."

2. "Formwork and Formwork Accessories."
3. "Reinforcement and Reinforcement Supports."
4. "Concrete Mixtures."
5. "Handling, Placing, and Constructing."

B. Comply with ACI 117.

2.2 STEEL REINFORCEMENT

- A. Recycled content of steel products: Postconsumer recycled content plus one- half of preconsumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- C. Plain-Steel Wire: ASTM A 1064, as drawn.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.
- E. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064, flat sheet.

2.3 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer throughout the project.
- B. Cementitious Materials:
 1. Portland Cement: ASTM C 150 Type II
- C. Normal-Weight Aggregate: ASTM C 33, 1-1/2-inch nominal maximum aggregate size.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494, Type A.
 2. Retarding Admixture: ASTM C 494, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
- F. Water: ASTM C 94.

2.4 RELATED MATERIALS

- A. Vapor Retarder: Plastic sheet, ASTM E 1745, Class A or B.
- B. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 CONCRETE MIXTURES

- A. Comply with ACI 301.
- B. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum W/C Ratio: 0.50.
 - 3. Slump Limit: 5 inches, plus or minus 1 inch.
 - 4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches and seal with manufacturers recommended adhesive or joint tape.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

3.6 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment according to ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding 1/2 inch.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.
 - 1. Apply to concrete surfaces exposed to public view.
- C. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301, to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-rubbed finish.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

- E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- F. Slip-Resistive Broom Finish: Apply a slip-resistive finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301.

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

END OF SECTION 03 30 53

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SECTION 09 96 36 - CHEMICAL-RESISTANT COATINGS FOR MATERIALS IN WASTEWATER FACILITIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Field application of chemical-resistant coatings.

1.2 DEFINITIONS

- A. Refer to ASTM D16 for definitions of terms used in this Section.

1.3 REFERENCE STANDARDS

- A. ASTM International:
1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. California Department of Public Health:
1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Green Seal:
1. GC-3 - Environmental Criteria for Anti-Corrosive Paints.
 2. GS-11 - Paints and Coatings.
- D. Master Painters Institute:
1. MPI - Approved Products List.
- E. NSF International:
1. NSF 61 - Drinking Water System Components - Health Effects.
- F. South Coast Air Quality Management District:
1. SCAQMD Rule 1113 - Architectural Coatings.
- G. SSPC: The Society for Protective Coatings:
1. SSPC-PA 2 - Procedure for Determining Conformance to Dry Coating Thickness Requirements.
 2. SSPC-SP 1 - Solvent Cleaning.
 3. SSPC-SP 2 - Hand Tool Cleaning.
 4. SSPC-SP 3 - Power Tool Cleaning.

5. SSPC-SP 5/NACE 1 - White Metal Blast Cleaning.
6. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.
7. SSPC-SP 10/NACE 2 - Near-White Metal Blast Cleaning.
8. SSPC-SP 10 - Near-White Metal Blast Cleaning.

1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.5 SEQUENCING

- A. Section 01 10 00 - Summary: Requirements for sequencing.
- B. Do not apply finish coats unless coatable sealant has been applied.
- C. Back prime wood trim before installation of trim.

1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 1. Submit manufacturer data on coatings.
 2. Include MPI - Approved Products Lists with proposed products highlighted.
- C. Samples:
 1. Submit two paper chip samples, illustrating range of colors and textures available for each surface finishing product as scheduled.
 2. Coated Samples:
 - a. Submit two coated samples, illustrating selected colors and textures for each selected color and system with specified coats cascaded.
 - b. Submit on proposed substrate.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit special surface preparation procedures, substrate conditions requiring special attention, and.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statements:
 1. Submit qualifications for manufacturer and applicator.
 2. Submit manufacturer's approval of applicator.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data: Submit information on cleaning, touchup, and repair of coated surfaces.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 73 00 - Execution and Section 01 70 00 - Closeout Requirements: Requirements for maintenance materials.
- B. Extra Stock Materials:
 - 1. Furnish 1 gal. of each color, type, and surface texture as provided for Project.
 - 2. Label each container with manufacturer's label, color, type, texture, room number and Site location.
 - 3. Store where directed by Owner.

1.9 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified to NSF 61.
- B. Surface Burning Characteristics:
 - 1. Fire-Retardant Finishes: Maximum 25/450 flame-spread/smoke-developed index when tested according to ASTM E84.
- C. Perform Work according to City of Callaway standards.
- D. Maintain 1 copy of each standard affecting Work of this Section on Site.

1.10 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Applicator: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Container Labeling: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Inspection:

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27656.01 CHEMICAL-RESISTANT COATINGS FOR MATERIALS IN WW FACILITIES 09 96 36-3

1. Accept materials on Site in manufacturer's sealed and labeled containers.
2. Inspect for damage and to verify acceptability.

D. Store materials in ventilated area and otherwise according to manufacturer instructions.

E. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.12 AMBIENT CONDITIONS

A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.

B. Storage Conditions:

1. Minimum Ambient Temperature: 45 degrees F.
2. Maximum Ambient Temperature: 90 degrees F

C. Application Conditions:

1. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by coating manufacturer.
2. Do not apply exterior coatings during rain or snow, when relative humidity is outside humidity ranges, or when moisture content of surfaces exceeds those required by coating manufacturer.
3. Lighting Level: 80fc measured mid-height at substrate surface.

1.13 WARRANTY

A. Section 01 73 00 - Execution and Section 01 70 00 - Closeout Requirements: Requirements for warranties.

B. Furnish five-year manufacturer's warranty for coatings.

PART 2 PRODUCTS

2.1 APPLICATORS

A. Applicators shall be approved by coating manufacturer.

2.2 COATINGS

A. Materials:

1. Coatings:
 - a. Ready mixed, except field-catalyzed coatings.
 - b. Capable of drying or curing free of streaks or sags.
2. Accessories:
 - a. Grade: Commercial.

- b. Turpentine.
- c. Thinners.
- d. Other materials not specifically indicated but required to achieve specified finishes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution and Section 01 70 00 - Closeout Requirements: Requirements for application examination.
- B. Verify that surfaces and substrate conditions are ready to receive Work as recommended by product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of Work, and report conditions capable of affecting proper application to Architect/Engineer.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Moisture Content:
 - 1. Measure moisture content of surfaces using electronic moisture meter.
 - 2. Do not apply finishes unless moisture content of surfaces are below following maximums:
 - a. Plaster and Gypsum Wallboard: 12 percent.
 - b. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - c. Interior Wood: 15 percent, measured according to ASTM D4442.
 - d. Exterior Wood: 15 percent, measured according to ASTM D4442.
 - e. Concrete Floors: 8 percent.

3.2 PREPARATION

- A. Section 01 73 00 - Execution and Section 01 70 00 - Closeout Requirements: Requirements for application preparation.
- B. Prepare coatings as follows:
 - 1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
 - 2. For smooth flow and brushing properties.
- C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Defects:
 - 1. Correct defects and clean surfaces capable of affecting Work of this Section.
 - 2. Remove or repair existing coatings exhibiting surface defects.
- E. Marks: Seal marks that may bleed through surface finishes with shellac.
- F. Impervious Surfaces:

1. Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach.
2. Rinse with clean water and allow surface to dry.

G. Galvanized Surfaces:

1. Remove surface contamination and oils, and wash with solvent.
2. Apply coat of etching primer.

H. Concrete and Unit Masonry Surfaces Scheduled to Receive Coating:

1. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter.
2. Remove oil and grease with solution of tri-sodium phosphate, rinse well, and allow to dry.
3. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water, and allow to dry.

I. Plaster Surfaces:

1. Fill hairline cracks, small holes, and imperfections with latex patching plaster.
2. Make smooth and flush with adjacent surfaces.
3. Wash and neutralize high-alkali surfaces.

J. Uncoated Steel and Iron Surfaces:

1. Remove grease, mill scale, weld splatter, dirt, and rust.
2. If heavy coatings of scale are evident, remove by hand or power tool wire brushing or by sandblasting.
3. Clean by washing with solvent.
4. Apply treatment of phosphoric acid solution, ensuring that weld joints, bolts, and nuts are similarly cleaned.
5. Spot-prime coat after repairs.

K. Shop-Primed Steel Surfaces:

1. Sand and scrape to remove loose primer and rust.
2. Feather edges to make touchup patches inconspicuous.
3. Clean surfaces with solvent.
4. Prime bare steel surfaces.

L. Existing Work:

1. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

3.3 APPLICATION

- A. Do not apply finishes to surfaces that are not dry.
- B. Apply each coat to uniform appearance.
- C. Apply each coat slightly darker than preceding coat, unless specified otherwise.
- D. Sand surfaces lightly between coats to achieve required finish.
- E. Cleaning:
 1. Vacuum surfaces to remove loose particles.

2. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Finishing Mechanical and Electrical Equipment:

1. Schedule of Color-Coding shall be in accordance with City of Callaway standard details.
2. Coat shop-primed equipment.
3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components, and coat separately.
4. Coat insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, and except where these items are shop finished.
5. Color-Coding:
 - a. Color-code equipment, piping, conduit, and exposed duct work according to indicated requirements.
 - b. Color band and identify with flow arrows, names, and numbering.
6. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings that were removed prior to finishing.

G. Installation Standards: Install Work according to City of Callaway standards.

3.4 FIELD QUALITY CONTROL

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Inspecting:
 1. Surface Preparation: Comply with SSPC-SP 10.
- C. Testing:
 1. Holiday Testing: Submerged surfaces including surfaces within vapor area.
 2. Dry Film Thickness: Measure according to SSPC-PA 2.
- D. Equipment Acceptance:
 1. Repair or recoat areas containing holidays according to coating manufacturer instructions.
 2. Retest repaired or recoated areas.

3.5 CLEANING

- A. Section 01 73 00 - Execution and Section 01 77 00 - Closeout Requirements: Requirements for cleaning.
- B. Collect waste material that may constitute fire hazards, place in closed metal containers, and remove daily from Site.

3.6 ATTACHMENTS

- A. Application: Ferrous metal structures and miscellaneous fabrications.
 1. Surface Preparation: SSPC-SP 10.
 2. Amine-cured epoxy.
 3. Manufacturers:
 - a. Sherwin Williams Company.

- b. Substitutions: As specified in Section 01 60 00 - Product Requirements.
 - c. Furnish materials according to City of Callaway standards.
- B. Interior & Exterior Exposed (not immersed):
- 1. Primer: Macropoxy 920 PrePrime Rust Penetrating Epoxy Pre-Primer Transparent; DFT 1.5-2.0 mils
 - 2. Intermediate Coat: Macropoxy 646 Fast Cure Epoxy Black: DFT 5.0-10.0 mils.
 - 3. Finish Coat: Acrolon 218 HS top coat; 3.0-6.0 mils
 - 4. Finish Color: As selected by Engineer from manufacturer's standard colors.
- C. Immersed – Wastewater:
- 1. Primer: Macropoxy 646 Fast Cure Epoxy Black; DFT 5.0-10.0 mils
 - 2. Stripe Coat: Macropoxy 646 Fast Cure Epoxy Black; DFT 5.0-10.0 mils
 - 3. Finish Coat: Macropoxy 646 Fast Cure Epoxy Black; DFT 5.0-10.0 mils
- D. Application: Ductile or cast iron pipe, pumps, motors, and valves.
- 1. Surface Preparation: SSPC-SP 10.
 - 2. Amine-cured epoxy.
 - 3. Manufacturers:
 - a. Sherwin Williams Company.
 - b. Substitutions: As specified in Section 01 60 00 - Product Requirements.
 - c. Furnish materials according to City of Callaway standards.
- E. Interior and/or Exterior Exposed:
- 1. Primer: Macropoxy 920 PrePrime Rust Penetrating Epoxy Pre-Primer Transparent; DFT 1.5-2.0 mils.
 - 2. Intermediate Coat: Macropoxy 646 Fast Cure Epoxy Black: DFT 5.0-10.0 mi.
 - 3. Finish Coat: Acrolon 218 HS top coat; 3.0-6.0 mils.
 - 4. Finish Color: As selected by Engineer from manufacturer's standard colors.
- F. Steel pipe and equipment:
- 1. Surface Preparation: SSPC-SP 10.
 - 2. Polyamide Epoxy:
 - 3. Manufacturers:
 - a. Sherwin Williams Company.
 - b. Substitutions: As specified in Section 01 60 00 - Product Requirements.
 - c. Furnish materials according to City of Callaway standards.
- G. Interior and/or Exterior Exposed:
- 1. Primer: Macropoxy 920 PrePrime Rust Penetrating Epoxy Pre-Primer Transparent; DFT 1.5-2.0 mils.
 - 2. Intermediate Coat: Macropoxy 646 Fast Cure Epoxy Black: DFT 5.0-10.0 mi.
 - 3. Finish Coat: Acrolon 218 HS top coat; 3.0-6.0 mils.
 - 4. Finish Color: As selected by Engineer from manufacturer's standard colors.

PART 4 EXECUTION

4.1 EXAMINATION

- A. Examine areas and conditions under which coating systems are to be applied. Notify Engineer of areas or conditions not acceptable. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected.

4.2 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

- A. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.
- B. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

4.3 SURFACE PREPARATION OF DUCTILE OR CAST IRON

- A. Surfaces shall be abrasive swept blasted to removal oil, grease, dirt, dust, loose annealing oxides, loose rust and loose mold coatings. Tightly adherent annealing oxides, rust and mold coatings (i.e., unable to be removed by lifting with a dull putty knife) may remain on the surface.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

4.4 PREPARATION FOR FERROUS METAL STRUCTURES AND MISCELLANEOUS FABRICATIONS

- A. General: Remove hardware, plates, lighting fixtures, and similar items already installed that are not to be painted. Remove these items to completely paint the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Where indicated for blast cleaning, conform to SSPC-SP 10.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to the manufacturer's instructions for each particular substrate condition and as specified.
- D. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
- E. Touch up bare areas and shop applied prime coats that have been damaged. Any areas having bare metal after surface preparation shall be cleaned in accordance with sspc-sp2 hand tool cleaning or sspc-sp3 power tool cleaning. Feather all edges and touch up with the same primer as the shop coat.

4.5 APPLICATION

- A. Apply coatings in accordance with manufacturer's instructions.
- B. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
- C. Keep containers closed when not in use to avoid contamination.
- D. Do not use mixed coatings beyond pot life limits.
- E. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.
- F. Uniformly apply coatings at spreading rate required to achieve specified DFT.
- G. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.
- H. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer.

4.6 REPAIR

- A. Materials and Surfaces Not Scheduled To Be Coated: Repair or replace damaged materials and surfaces not scheduled to be coated.
- B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.
- C. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

4.7 FIELD QUALITY CONTROL

- A. Services:
 - 1. Verify coatings and other materials are as specified.
 - 2. Verify surface preparation and application are as specified.
 - 3. Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges.
 - 4. Coating Defects: Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.
 - a. Check for holidays on interior steel immersion surfaces using holiday detector.
- B. Report:
 - 1. Submit written reports describing inspections made and actions taken to correct nonconforming work.

2. Report nonconforming work not corrected.
3. Submit copies of report to Engineer.

4.8 CLEANING

- A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

4.9 PROTECTION OF COATING SYSTEMS

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Engineer.
- B. Provide "Wet Paint" signs to protect newly-painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

END OF SECTION 09 96 36

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SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections
 - 1. Division 01 – General Requirements
 - 2. Division 26 – Electrical
 - 3. Section 33 32 13 – Submersible Centrifugal Pumps (SP-1/SP-2)
 - 4. Section 40 95 13 – Control Panel Construction (CP-LS)

1.2 SUMMARY

- A. Scope
 - 1. This section includes the furnishing, installation, testing, adjusting and placing in operation all electrical equipment, devices, facilities, materials, and auxiliary items necessary for the complete and successful operation of all electrical equipment as described herein, shown on the Drawings, or deemed necessary for the satisfactory completion of the electrical Work. A comprehensive electrical scope of work includes, but is not limited to, the following:
 - a. Power/Electrical System
 - b. Grounding System
 - c. Control System
 - d. Connection of electrically powered mechanical equipment
 - e. All incidentals necessary for a complete and fully operational electrical system
- B. Interpretation of Drawings
 - 1. Dimensions on Drawings related to equipment are based on equipment of certain manufacturers. Conform the dimensions of equipment furnished to space allocated to the equipment.
 - 2. Drawings show the principal elements of the electrical work and are not intended as detailed working drawings for the electrical Work. Drawings supplement and complement the Specifications relative to principal features of electrical systems.
 - 3. Equipment and devices furnished and installed under this Contract shall be properly connected and interconnected with other equipment and devices for successful operation of complete systems, whether or not all connections and interconnections are specifically mentioned or shown in the Contract Documents.
 - 4. Similar products shall be from the same manufacturer for uniformity.
 - 5. Drawings are provided for Contractor's guidance in fulfilling the operational intent of the Contract Documents.
 - 6. The Contractor is required to read all other equipment specifications contained in these Contract Documents and provide required power and control conductors for proper function as described.

C. Working Clearances

1. Working clearances around equipment requiring electrical services shall be verified by Contractor to comply with Code requirements. Should there be apparent violations of clearances; the Contractor shall notify the Engineer before proceeding with connection or placing of equipment.
2. The Contractor shall ascertain that lug sizes and wiring gutters or space allowed for proper accommodation and termination of the wires and cables are adequate.
3. Working space for all electrical and control equipment operating at 600v volts or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with NEC Article 110.26.

D. Workmanship

1. Workmanship under this Division shall be accomplished by persons skilled in the performance of the required task. All work shall be done in keeping with conventions of the trade. Work of this Division shall be closely coordinated with work of other trades to avoid conflict and interference.

E. Work Included in This Contract but Specified Elsewhere:

1. Excavation and backfilling for buried electrical Work shall conform to Division 31, Earthwork.
2. Concrete for equipment pads shall conform to Division 3, Concrete.
3. Shop painting and surface preparation shall conform to Division 09, Finishes.

1.3 DEFINITIONS (NOT USED)

1.4 ACTION SUBMITTALS

- A. Refer to Section 01 33 00, Submittal Requirements, for additional requirements.
- B. Submit Shop Drawings for each Specification section as a single submittal.
- C. Review of equipment submittals does not relieve Contractor of their contractual responsibility to provide complete and successfully operating systems.
- D. Shop Drawings shall include the following information to the extent applicable to the particular item:
 1. Manufacturer's name and product designation or catalog number.
 2. Electrical ratings.
 3. Conformance to applicable standards or specifications of ANSI, ASTM, ICEA, IEEE, ISA, NEC, NEMA, NFPA, OSHA, UL, or other organizations.
 4. Dimensioned plan, section, elevations, and panel layouts showing means for mounting, conduit connection, and grounding.
 5. Materials and finish specifications, including paints.
 6. List of components including manufacturer's names and catalog numbers.
 7. Internal wiring diagram and drawings indicating all connections to components and numbered terminals for external connections.
- E. Mark dimensions and values in units to match those specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Equipment tests
 - 1. Submit operating test procedures and results for equipment.

1.6 CLOSEOUT SUBMITTALS

- A. Refer to the following Sections for additional requirements.
 - 1. Section 01 77 00, Closeout Procedures
 - 2. Section 01 78 23, Operation and Maintenance Data
 - 3. Section 01 78 39, Project Record Documents
- B. General
 - 1. The Contractor shall provide detailed as-built drawings for the project indicating all power wiring.
 - 2. Drawings shall be delivered to the Owner in AutoCAD 2019 Format.
 - 3. The as-built drawings shall include detailed drawings of all underground conduit, above ground conduit, control panels, and control drawings. These drawings shall indicate exact location of all underground electrical wiring.
- C. Record Drawings
 - 1. System Record Drawings: Include the following:
 - a. Single-line wiring diagram of the distribution system.
 - b. Actual, in-place conduit and cable layouts with schedule of conduit sizes and number, and size of conductors.
 - c. Layouts of the power and lighting arrangements and the grounding system.
 - d. Control schematic diagrams, with terminal numbers and all control devices identified, for all equipment.
 - 2. Point-to-Point interconnection wiring diagram drawings: Include the following:
 - a. External wiring for each piece of equipment, panel, instrument, and other devices and wiring to control stations, lighting panels, and motor controllers.
 - b. Numbered terminal block identification for each wire termination.
 - c. Identification of the assigned wire numbers for all interconnections.
 - d. Identification of wiring by the conduit tag in which the wire is installed.
 - e. Terminal, junction, and pull boxes through which wiring is routed.
 - f. Identification of all equipment and the Shop Drawing transmittal number for equipment from which the wiring requirements and termination information was obtained.
 - 3. The record documents shall reflect final equipment and field installation information.

1.7 QUALITY ASSURANCE

- A. Electrical installation shall be in accordance with the latest edition (unless noted otherwise) of the following codes and standards:
 - 1. National Electrical Code (NFPA 70).
 - 2. National Electrical Safety Code (NFPA 70E).
 - 3. Standard for Fire Protection in Wastewater Treatment and Collection Facilities (NFPA 820).

B. References

1. NFPA 70 – National Electrical Code
2. IEEE C2 – National Electrical Safety Code
3. NEMA – National Electrical Manufacturer's Association
4. UL – Underwriters Laboratories
5. NFPA – National Fire Protection Association
6. IEEE – The Institute of Electrical and Electronics Engineers
7. IESNA – The Illuminating Engineering Society of North America
8. NETA – International Electrical Testing Association

C. Permits

1. Refer to the General Conditions and Supplementary Conditions for responsibilities relative to obtaining and paying for Contractor's permits, licenses, and inspection fees.

D. Testing Laboratory Labels

1. Electrical material and equipment shall be new and bear the label of Underwriters' Laboratories, Inc. or other nationally recognized, independent testing laboratory, where standards have been established and label service applies.

E. Area Classifications

1. Materials, equipment, and incidentals shall conform to the area classification(s) as defined under NFPA 820.
2. Wet Locations: Conform to NEC and NEMA requirements for wet locations. Enclosures in wet locations shall meet NEMA 4 requirements unless specified otherwise.
3. Corrosive Locations: Conform to NEC and NEMA requirements for corrosive locations. Enclosures in corrosive locations shall conform to NEMA 4X requirements unless specified otherwise.
4. Hazardous Locations: Conform to NEC requirements for the Class and Division designated.
5. Dusty Locations: Indoor areas not designated as hazardous, corrosive, or wet are dusty locations. Conform to NEC and NEMA 12 requirements unless specified otherwise.

F. Guarantee

1. The Contractor shall guarantee all other electrical systems, materials and workmanship to be free from defects for a period of one (1) year from the date of final acceptance. Contractor shall correct all defects arising within this period upon notification by the Owner, without additional compensation.
2. The rights and/or benefits given to the Owner by the guarantees found in these technical specifications are in addition to and not in contradiction to any rights and/or benefits found in the General Conditions and Supplemental Conditions of the Contract.

G. Regulatory Requirements

1. Conform to applicable sections of the Building Code and all local rules, regulations and ordinances.
2. Electrical: Conform to NFPA 70 & National Electric Safety Code.

H. Staffing

1. The Contractor shall provide a "Master Electrician" who has been deemed a "Master Electrician" by exam through the State of Florida, or any other Florida County Permitting Authority as the Electrical Superintendent for the project. The Electrical Superintendent shall be on the project site any time any electrical work is performed by the Contractor.

- I. Field Quality Control
 - 1. Conduct field quality control Work for the electrical installation. Field quality control shall be per the requirements specified in Article 3.5 of this Section.
 - 2. Obtain from Owner record drawings required to execute the Work.

1.8 FIELD CONDITIONS

- A. Protection Of Electrical Equipment
 - 1. Electrical equipment shall be protected by the weather, especially from water dripping or splashing upon it, at all times during shipment, storage and after installation.
 - 2. Should any apparatus be subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test, at the expense of the Contractor, to ascertain the suitability of this apparatus. The results of the test shall be submitted to the Engineer and if the apparatus is found to be unsuitable, the Contractor shall replace it without additional cost to the Owner.
- B. Product Delivery, Storage, And Handling
 - 1. Delivery of Products: Advise Subcontractors and Suppliers of the maximum shipping sizes of equipment that can be accommodated at the Site.

1.9 ELECTRICAL EQUIPMENT

- A. Unless specified otherwise, electrical equipment shall have ratings based on 75°C terminations.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL CONSTRUCTION

- A. Provide 6" concrete house-keeping pad under the Lift Station Control Panel, CP-LS.
- B. Electrical enclosures shall be NEMA 4X rated unless noted otherwise.

3.2 INSPECTION

- A. Examine the conditions under which Work is to be performed and notify Engineer in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.3 FINAL INSPECTION AND TESTING

- A. After the electrical Work is complete, the Contractor shall deliver to the Engineer the following information with his request for final inspection.
 - 1. One set of contract drawings marked to show all significant changes in equipment ratings and locations, alterations in locations of conduit runs, or of any data differing from the contract drawings. This shall include revised or changed panelboard and switchgear schedules.
 - 2. Certificates of final inspection from local authority.
 - 3. A tabulation of all motors listing their respective manufacturer, horsepower, nameplate voltage and current, actual running current after installation and overload heater rating.
- B. The electrical Work shall be thoroughly tested to demonstrate that the entire system is in proper working order and in accordance with the plans and specifications. Each motor with its control shall be run as nearly as possible under operating conditions for a sufficient length of time to demonstrate correct alignment, wiring capacity, speed and satisfactory operation. All main switches and circuit breakers shall be operated, but not necessarily at full load. Contractor may be required during final inspection, at the request of the Engineer to furnish test instruments for use during the testing.
- C. Conductor Testing
 - 1. Refer to Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables, for testing requirements.

3.4 DEMONSTRATION OF EQUIPMENT

- A. Demonstrate to Owner and Engineer when the Work is Substantially Complete that all electrical systems and electrically operated equipment operate per the Contract Documents and as required.
- B. Perform the following operational tests:
 - 1. Operate power circuits to verify proper operation and connection to equipment.
 - 2. Operate control circuits including pushbuttons, indicating lights, and similar devices to verify proper connection and function. Operate all devices, such as pressure and flow switches and similar devices, to verify that shut-downs and control sequences operate as required.
 - 3. Verify remote monitoring is operational with Owner.
 - 4. Test receptacle devices to verify proper operation and connections.
- C. Provide a report on the equipment demonstration and operating tests. The report shall include complete information on the tests performed and results.

3.5 FIELD QUALITY CONTROL

- A. Provide services to interface with existing circuits. Field-determine system and equipment requirements prior to modifying existing systems.
- B. Coordinate the remote monitoring interface of the Telemetry Control Unit specified under Section 40 9513 with Owner's personnel.

- C. Provide tools and equipment required to trace circuits necessary for proper execution of the Work.
- D. Define and identify all wiring, circuit terminations, and equipment to be modified to ensure the proper interface of all components. The Contract Price includes all costs associated with field services specified for a complete and functional system.

END OF SECTION 26 05 00

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SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alpha Wire Company.
 - 2. Belden Inc.
 - 3. Cooper Industries, Inc.
 - 4. Encore Wire Corporation.

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5. General Cable; General Cable Corporation.
6. Senator Wire & Cable Company.
7. Southwire Company.

B. Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2 and Type XHHW-2.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M.
2. AFC Cable Systems; a part of Atkore International.
3. Gardner Bender.
4. Hubbell Power Systems, Inc.
5. Ideal Industries, Inc.
6. NSi Industries LLC.
7. O-Z/Gedney; a brand of Emerson Industrial Automation.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

- B. Exposed Feeders: Type XHHW-2, single conductors in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.
- D. Exposed Branch Circuits: Type THHN/THWN-2, single conductors in raceway.
- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- D. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

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END OF SECTION 26 05 19

SECTION 26 05 23 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. UTP cabling.
 - 2. RS-485 cabling.
 - 3. Low-voltage control cabling.
 - 4. Control-circuit conductors.
 - 5. Identification products.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- C. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. 3M.
2. Belden CDT Networking Division/NORDX.
3. Nexans.
4. Superior Essex Inc.

- B. Description: 100-ohm, four-pair UTP.

1. Comply with ICEA S-90-661 for mechanical properties of Category 5e cables.
2. Comply with ICEA S-102-700 for mechanical properties of Category 6 cables.
3. Comply with TIA-568-C.1 for performance specifications.
4. Comply with TIA-568-C.2, Category 5e.
 - a. Communications, Plenum Rated: Type CMP complying with UL 1685 or Type CMP in listed plenum communications raceway.
 - b. Communications, Plenum Rated: Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 - c. Communications, Riser Rated: Type CMP or Type CMR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 - d. Communications, General Purpose: Type CM, Type CMG, Type CMP, Type CMR, or Type CMX in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

2.3 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Belden CDT Networking Division/NORDX.
2. Belden Inc.
3. Corning Cable Systems.
4. Hubbell Incorporated; Wiring Device-Kellems.
5. Hubbell Premise Wiring.
6. Leviton Manufacturing Co., Inc.

7. Panduit Corp.

- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-C.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Connecting Blocks: 110-style IDC for Category 5e. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
 - 1. Number of Terminals per Field: One for each conductor in assigned cables.
- E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
 - 1. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.
- F. Jacks and Jack Assemblies: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-C.1.
- G. Patch Cords: Factory-made, four-pair cables in 36-inch lengths; terminated with eight-position modular plug at each end.
 - 1. Patch cords shall have color-coded boots for circuit identification.
- H. Workstation Outlets: Four-port-connector assemblies mounted in single faceplate.
- I. Faceplates:
 - 1. Metal Faceplate: Stainless steel, complying with requirements in Section 26 27 26 "Wiring Devices."
 - 2. For use with snap-in jacks accommodating any combination of UTP, optical-fiber, and coaxial work area cords.
 - a. Flush-mounted jacks, positioning the cord at a 45-degree angle.
- J. Legend:
 - 1. Machine printed, in the field, using adhesive-tape label.
 - 2. Snap-in, clear-label covers and machine-printed paper inserts.

2.4 RS-485 CABLE

- A. Standard Cable: NFPA 70, Type CMG.
 - 1. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned-copper conductors.

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2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1685.

2.5 LOW-VOLTAGE CONTROL CABLE

A. Paired Cable: NFPA 70, Type CMG.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1685.

2.6 CONTROL-CIRCUIT CONDUCTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Cable; General Cable Corporation.
2. Encore
3. Service Wire Co.

B. Class 1 Control Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway.

C. Class 2 Control Circuits: Stranded copper, Type THHN-2-THWN-2, in raceway.

D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN-2-THWN-2.

E. Class 2 Control Circuits and Class 3 Remote-Control and Signal Circuits That Supply Critical Circuits: Circuit Integrity (CI) cable.

2.7 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP cables according to TIA-568-C.2.

C. Cable will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Test cables on receipt at Project site.
 - 1. Test each pair of UTP cable for open and short circuits.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1 and NFPA 70.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568-C Series of standards.
 - 2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems".
 - 3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 - 4. Cables may not be spliced.
 - 5. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems". Install lacing bars and distribution spools.
 - 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - 8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
 - 9. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems" and Ch. 6, "Optical Fiber Structured Cabling Systems." Monitor cable pull tensions.
 - 10. Support: Do not allow cables to lay on removable ceiling tiles.
 - 11. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
- C. UTP Cable Installation:
 - 1. Comply with TIA-568-C.2.
 - 2. Do not untwist UTP cables more than 1/2 inch at the point of termination to maintain cable geometry.
- D. Installation of Control-Circuit Conductors:
 - 1. Install wiring in raceways. Comply with requirements specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- E. Optical-Fiber Cable Installation:

1. Comply with TIA-568-C.3.
2. Terminate cable on connecting hardware that is rack or cabinet mounted.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.

3.3 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits; No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.4 GROUNDING

- A. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.
- B. For low-voltage control wiring and cabling, comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.5 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
- B. Identify data and communications system components, wiring, and cabling according to TIA-606-A; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Visually inspect UTP materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test UTP cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- C. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- D. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

James J. Tatone, P.E.
BDI/PNS - REI

END OF SECTION 26 05 23

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CONTROL-VOLTAGE ELECTRICAL POWER CABLES

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SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.
 - 2. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:

- a. Instructions for periodic testing and inspection of grounding features at test wells ground rings grounding connections for separately derived systems based on NETA MTS.
 - 1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - 2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Burndy; Part of Hubbell Electrical Systems.
 2. ERICO International Corporation.
 3. Galvan Industries, Inc.; Electrical Products Division, LLC.
 4. Harger Lightning & Grounding.
 5. O-Z/Gedney; a brand of Emerson Industrial Automation.
 6. Robbins Lightning, Inc.

2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

- A. Insulated Conductors: tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Conductor: No. 2 AWG, bare solid or stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Grounding Electrode Conductors: Install bare copper conductor, No. 2 AWG minimum buried at least 24 inches below grade.
- B. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 4. Connections to Reinforcing Steel Bars: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

- B. Metallic Fences: Comply with requirements of IEEE C2.
 - 1. Grounding Conductor: Bare, tinned copper, not less than No. 8 AWG.
 - 2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
 - 3. Barbed Wire: Strands shall be bonded to the grounding conductor.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length (10 feet minimum) from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Test Wells: Ground rod driven in bottom of handhole. Handholes are specified on drawings and shall be at least 12 inches deep, with cover.

Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit. Use exothermic-welded connectors for underground bonding connections

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

- b. Perform tests by fall-of-potential method according to IEEE 81.
- 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed 5 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

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SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Requirements:

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Aluminum Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cooper Industries, Inc.
 - b. Flex-Strut Inc.
 - c. Haydon Corporation.
 - d. MKT Metal Manufacturing, Inc.
 - e. Thomas & Betts Corporation, A Member of the ABB Group.
 - 2. Channel Width: 1-5/8 inches.
 - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - 6. Channel Dimensions: Selected for applicable load criteria.
- B. Conduit and Cable Support Devices: Stainless steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) B-line, an Eaton business.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 2. Concrete Inserts: Stainless steel slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 - 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 5. Toggle Bolts: Stainless-steel springhead type.
 - 6. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.

- B. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 3.
- C. Anchor equipment to concrete base as follows:
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Boxes, enclosures, and cabinets.
 - 4. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

- A. RAC: Rigid aluminum conduit.
- B. EMT: Electrical metallic tubing
- C. FMC: Flexible metallic conduit
- D. LFMC: Liquidtight flexible metallic conduit

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems; a part of Atkore International.
 - 2. Allied Tube & Conduit; a part of Atkore International.
 - 3. Anamet Electrical, Inc.
 - 4. Electri-Flex Company.
 - 5. FSR Inc.
 - 6. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - 7. Patriot Aluminum Products, LLC.
 - 8. Picoma Industries, Inc.
 - 9. Republic Conduit.
 - 10. Robroy Industries.

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11. Southwire Company.
 12. Thomas & Betts Corporation, A Member of the ABB Group.
 13. Western Tube and Conduit Corporation.
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. RAC: Comply with ANSI C80.5 and UL 6A.
- D. LFMC: (CLASS 1/ DIV 1 AND 2 LOCATIONS ONLY) Flexible steel conduit with PVC jacket and complying with UL 360.
- E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
- F. Joint Compound for RAC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems; a part of Atkore International.
 2. Anamet Electrical, Inc.
 3. Arnco Corporation.
 4. CANTEX INC.
 5. CertainTeed Corporation.
 6. Condux International, Inc.
 7. Electri-Flex Company.
 8. Kraloy.
 9. Lamson & Sessions.
 10. Niedax Inc.
 11. RACO; Hubbell.
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. RNC: Type EPC-40-PVC and Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. LFNC: Comply with UL 1660.
- E. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- F. Fittings for LFNC: Comply with UL 514B.

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2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Adalet.
 2. Crouse-Hinds, an Eaton business.
 3. EGS/Appleton Electric.
 4. Erickson Electrical Equipment Company.
 5. FSR Inc.
 6. Hoffman; a brand of Pentair Equipment Protection.
 7. Hubbell Incorporated.
 8. Kraloy.
 9. Milbank Manufacturing Co.
 10. MonoSystems, Inc.
 11. Oldcastle Enclosure Solutions.
 12. O-Z/Gedney; a brand of Emerson Industrial Automation.
 13. RACO; Hubbell.
 14. Robroy Industries.
 15. Spring City Electrical Manufacturing Company.
 16. Stahlin Non-Metallic Enclosures.
 17. Thomas & Betts Corporation, A Member of the ABB Group.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep
- G. Gangable boxes are not allowed.
- H. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 4 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Stainless steel, all sides.
 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- I. Lift Station Control Panel, CP-LS:
1. NEMA 4X, 316 stainless steel enclosure with removable interior panel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Barriers to separate wiring of different systems and voltage.

5. Mount on top of 316 stainless steel, support base with ventilated, removable panels on front, back and sides of the support base. Maximum dimension of the ventilated, removable panels shall be 24" x 24".

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: RAC.
 2. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 3. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X.
 4. Conduit, Class 1/Division 1 or 2 Locations: RAC and Type EPC-80 PVC
 5. Boxes and Enclosures, Class 1/Division 1: UL listed for the location
- B. Minimum Raceway Size: 3/4-inch trade size.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
 1. Rigid Aluminum Conduit: Use threaded rigid aluminum conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- D. Aluminum conduits or fittings in direct contact with concrete or earth shall be coated with bitumastic paint or two wraps of anti-corrosion tape.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits.
- B. Complete raceway installation before starting conductor installation.
- C. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- D. Arrange stub-ups so curved portions of bends are not visible above finished elevation.
- E. Support conduit within 12 inches of enclosures to which attached.
- F. Raceways Embedded in Slabs:
 1. Run conduit parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.

2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
 4. Do not embed threadless fittings in concrete unless specifically approved by Engineer for each specific location.
 5. Transition from RNC, Type EPC-40-PVC, to RAC before rising above grade or exiting concrete encasement.
- G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- I. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- J. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- K. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- L. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- M. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- N. Flexible Conduit Connections to Vibrating and Motor Loads: Maximum of 48 inches in length.
- O. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

END OF SECTION 26 05 33

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SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels, including arc-flash warning labels.
7. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

- B. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- B. Warning labels and signs shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
 - 3. Arc Flash Warning Label. Perform arc flash study for labeling information.

2.3 LABELS

- A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Champion America.
 - c. emedco.
 - d. Grafoplast Wire Markers.
 - e. LEM Products Inc.
 - f. Marking Services, Inc.
 - g. Panduit Corp.
- B. Snap-Around Labels for Raceways and Cables Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceways they identify, and that stay in place by gripping action.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Marking Services, Inc.

c. Panduit Corp.

C. Self-Adhesive Labels:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Brother International Corporation.
 - c. emedco.
 - d. Grafoplast Wire Markers.
 - e. Ideal Industries, Inc.
 - f. LEM Products Inc.
 - g. Marking Services, Inc.
 - h. Panduit Corp.
2. Preprinted or Write-on, 3-mil-thick, polyester or vinyl flexible label with acrylic pressure-sensitive adhesive.
 - a. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized to fit the cable and raceway diameter, such that the clear shield overlaps the entire printed legend.
3. Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
 - a. Nominal Size: 3.5-by-5-inch.
4. Marker for Tags: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.4 BANDS AND TUBES:

- A. Snap-Around, Color-Coding Bands for Raceways and Cables: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters of raceways or cables they identify, and that stay in place by gripping action.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Marking Services, Inc.
- B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameters of and shrunk to fit firmly around cables they identify. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Brady Corporation.
- b. 3M.

2.5 TAPES AND STENCILS:

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlton Industries, LP.
 - b. Champion America.
 - c. Ideal Industries, Inc.
 - d. Marking Services, Inc.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. emedco.
- C. Tape and Stencil for Raceways Carrying Circuits 600 V or Less: 4-inch-wide black stripes on 10-inch centers placed diagonally over orange background that extends full length of raceway or duct and is 12 inches wide. Stop stripes at legends.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LEM Products Inc.
 - b. Marking Services, Inc.
 2. Color and Printing:
 - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
 - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
- D. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.6 TAGS

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory screened or printed permanent designations; punched for use with self-locking cable tie fastener.
- C. Write-On Tags:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlton Industries, LP.
 - b. LEM Products Inc.
 - 2. Polyester Tags 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to raceway, conductor, or cable.
 - 3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.7 SIGNS

- A. Baked-Enamel Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch grommets in corners for mounting.
 - 3. Nominal Size: 7 by 10 inches.
- B. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Engraved legend.
 - 2. Thickness:
 - a. For signs up to 20 sq. inches, minimum 1/16-inch.
 - b. For signs larger than 20 sq. inches, 1/8 inch thick.
 - c. Engraved legend with black letters on white face.
 - d. Punched or drilled for mechanical fasteners.
 - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Verify identity of each item before installing identification products.

C. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

D. Apply identification devices to surfaces that require finish after completing finish work.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.

- G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.
- H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- I. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

3.3 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive vinyl label. Install labels at 10-foot maximum intervals.
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral: White.
 - 5) Ground: Green.
 - c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Install instructional sign, including the color code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive, self-laminating polyester labels with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.
- F. Conductors To Be Extended in the Future: Attach marker tape to conductors and list source.

- G. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker-tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- H. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control.
1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment.
- J. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- K. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- L. Equipment Identification Labels: Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Outdoor Equipment: Engraved, laminated acrylic or melamine label Stenciled legend 4 inches high.
 - b. Unless labels are provided with self-adhesive means of attachment, fasten them with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 2. Equipment To Be Labeled:
 - a. Enclosures and electrical cabinets.
 - b. Enclosed switches.
 - c. Enclosed circuit breakers.

- d. Enclosed controllers.
- e. Push-button stations.
- f. Power-transfer equipment.
- g. Contactors.
- h. Monitoring and control equipment.

END OF SECTION 26 0553

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SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Receptacles with integral GFCI, and associated device plates.
 - 2. Weather-resistant receptacles.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton (Arrow Hart).
 - 2. Hubbell Incorporated; Wiring Device-Kellems.
 - 3. Leviton Manufacturing Co., Inc.
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

- C. All receptacles shall be GFCI type.

2.3 GFCI RECEPTACLES

A. General Description:

1. Straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton (Arrow Hart).
 - b. Hubbell Incorporated; Wiring Device-Kellems.
 - c. Leviton Manufacturing Co., Inc.
 - d. Leviton Manufacturing Co., Inc.
2. Description:
 - a. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, and UL 498.
 - b. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.4 WALL PLATES

- A. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum, while-in-use type, with lockable cover.

2.5 FINISHES

A. Device Color:

1. Wiring Devices: Gray unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles.

3.3 IDENTIFICATION

- A. Comply with Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering for normal power circuits and red-filled lettering for emergency power circuits on face of plate, and durable wire markers or tags inside outlet boxes.

END OF SECTION 26 27 26

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SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Molded-case circuit breakers (MCCBs).
 - 2. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Include evidence of NRTL listing for series rating of installed devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet.

1.8 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Square D, by Schneider Electric
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- E. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

2.2 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Outdoor Locations: NEMA 250, Type 4X stainless steel.
 - 2. Hazardous Area (within wet well): NEMA 250, Type 7.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

END OF SECTION 26 28 16

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities and abandoning site utilities in place.
7. Temporary erosion and sedimentation control.

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- D. Plant-Protection Zone: Area surrounding individual shrubs or other vegetation to be protected during construction and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Engineer.
- C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises. Coordinate location with Owner's Representative.
- D. Utility Locator Service: Notify Sunshine One Call for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- F. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 31 20 00 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
- D. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Grind down stumps and remove roots larger than 2 inches (50 mm) in diameter, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
 - 3. Use only hand methods or air spade for grubbing within protection zones.
 - 4. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be reused or requested by the Owner.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 10 00

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SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Subsurface drainage backfill for walls and trenches.
3. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements:

1. Section 31 50 00 "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
 2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
- I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D 1586.
- J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- K. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- L. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- M. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct preexcavation conference at Project site.
1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.

- c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
- d. Extent of trenching by hand or with air spade.
- e. Field quality control.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 - 1. Geotextiles.
 - 2. Controlled low-strength material, including design mixture.
 - 3. Geofoam.
 - 4. Warning tapes.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - 1. Classification according to ASTM D 2487.
 - 2. Laboratory compaction curve according to ASTM D 698.
- C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.7 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.8 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify utility locator service and Owner for area where Project is located before beginning earth-moving operations.
- C. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- D. Do not direct vehicle or equipment exhaust towards protection zones.
- E. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.
1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

- H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33/C 33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Survivability: As follows:
 - a. Grab Tensile Strength: 157 lbf; ASTM D 4632.
 - b. Sewn Seam Strength: 142 lbf; ASTM D 4632.
 - c. Tear Strength: 56 lbf; ASTM D 4533.
 - d. Puncture Strength: 56 lbf; ASTM D 4833.
 - 3. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
 - 4. Permittivity: 0.5 per second, minimum; ASTM D 4491.
 - 5. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Survivability: As follows:
 - a. Grab Tensile Strength: 247 lbf; ASTM D 4632.
 - b. Sewn Seam Strength: 222 lbf; ASTM D 4632.
 - c. Tear Strength: 90 lbf; ASTM D 4533.
 - d. Puncture Strength: 90 lbf; ASTM D 4833.
 - 3. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
 - 4. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 - 5. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
1. Red: Electric.
 2. Yellow: Gas, oil, steam, and dangerous materials.
 3. Orange: Telephone and other communications.
 4. Blue: Water systems.
 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Engineer. Changes in the Contract Time may be authorized for rock excavation.
1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
 2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: minimum 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. For pipes and conduit 4 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
 - 2. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
 - 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- E. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.8 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing trash and debris.
 - 5. Removing temporary shoring, bracing, and sheeting.
 - 6. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill voids with satisfactory soil while removing shoring and bracing.
- D. Initial Backfill:
 - 1. Soil Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Final Backfill:
 - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
 - 4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
 - 3. Existing drainage courses shall be maintained and/or restored, unless otherwise shown on the drawings.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 - 2. Determine that fill material classification and maximum lift thickness comply with requirements.
 - 3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two test.

- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.15 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.16 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
- B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Engineer.
 - 1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00

SECTION 31 23 16 - EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for building foundations.
3. Excavating for Site structures.

B. Related Requirements:

1. Section 31 23 17 - Trenching: Excavating as required for utilities.
2. Section 31 23 23 - Fill: Backfilling at Site structures, and fill under slabs on grade and pavement.

1.2 REFERENCE STANDARDS

- A. Local utility standards when working within 24 inches of utility lines.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:

1. Indicate soil densification grid for each size and configuration footing requiring soil densification.
2. Excavation Protection Plan:
 - a. Describe sheeting, shoring, and bracing materials and installation, as required, to protect excavations and adjacent structures and property.
 - b. Submit signed and sealed Shop Drawings with design calculations and assumptions to support plan.

- C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Qualifications Statement:

1. Submit qualifications for licensed professional.

PART 2 - PRODUCTS

2.1 Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Section 01 70 00 - Execution and Section 01 77 00 - Closeout Procedures: Requirements for installation preparation.
- B. Utility Service Locator:
 - 1. Call local utility service-line information at 811 not less than three working days before performing Work.
 - 2. Request that underground utilities be located and marked within and immediately surrounding construction areas.
 - 3. Identify required lines, levels, contours, and data.
- C. Existing Utilities:
 - 1. Protect from damage utilities indicated to remain.
- D. Protect plant life, lawns and other features designated to remain as portion of final landscaping.
- E. Protect benchmarks, survey control points, existing structures, fences from excavating equipment and vehicular traffic.
- F. Do not close or obstruct roadways or hydrants without permits.

3.2 SOIL DENSIFICATION BY VIBRO-COMPACTION

- A. Description:
 - 1. Vibro-compact substrates below footing bearing surfaces for footings as indicated on Drawings before excavating Site.
 - 2. Densify existing subsoils with existing relative density rating of "compact to dense" to attain relative density rating of "very dense."
 - 3. Densify subsoils to depth of 3 feet.
- B. Equipment:
 - 1. Depth Vibrator:
 - a. Type: Poker.
 - b. Follower Tubes: Furnish visible marking every 12 inches to enable insertion depth measurement.
 - 2. Motion: Radial in horizontal plane.

3. Data Acquisition System: Record amps or pressure of vibrator motor over time and depth.

C. Procedure:

1. Perform densification in presence of Engineer.
2. Perform densification directly under each footing, with vibrator inserted in grid pattern at maximum 6 feet o.c.
3. Arrange compaction grid for each footing for maximum number of insertion points, and with outermost insertion points within bearing area of footings.
4. Adjust compaction grid arrangement and spacing as directed by Engineer to achieve required densification.
5. Insert vibrator to maximum specified depth, densify soils for 30 seconds or other time as directed by Engineer, and withdraw vibrator every 12 inches while repeating densification at each increment.
6. If subsurface obstruction prevents vibrator insertion to specified depth, request instructions from Engineer to compensate for obstruction.

D. Tolerances:

1. Maximum Deviation from Center of Completed Compaction: 8 inches from indicated position.
2. Maximum Deviation from Vertical: 4 degrees during vibrator insertion.

3.3 EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavation Work.
- B. Excavate subsoil to accommodate building foundations.
- C. Compact disturbed load-bearing soil in direct contact with foundations to original bearing capacity, as specified in Section 31 23 23 - Fill and Section 31 23 17 - Trenching.
- D. Slope banks with machine to angle of repose or less until shored.
- E. Do not interfere with 45 -degree bearing splay of foundations.
- F. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- G. Trim excavation and remove loose matter.
- H. Notify Engineer of unexpected subsurface conditions.
- I. Correct over-excavated areas with structural fill as specified in Section 31 23 23 - Fill as directed by Engineer.
- J. Remove excavated material from Site.
- K. Repair or replace items indicated to remain that have been damaged by excavation.

3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Section 01 77 00 - Closeout Procedures: Requirements for testing, adjusting, and balancing.
- B. Inspecting: Request visual inspection of bearing surfaces by Engineer before installing subsequent Work.

3.5 PROTECTION

- A. Section 01 70 00 - Execution and Section 01 77 00 - Closeout Procedures: Requirements for protecting finished Work.
- B. Prevent displacement or loose soil from falling into excavation, and maintain soil stability.
- C. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- D. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that may be created by earth operations.

END OF SECTION 31 23 16

SECTION 31 23 17 - TRENCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 31 23 23 - Fill: General backfilling.
2. Section 33 31 00 - Sanitary Utility Sewerage Piping: Sanitary sewer piping and bedding from doghouse manhole to lift station.
3. Section 40 05 13 – Lift Station Process Pipe and Fittings: PVC force main piping from lift station to existing force main

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 SUBMITTALS

- A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

- B. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- C. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.
- D. Materials Source: Submit name of imported fill materials suppliers.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Florida.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.7 COORDINATION

- A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Determination of source of materials for fill shall be the responsibility of the Contractor, but use of such materials shall be subject to approval of Engineer.

2.2 SHEETING, SHORING, AND BRACING

- A. Use structural steel
- B. Use shapes and sizes as required
- C. Designed by a licensed Professional Engineer for the project area for live and dead loads and groundwater conditions

PART 3 EXECUTION

3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
 - 1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- C. Maintain and protect above and below grade utilities indicated to remain.

3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume. Remove larger material.
- C. Perform excavation within 24 inches of existing utility service in accordance with utility's requirements.
- D. Do not advance open trench more than 200 feet ahead of installed pipe.
- E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
- F. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.
- G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.
- H. Do not interfere with 45 degree bearing splay of foundations.
- I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.
- K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Structural Fill and compact to density equal to or greater than requirements for subsequent backfill material.
- L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.
- N. Remove excess subsoil not intended for reuse, from site.

***** OR *****

- O. Stockpile subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.

3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

***** OR *****

- C. Design sheeting and shoring to be removed at completion of excavation work.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place geotextile fabric prior to placing subsequent fill materials.

***** OR *****

- D. Place material in continuous layers as follows:
 - 1. Subsoil Fill: Maximum 12 inches compacted depth.
 - 2. Structural Fill: Maximum 8 inches compacted depth.
 - 3. Granular Fill: Maximum 8 inches compacted depth.
- E. Employ placement method that does not disturb or damage foundation perimeter drainage, utilities in trench.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Do not leave more than 50 feet of trench open at end of working day.
- H. Protect open trench to prevent danger to the public.

3.6 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D1557.
- B. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D1556.
 - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
- D. Frequency of Tests: One test for every 2,000 square feet but not less than 3 tests per project site.

3.8 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.9 SCHEDULE

- A. Storm and Sanitary Piping:
 - 1. Cover pipe and bedding with Fill Type: To subgrade elevation.
 - 2. Compact uniformly to minimum 95 percent of maximum density.
- B. Duct Bank:
 - 1. Cover duct and bedding with Fill: To subgrade elevation.
 - 2. Compact uniformly to minimum 95 percent of maximum density.

END OF SECTION 31 23 17

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SECTION 31 23 18 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes construction dewatering.

1.3 ALLOWANCES

- A. Dewatering observation wells are part of dewatering bid item.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review condition of site to be dewatered including coordination with temporary erosion-control measures and temporary controls and protections.
 - 3. Review proposed site clearing and excavations.
 - 4. Review existing utilities and subsurface conditions.
 - 5. Review observation and monitoring of dewatering system.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For dewatering system, prepared by or under the supervision of a qualified professional engineer.
 - 1. Include plans, elevations, sections, and details.
 - 2. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
 - 3. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
 - 4. Include written plan for dewatering operations including sequence of well and well-point placement coordinated with excavation shoring and bracings and control procedures to be adopted if dewatering problems arise.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer land surveyor and professional engineer.
- B. Field quality-control reports.
- C. Existing Conditions: Using photographs or video recordings, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by dewatering operations. Submit before Work begins.
- D. Record Drawings: Identify locations and depths of capped wells and well points and other abandoned-in-place dewatering equipment.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.

1.8 FIELD CONDITIONS

- A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
 - 1. Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer.
 - 2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, prevention of flooding in excavation, and prevention of damage to subgrades and permanent structures.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 5. Remove dewatering system when no longer required for construction.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with water- and debris-disposal regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
 - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site or surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.
- D. Protect and maintain temporary erosion and sedimentation controls, which are shown on the Drawings.

3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - 1. Space well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Place dewatering system into operation to lower water to specified levels before excavating below ground-water level.
- C. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- D. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

- A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

- B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
 - 2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 3. Maintain piezometric water level a minimum of 24 inches below bottom of excavation.
- C. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.
- D. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

3.4 FIELD QUALITY CONTROL

- A. Observation Wells: Provide observation wells or piezometers, take measurements, and maintain at least the minimum number indicated; additional observation wells may be required by authorities having jurisdiction.
 - 1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
 - 2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
 - 3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.
- B. Survey-Work Benchmarks: Resurvey benchmarks monthly during dewatering and maintain an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.
- C. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.
- D. Prepare reports of observations.

3.5 PROTECTION

- A. Protect and maintain dewatering system during dewatering operations.
- B. Promptly repair damages to adjacent facilities caused by dewatering.

END OF SECTION 31 23 18

SECTION 31 23 23 - FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backfilling building perimeter to subgrade elevations.
2. Backfilling site structures to subgrade elevations.
3. Fill under slabs-on-grade.
4. Fill under paving.
5. Fill for over-excavation.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data for geotextile fabric indicating fabric and construction.

C. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.

- D. Materials Source: Submit name of imported fill materials suppliers.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Callaway standard.
- B. Maintain one copy of each document on site.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Subsoil Fill: Per Geotechnical report.
- B. Structural Fill: Per Geotechnical report.
- C. Granular Fill: Per Geotechnical report.
- D.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- B. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- C. Verify structural ability of unsupported walls to support loads imposed by fill.

3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of 6 inch.
- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place geotextile fabric over fill prior to placing next lift of fill.
- D. Place material in continuous layers as follows:
 - 1. Subsoil Fill: Maximum 12 inches compacted depth.
 - 2. Structural Fill: Maximum 8 inches compacted depth.
 - 3. Granular Fill: Maximum 8 inches compacted depth.
- E. Employ placement method that does not disturb or damage other work.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- H. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- I. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- J. Make gradual grade changes. Blend slope into level areas.
- K. Remove surplus backfill materials from site.
- L. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

- A. Top Surface of Backfilling Within Building Areas: Plus or minus 1/2 inch from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 1/2 inch from required elevations.

3.5 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM D1557.
- B. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. Moisture Tests: ASTM D3017.

- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests: One every 2,000 square feet, but never less than three per site.
- E. Proof roll compacted fill surfaces under slabs-on-grade, pavers, paving.

3.6 PROTECTION OF FINISHED WORK

- A. Reshape and re-compact fills subjected to vehicular traffic.

3.7 SCHEDULE

- A. Interior Crawl Spaces:

1. Fill Type per Geotechnical report, 8 inches thick, compact uniformly to 90 percent of maximum density.
2. Cover with Fill Type per Geotechnical report, 2 inches thick, compact uniformly to 95 percent of maximum density.

- B. Interior Slab-On-Grade:

1. Fill Type per Geotechnical report, 8 inches thick, compacted to 95 percent.
2. Cover with Fill Type per Geotechnical report, 2 inches thick, compact uniformly to 95 percent of maximum density.

- C. Exterior Side of Foundation Walls Retaining Walls and Over Granular Filter Material and Foundation Perimeter Drainage:

1. Fill Type per Geotechnical report, to subgrade elevation, each lift, compact uniformly to 90 percent of maximum density.

- D. Underground Tanks:

1. Initial fill of Fill Type per Geotechnical report, 8 inches thick, compacted to 95 percent.
2. Remaining fill of Fill Type per Geotechnical report, to subgrade elevation, compact uniformly to 95 percent of maximum density.

- E. Fill Under Grass Areas:

1. Fill Type per Geotechnical report, to 6 inches below finish grade, compact uniformly to 90 percent of maximum density.

- F. Fill Under Landscaped Areas:

1. Fill Type per Geotechnical report, to 12 inches below finish grade, compact uniformly to 90 percent of maximum density.
- G. Fill For Berming:
1. Fill Type per Geotechnical report, to 12 inches below finish grade, compact uniformly to 90 percent of maximum density.
- H. Fill for French Drains or Well Points:
1. Fill Type per Geotechnical report, to 12 inches below finish grade, compact uniformly to 90 percent of maximum density.
- I. Fill Under Interlocking Pavers:
1. Fill Type per Geotechnical report, to underside of sand leveling bed, compact uniformly to 95 percent of maximum density.
- J. Fill Under Asphalt and Concrete Paving:
1. Compact subsoil to 95 percent of its maximum dry density.
 2. Fill Type per Geotechnical report, to 6 inches below finish paving elevation, compact uniformly to 95 percent of maximum density.
- K. Planter Boxes:
1. Fill Type per Geotechnical report, lightly tamped.
- L. Fill to Correct Over-excavation:
1. Lean concrete to minimum compressive strength of 1000 psi.
 2. Fill Type per Geotechnical report, flush to required elevation, compact uniformly to 95 percent of maximum density.

END OF SECTION 31 23 23

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SECTION 31 25 01 - SEDIMENTATION AND EROSION CONTROL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals necessary to perform all installation, maintenance, removal, and area cleanup related to sedimentation control work as shown on the Drawings and as specified herein or as required to prevent the transport of silt or sediment outside the limits of construction. The work shall include, but not necessarily be limited to, installation of temporary access ways and staging areas, silt fences, temporary seeding, turbidity barriers, sediment removal and disposal, device maintenance, removal of temporary devices, temporary mulching, and final cleanup.
- B. The CONTRACTOR shall prepare a Sedimentation and Erosion Control Plan. This plan shall be used as a minimum in developing the Pollution Prevention Plan for the NPDES permit application (notification) to be filed by the CONTRACTOR.

1.2 SUBMITTALS

- A. Within 10 days after award of Contract, the CONTRACTOR shall submit to the ENGINEER for approval, technical product literature for all commercial products to be used for sedimentation and erosion control.

1.3 QUALITY ASSURANCE

- A. The CONTRACTOR shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the movement of sediment from the construction site to off-site areas, via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment outside the limits of construction shall be installed, maintained, removed, and cleaned up at the expense of the CONTRACTOR. No additional charges to the OWNER will be considered.
- B. Sedimentation and erosion control measures shall conform to the Best Management Practices outlined in the Drawings and in the Florida Development Manual.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Silt Fence

1. Steel posts shall be a minimum of 5 feet in length, 2-1/2-in by 2-1/2-in by 1/4-in angle post with self-fastening tabs and a 5-in by 4-in (nominal) steel anchor plate at bottom.
2. Welded wire fabric shall be 4-in by 4-in mesh of 12 gauge by 12 gauge steel wire.
3. Silt fence fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X as manufactured by Mirafi, Inc., Charlotte, NC or equal.
4. Tie wires for securing silt fence fabric to wire mesh shall be light gauge metal clips (hog rings), or 1/32-in diameter soft aluminum wire.
5. Prefabricated commercial silt fence may be substituted for built-in-field fence. Pre-fabricated silt fence shall be "Envirofence" as manufactured by Mirafi Inc., Charlotte, NC or approved equal.

- B. Turbidity Barriers: Turbidity barriers meeting FDOT Type I and Type II requirements shall be provided. Turbidity barrier may be floating or staked, based on the conditions at the location for installation. Turbidity barrier shall be capable of functioning properly for flow conditions up to a 5 year/24 hour storm event. Turbidity barriers shall be constructed of PVC or polypropylene material, all portions which will be exposed to direct sunlight shall be ultraviolet resistant. All metal components shall be corrosion resistant. Woven materials may be acceptable for installations where high flow conditions may exist during storm events. Turbidity barriers shall be "Mark I", "Mark II", or "PC-2" as manufactured by American Boom & Barrier Corporation, Cape Canaveral, FL or approved equal.

- C. Straw mulch shall be utilized on all newly graded areas to protect areas against washouts and erosion. Straw mulch shall be comprised of threshed straw of oats, wheat, barley, rye, or hay that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

- D. Latex acrylic copolymer, such as Soil Sealant with coalescing agent as manufactured by Soil Stabilization Co., Merced, CA or approved equivalent shall be used as straw mulch tackifier.

- E. An asphalt tackifier may be used in place of a latex acrylic copolymer with prior written approval from the ENGINEER.

- F. Temporary Grassing: Certain areas of Grassing constructed in accordance with Section 33 31 00 may be designated by the ENGINEER as temporary erosion control features. The ENGINEER may determine that permanent type grass seed be omitted from Grassing and the specified rate of spread for fertilizer used in conjunction with grassing

operations be reduced when such work is designated as a temporary erosion control feature.

- G. Baled Hay or Straw: This work shall consist of construction of baled hay or straw dams to protect against downstream accumulations of silt. The baled hay or straw dams shall be constructed in accordance with the details in the FDOT Roadway and Traffic Design Standards. All baled hay or straw utilized shall comply with the provisions of FDOT Specification Section 104 for dry mulch.
- H. Erosion control matting shall be installed as shown on the drawings or as approved by the Engineer. Erosion control matting shall be North American Green P300 or approved equal.
- I. Excelsior matting shall be installed as shown on the drawings or as approved. Excelsior matting shall be North American Green SC150 or approved equal.
- J. Fabric formed concrete erosion protection shall be Armorform as manufactured by Nicolon, or equal. Material shall correspond to the 4-inch thick Uniform Section Mat (USM), or approved equal.

PART 3 - EXECUTION

3.1 LOCATION OF SEDIMENT/EROSION CONTROL AND TURBIDITY BARRIERS

- A. At a minimum, sediment/erosion control devices shall be installed at all locations shown on the plans and specified herein.
- B. Sediment/erosion control devices shall be installed at 500 feet intervals along all swales and ditches constructed and around all installed drainage structures prior to placement of sod.
- C. Sediment/erosion control shall be installed along all limits of construction.
- D. CONTRACTOR shall provide additional sediment/erosion control and turbidity barriers as needed to control the transport of silt and sediments outside of the limits of construction.
- E. Sediment/erosion control shall be installed around the base of all soil stockpile areas.
- F. Sediment/erosion control devices shall be installed along the perimeter of all staging areas.
- G. All disturbed areas, greater than one (1) acre, in which construction activities have stopped and are not anticipated to resume for a period of three months or longer shall be temporarily seeded, within five days of stoppage of construction.

- H. All disturbed areas, greater than one (1) acre, in which construction activities have been stopped and are not anticipated to resume for a period of 21 days, but not longer than three months shall be temporarily mulched, within five days of stoppage of construction in accordance with Paragraph 3.4.

3.2 INSTALLATION

A. Silt Fence Installation

1. Silt fences shall be positioned as specified indicated on the Drawings and as necessary to prevent movement of sediment produced by construction activities outside of the limits of construction or as approved.
2. Dig trench approximately 6-in wide and 6-in deep along proposed fence lines.
3. Drive metal-stakes, 8 feet on center (maximum) at back edge of trenches. Stakes shall be driven 2 feet (minimum) into ground.
4. Hang 4 by 4 woven wire mesh on posts, setting bottom of wire in bottom of trench. Secure wire to posts with self-fastening tabs.
5. Hang filter fabric on wire carrying to bottom of trench with about 4-in of fabric laid across bottom of trench. Stretch fabric fairly taut along fence length and secure with tie wires 12-in O.C. both ways.
6. Backfill trench with excavated material and tamp.
7. Install pre-fabricated silt fence according to MANUFACTURER's instructions.

B. Hay Bale Barrier

1. Bales shall be either wire-bound or string-tied with the bindings oriented around the sides rather than over and under the bales.
2. Bales shall be placed lengthwise in a single row with the ends of adjacent bales tightly abutting one another.
3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After bales are staked and chinked, the excavated soil shall be backfilled against the barrier. Backfilled material shall conform to the ground level on the downhill side and shall be built up to 2 inches against the uphill side.
4. Each bale shall be securely anchored by at least two stakes or rebars driven through the bale. The first stake shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven deep enough into the ground to securely anchor the bales.
5. The gaps between each bale shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales.

C. Turbidity Barriers

1. Turbidity barriers should extend the entire depth of the water.
2. Turbidity barriers should not be placed perpendicular to flow. Barriers should be installed at an angle to the flow. Angle should be determined on the amount of flow in the waterway and the MANUFACTURER's recommendation.
3. Turbidity barrier should be 10 to 20 percent longer than the straight line measurement.

4. Joints between panels should be kept to a minimum.
5. Barrier should extend to the top of bank. All ends should be secured firmly to the shoreline.
6. Where significant flow is anticipated, a heavy woven pervious filter fabric may be substituted.

D. Inlet Protection

1. Inlet protection shall be installed for all catch basins, drop inlets, drop structures, inlets to drainage pipes, or other structures.
2. A 5-foot strip of sod shall be laid surrounding the perimeter of each structure.
3. A silt fence or haybale barrier shall be installed around the perimeter of the sodded area.

E. Fabric Formed Concrete Erosion Protection

1. Fabric formed concrete erosion protection shall be installed as shown on the drawings and in accordance with MANUFACTURER's recommendations.

F. Erosion Control and Excelsior Matting

1. Erosion control and excelsior matting blankets shall be installed as shown on the drawings and as approved in accordance with MANUFACTURER's instructions. The area to be covered shall be properly prepared before the blanket is applied. When the blanket is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area. The blankets shall be applied in the direction of water flow, and stapled. Blankets shall be placed a minimum of three rows (of 4-ft) wide (total approx. 12-ft width) and stapled together in accordance with MANUFACTURER's instructions. Side overlaps shall be 6-in minimum. The staples shall be made of wire, 0.091-in in diameter or greater, "U" shaped with legs 10-in in length and a 1-1/2-in crown. The staples shall be driven vertically into the ground, spaced approximately 2 linear feet apart, on each side, and one row in the center alternately spaced between each side. Upper and lower ends of the matting shall be buried to a depth of 4-in in a trench. The bottom of the fold shall be 4-in below the ground surface. Staple on both sides of fold. Where the matting must be cut or more than one roll length is required, turn down upper end of downstream roll into a trench to a depth of 4-in. Overlap lower end of upstream roll 4-inches past edge of downstream roll and staple.
2. To ensure full contact with soil surface, roll matting with a roller weighing 100 pounds per foot of width perpendicular to flow direction after placing matting, stapling and seeding and sodding. Thoroughly inspect channel after completion. Correct any areas where matting does not present a smooth surface in full contact with the soil below.

3.3 MAINTENANCE AND INSPECTIONS

A. Inspections

1. CONTRACTOR shall make a visual inspection of all sedimentation and erosion control devices (including turbidity barriers) once per week and promptly after

every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to areas outside the limits of construction, CONTRACTOR shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.

2. CONTRACTOR shall keep a log of all inspections indicating the following:
 - a. Date and time of inspection
 - b. Inspector
 - c. Amount of rainfall
 - d. Erosion and sediment control devices inspected
 - e. Condition of sediment and erosion control devices
 - f. Repairs needed
 - g. Date repair is completed

B. Device Maintenance

1. Silt Fences
 - a. Remove accumulated sediment once it builds up to one-half of the height of the fabric.
 - b. Replace damaged fabric, or patch with a 2-ft minimum overlap.
 - c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.
2. Hay Bale Barriers
 - a. Remove accumulated sediment once it builds up to one-half of the height of the hay bales.
 - b. Replace damaged hay bales.
 - c. Make other repairs as necessary to ensure that the hay bales are filtering all runoff directed to the barrier.
3. Inlet Protection
 - a. Remove accumulated sediment once it builds up to one-half of the height of the barrier.
 - b. Remove all sediment accumulated within the barrier and replace damaged sod.
 - c. Make other repair as necessary to ensure that the inlet protection device is operating properly.
4. Turbidity Barriers
 - a. Turbidity barriers shall be inspected on a daily basis.
 - b. Replace damaged fabric, or patch with a 2 foot minimum overlap.
 - c. Make other repairs as necessary to ensure barriers are effectively maintaining turbidity levels outside of the barrier within regulatory limits.

3.4 TEMPORARY MULCHING

- A. Apply temporary mulch to areas where rough grading has been completed but final grading is not anticipated to begin within 21 days of the completion of rough grading. If construction activities are not planned to resume for three months or longer, the temporary seeding requirements shall be followed.

- B. Straw mulch shall be applied at rate of 2,000 lbs/acre and tackified with latex acrylic copolymer at a rate of 1 gal/1000 ft² diluted in a ratio of 30 parts water to 1 part latex acrylic copolymer mix.
- C. After temporary mulching, traffic should be kept to a minimum, except for designated temporary access roads.

3.5 REMOVAL AND FINAL CLEANUP

- A. Once the site has been fully stabilized against erosion, remove sediment control devices and all accumulated silt. Dispose of silt and waste materials in proper manner. Regrade all areas disturbed during this process and stabilize against erosion with surfacing materials as indicated on the Drawings or specified herein.

END OF SECTION 31 25 01

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SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes temporary excavation support and protection systems.
- B. Related Requirements:
 - 1. Section 31 20 00 "Earth Moving" for excavating and backfilling and for controlling surface-water runoff and ponding.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review existing utilities and subsurface conditions.
 - 2. Review coordination for interruption, shutoff, capping, and continuation of utility services.
 - 3. Review proposed excavations.
 - 4. Review proposed equipment.
 - 5. Review monitoring of excavation support and protection system.
 - 6. Review coordination with waterproofing.
 - 7. Review abandonment or removal of excavation support and protection system.

1.4 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Using photographs or video recordings, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.

1.5 FIELD CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 - 1. Notify Engineer no fewer than two days in advance of proposed interruption of utility.

2. Do not proceed with interruption of utility without Engineer's written permission.
- B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide, design, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting earth and hydrostatic pressures and superimposed and construction loads.
1. Contractor Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer.
 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 3. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
 4. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

2.2 MATERIALS

- A. General: Provide materials that are either new or in serviceable condition.
- B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.
- C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.
1. Corners: Roll-formed corner shape with continuous interlock.
- D. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- E. Tiebacks: Steel bars, ASTM A 722/A 722M.
- F. Tiebacks: Steel strand, ASTM A 416/A 416M.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction so that construction and finishing of other work is not impeded.

3.2 SHEET PILING

- A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.
- B. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- C. Cut tops of sheet piling to uniform elevation at top of excavation.

3.3 TIEBACKS

- A. Drill, install, grout, and tension tiebacks.
- B. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
 - 1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.
- C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.4 BRACING

- A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
 - 1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Engineer.
 - 2. Install internal bracing if required to prevent spreading or distortion of braced frames.
 - 3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 FIELD QUALITY CONTROL

- A. Survey-Work Benchmarks: Resurvey benchmarks weekly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Engineer if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
- B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.
- C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.6 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
 - 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
 - 2. Fill voids immediately with approved backfill compacted to density specified in Section 31 20 00 "Earth Moving."
 - 3. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by removing excavation support and protection systems.
- B. Leave excavation support and protection systems permanently in place.

END OF SECTION 31 50 00

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Galvanized-Steel chain link fabric.
- 2. Galvanized-steel framework.

- B. Related Sections:

- 1. Section 03 30 53 "Miscellaneous Cast-in-Place Concrete for post footings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has at least three years' experience and has completed at least five chain link fence projects with same material and of similar scope to that indicated for this Project with a successful construction record of in service performance.
- B. Single Source Responsibility: Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE

A. Reinforced Vinyl Fence Fabric

1. Fabric Diameter & Finish: As indicated on Drawings.
 - a. 3-1/2" x 5" mesh by 9 ga. (0.148") galvanized before weaving per ASTM A392 & A817, 1.2 oz Type II Class 4. 3-1/2" x 5" mesh by 9 ga. (0.148") galvanized before weaving per ASTM A392 & A817, 1.2
2. Fabric Color: The vinyl coated chain link fabric shall be white. The privacy slats shall be double wall, self-locking and approximately 2.85" wide to provide a tight fit in the fence fabric and provide a 98% approximate privacy. The privacy slats shall be manufactured from virgin, high density polyethylene and shall be white.

2.2 FENCE FRAMING

- A. Posts and Rails: Comply with ASTM F 1083 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1083 based on the following:
1. Fence Height: 72 inches.
 2. Heavy Industrial Strength: Material Group IA, round steel pipe, Schedule 40
 - a. End, Corner, Line, and Pull Post: 4.0 inches in diameter.
 3. Horizontal Framework Members: top and bottom rails complying with ASTM F 1043.
 - a. Top Rail: 2.375 inch OD Type I or II Steel Pipe.
 4. Brace Rails: Comply with ASTM F 1043.
 5. Metallic Coating for Steel Framing:
 - a. Type A, consisting of not less than minimum 2.0-oz./sq. ft. average zinc coating per ASTM A 123/A 123M or

2.3 TENSION WIRE

- A. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824, with the following metallic coating:

2.4 HORIZONTAL-SLIDE GATES

- A. General: Comply with ASTM F 1184 for gate posts and single sliding gate types.
 - 1. Classification: Type I Overhead Slide.
 - a. Gate Leaf Width: As indicated.
 - b. Gate Fabric Height: As indicated.
- B. Pipe and Tubing:
 - 1. Zinc-Coated Steel: Protective coating and finish to match fence framing.
 - 2. Gate Posts: Comply with ASTM F 1184. Provide round tubular steel posts.
 - 3. Gate Frames and Bracing: Round tubular steel.
- C. Frame Corner Construction: Welded.
- D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame as indicated as required to attach barbed wire assemblies.
- E. Overhead Track Assembly: Manufacturer's standard track, with overhead framing supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.

2.5 FITTINGS

- A. General: Comply with ASTM F 626.
- B. Post Caps: Provide for each post.
 - 1. Provide line post caps with loop to receive tension wire or top rail.
- C. Rail and Brace Ends: For each gate, corner, pull, and end post.
- D. Rail Fittings: Provide the following:
 - 1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
 - 2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails in the fence line-to-line posts.

- E. Tension and Brace Bands: Pressed steel.
- F. Tension Bars: Steel length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
- G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading and turnbuckle or other means of adjustment.
- H. Barbed Wire Arms: Pressed steel or cast iron, with clips, slots, or other means for attaching strands of barbed wire, and means for attaching to posts for each post unless otherwise indicated, and as follows:
 - 1. Provide line posts with arms that accommodate top rail or tension wire.
 - 2. Provide corner arms at fence corner posts, unless extended posts are indicated.
 - 3. Type I, single slanted arm.
 - 4. Type II, single vertical arm.
 - 5. Type III, V-shaped arm.
 - 6. Type IV, A-shaped arm.
- I. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
 - 1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - a. Hot-Dip Galvanized Steel: 0.106-inch- diameter wire galvanized coating thickness matching coating thickness of chain-link fence fabric.
- J. Finish:
 - 1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.

2.6 BARBED WIRE

- A. Steel Barbed Wire: Comply with ASTM A 121, for two-strand barbed wire, 0.099-inch-diameter line wire with 0.080-inch- diameter, four-point round barbs spaced not more than 5 inches o.c.
 - 1. Zinc Coating: Type Z, Class 3.

2.7 GROUT AND ANCHORING CEMENT

- A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

- B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

2.8 FENCE GROUNDING

- A. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 - 1. Material above Finished Grade: Copper.
 - 2. Material on or below Finished Grade: Copper.
 - 3. Bonding Jumpers: Braided copper tape, 1 inch wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- B. Connectors and Grounding Rods: Comply with UL 467.
 - 1. Connectors for Below-Grade Use: Exothermic welded type.
 - 2. Grounding Rods: Copper-clad steel, 5/8 by 100 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.
 - 1. Install fencing on established boundary lines inside property line.

3.3 CHAIN-LINK FENCE INSTALLATION

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

- B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
 - 1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - 2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - a. Exposed Concrete: Extend 1 inches above grade; shape and smooth to shed water.
- C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.
- D. Line Posts: Space line posts uniformly at 96 inches o.c.
- E. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
 - 1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
- F. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
 - 1. Extended along top and bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.
- G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- H. Intermediate and Bottom Rails: Install and secure to posts with fittings.
- I. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- J. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.
- K. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- L. Barbed Wire: Install barbed wire uniformly spaced as indicated on Drawings. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.
- M. Barbed Tape: Comply with ASTM F 1911. Install barbed tape uniformly in configurations indicated and fasten securely to prevent movement or displacement.

3.4 GATE INSTALLATION

- A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.5 GROUNDING AND BONDING

- A. Fence Grounding: Install at maximum intervals of 100 feet.
- B. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet on each side of crossing.
- C. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.
- D. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location, including the following:
 1. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
 2. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
- E. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
- F. Connections: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- G. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

3.6 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware and other moving parts.

END OF SECTION 32 31 13

SECTION 33 05 07.13 - HDPE PIPE INSTALLATION BY HORIZONTAL DIRECTIONAL DRILL (HDD)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

- A. The extent of directional boring is shown on the drawings.
- B. The work included in this section covers the installation of carrier pipe for force mains by the directional boring (trenchless installation) method as described herein, within the limits indicated on the drawings. In general, include bore pit, pilot hole (as required), drilling fluids, carrier pipe, removal and disposal of drilling fluids and soil cuttings, soil reports as required by jurisdictional agencies, siltation and sediment control, and other work required to install the carrier pipe as specified herein and as shown on the drawings.
- C. Contractor shall furnish labor, equipment, materials, and supplies, and shall perform the work necessary to provide Owner with a complete, finished force main crossing via horizontal directional drilling.
- D. The proposed alignment length, profile and grade to which the force main shall be installed are noted on the applicable drawings. This profile indicates the minimum grade to which the pipe shall be installed.

1.3 DESIGN/PERFORMANCE REQUIREMENTS

- A. Provide design engineering for the work as described in paragraph 1.2 and as described herein and on the contract drawings, including, but not limited to, the following elements:
 - 1. Bore hole diameter and length,
 - 2. Location of borehole entry and exit points,
 - 3. Drilling procedures,
 - 4. Pipeline pulling operations,
 - 5. Method of drilling fluid disposal,
 - 6. Area required for drilling operations and storage of pipe,
 - 7. Drilling fluids management plan, and

8. Review of plan and profile drawings and proposed horizontal and vertical alignment of the pipeline, with written certification of agreement with them, or recommended departure from them.
- B. Contractor's submitted design shall be signed and sealed by a Professional Engineer whose specialty includes design of horizontal drilling operations. The cost of these engineering services shall be included in the bid price.
- C. Contractor shall be responsible for conducting the job in accordance with applicable federal, state, and local permits, codes, and statutes.
- D. Contractor shall be responsible for keeping driveways and roadways accessible to traffic during the pipe joining and pulling operations by bridging over the area, providing ramps or other acceptable means approved by Engineer. This work shall be at no additional cost to Owner.

1.4 SUBMITTALS

- A. Drawings: Working drawings showing in detail the size and location of boring pits together with sheeting and shoring to be used in supporting embankments and trench walls, and any other details of the proposed methods of installation required to allow adequate review by the Engineer. Contractor shall prepare a drilling plan indicating equipment proposed for each location, pull-back forces anticipated, and shall verify that the DR of the pipe specified is adequate to withstand the anticipated pull-back forces in addition to the earth, line, and groundwater loads.
- B. Shop Drawings: Complete layout and details for fabrication and installation of pipeline; including design data and calculations. Submittal shall include, but not be limited to, elements listed in paragraph 1.2 A.
- C. Task Schedule: Detailed schedule of tasks for each stage or operation involved in the work of this section. Include as a minimum the following major tasks:
 1. Preparatory earthwork operations,
 2. Drilling rig mobilization and set-up,
 3. Pipe delivery and on-site pipe joining operations,
 4. Pilot hole drilling and reaming operations,
 5. Pipeline pulling operations,
 6. Pipeline hydrostatic testing,
 7. Drilling fluid disposal, and
 8. Restoration and demobilization.
- D. Task Schedule shall conform to contract schedule as outlined in the General Provisions.
- E. On completion of pilot hole phase of each drill site, a complete set of "as-built" records shall be submitted in duplicate to the Engineer. Include copies of the plan and profile drawing, as well as directional survey reports as recorded during the drilling operation.

Upon completion, drawings shall be submitted to the Engineer in ACAD 2000 file format.

- F. Provide technical data of equipment to be utilized.
- G. Prior to approval, submit the names of supervisory field personnel and historical information of directional boring experience.
- H. Submit MSDS (Material Safety Data Sheets) information for the drilling slurry compounds.
- I. Disposal Plan: Describe Contractor's plans for disposal of the drilling fluid and the names, addresses, and telephone numbers of subcontractors who will be performing any portion of the disposal activities. At a minimum the plan shall include:
 - 1. Disposal method,
 - 2. Disposal hauler(s),
 - 3. Disposal locations,
 - 4. Estimated quantity to be disposed,
 - 5. Type of vehicle hauling drilling fluids,
 - 6. Signed statement that hauling equipment (ie., vehicle, tanker, dump truck, trailer, etc.) meets requirements of state agencies, and
 - 7. Letter from proposed disposal site(s) accepting material.
- J. Erosion Control Plan: Submit prior to the preconstruction conference. It shall be a written, detailed plan for the accomplishment of acceptable erosion control on the project. The plan shall describe necessary temporary measures to be implemented for preventing soil erosion from the construction site until permanent erosion control and finished surfaces are installed. The plan shall comply with federal (if applicable), state and local requirements.
- K. Pipe Connection Procedures: Submit to the Engineer prior to connecting any pipe. For plastic (HDPE) pipe, submit the pipe manufacturer's representative's written approval of his procedures.

1.5 PERMITS

- A. Obtain necessary permits prior to construction. Keep copies of the permits on site during construction operations.

1.6 QUALITY ASSURANCE

- A. Crossings must conform to applicable requirements of utility companies affected, State Highway Department, and environmental agencies.
- B. Qualifications: Contractor shall be thoroughly experienced in the type construction contemplated herein.

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- C. Demonstrate expertise in trenchless methods by providing a list of five references for whom similar work has been performed within the last two years. Two of the references shall be from projects where the SAME SIZE OR LARGER pipe than the largest carrier pipe specified in the contract documents was successfully installed at a linear distance greater than or equal to the longest bore required by the contract documents. The references shall include a name and telephone number where contact can be made to verify capability. The subcontractor shall provide documentation showing successful completion of projects used for reference. Conventional trenching experience shall not be considered applicable.
- D. Upon completion of carrier pipe installation, pass a mandrel through the entire length of the bore in the presence of Owner's representative to inspect for roughness and necking. Mandrel shall not be more than two-inches in diameter smaller than the ID of the carrier pipe installed. Mandrel and towrope shall be constructed of materials that will not scar or harm the carrier pipe in any manner.
- E. Pipe Manufacturer's Quality Control: The pipe manufacturer shall have an ongoing Quality Control program for incoming and outgoing materials. High-density polyethylene (HDPE) resins for manufacturing of pipe shall be checked for density, melt flow rate, and contamination. NSF shall approve these incoming resins before being converted to pipe. Pipe shall be checked for outside diameter, wall thickness, length, roundness, and surface finish on the inside and outside and end cut.
- F. Fittings Manufacturer's Quality Control: The fitting manufacturer shall have an ongoing quality control program for incoming and outgoing materials. Molded fittings shall be inspected for voids and knit lines. Fabricated fittings shall be inspected for joint quality and alignment. Fabricated fitting welds shall be made using a Data Logger. The fitting manufacturer shall maintain a record of the temperature, pressure, and graph of the fusion cycle.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The pipe and fitting manufacturer shall package products for shipment in a manner suitable for safe transport on commercial carriers. When delivered, a receiving inspection shall be performed, and any shipping damage reported to the pipe and fittings manufacturer. Pipe and fittings shall be handled, installed, and tested in accordance with manufacturer's recommendations and the requirements of this specification.
- B. Deliver and store materials as directed by Owner.
- C. Secure project materials and bear the cost of replacing any materials that may become misplaced or stolen.

1.8 JOB CONDITIONS

- A. Protect against surface subsidence, damage, or disturbance of adjacent property and facilities from construction methods.
- B. Each directional boring crew shall have a reasonable proportion of experienced men. A superintendent and/or engineer experienced in directional boring methods and techniques, and who represents the boring contractor, shall be present at all times while work is proceeding. He shall also be responsible for the frequent checking of line and grade, if needed. Tolerances should be agreed to in the light gradient and easement requirements.
- C. Coordinate and schedule construction work.

1.9 SAFETY

- A. Drilling equipment shall have a permanent inherent alarm system capable of detecting an electrical current. Ground system shall be equipped with an audible alarm to warn the operator when the drill head nears electrified cable.
- B. Crews shall be provided with grounded safety mats, heavy gauge ground cables with connectors, and hot boots and gloves.
- C. Supervisory personnel shall be adequately trained and have direct supervisory experience in directional boring.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Drilling fluid shall be a gel-forming colloidal fluid consisting of at least 10% of high-grade bentonite, which is totally inert and contains no environmental risk, or equal.
- B. Carrier Pipe for Force Main:
 - 1. Pipe and fittings shall be high-density polyethylene manufactured from NSF approved PLEXCO P34CH compound, PE 4710, or equal.
 - 2. Pipe shall meet AWWA C-906, PE Pressure Pipe and Fittings 4" – 53" for Distribution and shall be marked with the NSF-pw logo. Force main shall be impregnated with three, 1" green stripes the length of the pipe, both equally spaced around the pipe.
 - 3. Hydrostatic design stress (HDS) shall be 800 psi at 73.4°F with a minimum pipe DR of 11 and operating pressure of 200 psi at 73.4°F.
 - 4. Pipe and fittings shall be produced by the same manufacturer from identical materials meeting the requirements of this specification.

5. Molded fittings shall meet the requirements of ASTM D-3261 and this specification. At the point of fusion, the outside diameter and minimum wall thickness of fitting butt fusion outlets shall meet the outside diameter and minimum wall thickness specifications of ASTM F-714 for the same size of pipe.
6. Pipe shall be manufactured in accordance with ASTM F-714, ASTM D-3035, or the applicable dedicated service specification. Print line markings shall include a production code from which the location and date of manufacture can be identified. Upon request, the manufacturer shall provide an explanation of his production code.
7. Pipe Marking: HDPE color coding shall be in accordance with the marking requirements specified herein.

Base Bid – High Density Polyethylene Pipe (HDPE) Pipe						
<u>Pipe Description</u>	<u>AWWA</u>	<u>Outside Di- ameter (in.)</u>	<u>DR</u>	<u>Color</u>	<u>Pressure Class (psig)</u>	<u>Inner Diameter (in.)</u>
4” HDPE FM (DIPS)	C-906	4.8	11	Green	200	3.875

C. ACCEPTABLE PIPE MANUFACTURER

1. Performance Pipe, Driscoplex 4000, PE 3408, AWWA C-906, DIPS sizing, Richardson TX, (800) 527-0662; Supplier: ISCO Industries, Grand Bay, AL, 1-800-345-4726
2. JM Eagle, 5200 West Century Blvd, Los Angeles, CA 90045, 1-800-621-4404
3. Engineer approved equal.

D. Butt fusion Fittings: HDPE fittings shall be PE 4710 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99, and approved for AWWA use. Butt fusion fittings shall have a manufacturing standard of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings shall be manufactured using Data Loggers. Temperature, fusion pressure, and a graphic representation of the fusion cycle shall be part of the Quality Control records. Fittings shall be suitable for use as pressure conduits, and per AWWA C906, shall have nominal burst values of three and one-half times the working pressure rating of the fitting.

E. Transition Fittings: Terminate HDPE pipe with fusion welded flanges (125 lb bolt pattern). See below for alternate fusion procedures.

F. Tracer wire shall be two strands of 6ga. Copper with green insulation.

2.2 EQUIPMENT

A. Directional Drilling Equipment

1. General: The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pull back the pipe, a drilling

fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the installation, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused (if required), a magnetic guidance system or walk over system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, and trained and competent personnel to operate the system. Equipment shall be in good, safe condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of the project.

2. Drilling Rig: The directional drilling machine shall consist of a hydraulically powered system to rotate and push hollow drilling pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing, and rotating pressure required to complete the installation. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pullback pressure during pullback operations. There shall be a system to detect electrical current from the drill string and an audible alarm that automatically sounds when an electrical current is detected.
3. Drill Head: The drill head shall be steerable by changing its rotation and shall provide necessary cutting surfaces and drilling fluid jets.

B. GUIDANCE SYSTEM

1. General: An electronic walkover tracking system or a Magnetic Guidance System (MGS) probe or proven gyroscopic probe and interface shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at depths up to fifty feet and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate and calibrated to manufacturer's specifications of the vertical depth of the borehole at sensing position at depths up to fifty feet and accurate to 2-feet horizontally.
2. Components: Supply components and materials to install, operate, and maintain the guidance system.
3. Guidance System shall be of a proven type, and shall be set up and operated by personnel trained and experienced with the system. Operator shall be aware of any geo-magnetic anomalies and shall consider such influences in the operation of the guidance system.

2.3 JOINING METHODS

- A. Butt fusion joining: Plain end pipe and fittings shall be made using butt fusion. The butt fusion procedures shall be in accordance with the manufacturer or the PPI. The fusion equipment operator shall receive training using the recommended procedure. Contractor

shall verify that the fusion equipment is in good operating condition and that the operator has been trained within the past twelve months. Fusion equipment shall be equipped with a Data Logger. Records of the welds (heater temperature, fusion pressure, and a graph of the fusion cycle) shall be maintained for five (5) years. Fusion beads shall not be removed.

- B. Mechanical Joining: Polyethylene pipe and fittings shall be joined together using flanges or mechanical joint adapters. These fittings shall be made from PE 3048 HDPE, with a Cell Classification of 345464C as determined by ASTM D3350-99. Flanged and MJ adapters shall have a manufacturing standard of ASTM D3261. They shall have a pressure rating equal to the pipe unless otherwise specified on the plans.
- C. Electrofusion couplings: Polyethylene pipe and fittings shall be joined using approved electrofusion couplings. Fittings shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99. Electrofusion fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. Electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, shall have nominal burst values of three and one-half times the working pressure rating of the fitting.

PART 3 - EXECUTION

3.1 EXECUTION

- A. Set grade stakes, lines, and levels.
- B. Coordinate the locations of underground utilities with appropriate companies. Advise Engineer immediately if conflict exists. Locate existing utilities using ground-penetrating radar.
- C. Operate and maintain equipment as required to keep the work free from excessive spoil and environmental risks.
- D. Install siltation fences, sediment barriers, etc. as required and shown on Contractor's Erosion Control Plan drawings.
- E. Perform the necessary general earthwork operations as required for the directional drilling and pipe pulling operations.
- F. Restore to pre-work conditions the areas impacted by Contractor's work effort.
- G. Construct appropriate means of temporary access to the designated work sites.
- H. Accept liability for damages caused as a result of the work.

3.2 INSTALLATION

- A. Installation shall be in a trenchless manner producing continuous bores. The entry point shall be where shown on the plan submitted as required in 1.2 above. The exit point for the drilled hole shall be within 5 feet laterally and within 10 feet longitudinally of where shown on the plan submitted as required in 1.2 above. No exception to this requirement shall be allowed.
- B. The tunneling system shall be remotely steerable and shall permit electronic monitoring of tunnel depth and location.
- C. Tunneling shall be performed by a fluid-cutting process (high pressure-low volume) utilizing a liquid clay, i.e., bentonite. The clay lining will maintain tunnel stability and provide lubrication in order to reduce frictional drag while the pipe is being installed. In addition, the clay fluid shall be totally inert and shall contain no environmental risk.
- D. Provide a mobile vacuum spoils recovery vehicle on site to remove the drilling spoils from the access pits. The spoils shall be transported from the job site and shall be properly disposed. Under no circumstances shall drilling spoils be permitted to be disposed into sanitary, storm, or other public or private drainage systems.
- E. Mechanical, pneumatic, or water-jetting methods are unacceptable due to the possibility of surface subsidence.
- F. After an initial bore has been completed, a reamer shall be installed at the termination pit and the pipe shall be pulled back to the starting pit. The reamer shall be capable of discharging liquid clay to facilitate the installation of the pipe into a stabilized and lubricated tunnel.
- G. Provide material, equipment, and facilities required for directional drilling. Proper alignment and elevation of the borehole shall be consistently maintained throughout the directional drilling operation. The method used to complete the directional drill shall conform to the requirements of applicable permits.
- H. The entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If Contractor is using a magnetic guidance system, drill path shall be surveyed for any surface geo-magnetic variations or anomalies.
- I. Place a silt fence between drilling operations and drainage, well-fields, wetland, waterway or other area designated for such protection necessary by documents, state, federal, and local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains, and other measures. Fuel shall not be stored in bulk containers within 200 feet of any water body or wetland.

- J. Readings shall be recorded after advancement of each successive drill pipe, (no more than 15') and the readings plotted on a scaled drawing of 1" = 5', both vertical and horizontal. Access to recorded readings and plan and profile information shall be made available to the Engineer or his representative at all times. The deflection radius of the drill pipe shall not exceed the deflection limits of the carrier pipe as specified herein.
- K. A complete list of drilling fluid additives and mixtures to be used in the directional operation shall be submitted to the Engineer, along with their respective Material Safety Data Sheets. Drilling fluids and loose cuttings shall be contained in pits or holding tanks for recycling or disposal, and no fluids shall be allowed to enter any unapproved areas or natural waterways. Upon completion of the directional drill project, dispose of the drilling mud and cuttings at an approved dumpsite.
- L. The pilot hole shall be drilled on bore path with no deviations greater than 5% of depth over a length of 100-feet. In the event the pilot does deviate from the bore path more than 5-feet of depth in 100-feet, Contractor shall notify Engineer and Engineer may require Contractor to pullback and re-drill from the location along bore path before the deviation. In the event the drilling fluid fractures, inadvertent returns or returns loss occurs during pilot hole drilling operations, Contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel, and wait another 30 minutes. If mud fracture or returns loss continues, Contractor shall discuss additional options with Engineer and work shall then proceed accordingly.
- M. Flange/MJ Adapter Installation: Flanges/MJ Adapters shall be attached to pipe and fittings using butt fusion. The flanges/MJ adapters shall be aligned and centered relative to the pipe. Flanges/MJ adapters shall be square with the valve or other flange before tightening of bolts. Bolts shall not be used to draw flanges into alignment. Bolt threads shall be lubricated, and flat washers shall be used under flange nuts. Bolts shall be tightened using a "star tightening pattern". See manufacturer's recommendations. Twenty-four hours after first tightening the flange bolts, they shall be re-tightened using the same "star tightening pattern" used above. The final tightening torque shall be as indicated by the manufacturer.
- N. Socket and saddle fusions shall be tested by a bent strap test as described by the pipe manufacturer. The pipe manufacturer shall provide visual guidelines for inspecting the butt, saddle, and socket fusions joints.
- O. Retrieve or seal any pipe that becomes lodged in the drill hole.

3.3 PIPE PULLING OPERATIONS

- A. The full length of the pipe to be installed shall be laid out, welded, and tested in one complete unit before being pulled back through the drilled hole. Once started, pipeline pullback shall be continuous unless approved otherwise in writing by Owner or Owner's designated representative.

- B. The pulling head shall be designed by Contractor to withstand the continuous tensile pull stresses with intermittent sudden occasional surges. Contractor shall be responsible for determining the pulling loads.
- C. The pipe shall be continuously lubricated with bentonite slurry and the assembled pipeline shall be laid on rollers, or other apparatus, to facilitate pullback and prevent damage to pipe.
- D. Tracer wire shall be pulled back with the pipe.
- E. Pull back until 10 linear feet (minimum) of pipe is above ground for the purpose of pipe inspection.
- F. A blind flange shall be bolted to the fusion-welded flange, and the pipe shall be marked and buried with a minimum cover of 36-inches. Connections will require the removal of the blind flange and a flanged ductile iron adapter shall be bolted to the fusion-welded flange suitable for the transitional material, if necessary. Provide restrained joints or Megalug joint restraint as required.

3.4 TESTING

- A. Conduct a low pressure air test of the HDPE force main above ground prior to pullback as follows:
 - 1. Secure and brace ends of pipe to be tested.
 - 2. Provide calibrated low range air pressure gauge on high end of pipe.
 - 3. Fill pipe to maximum pressure of 20.0 psig. Add air as necessary to compensate for internal/external pipe temperature and initial pipe expansion. Check pipe joints and test fittings with mild soap solution. Repair or replace leaking joints, pipe and/or fittings.
 - 4. Once air pressure has stabilized, pipe should hold constant air pressure for two hours. If pipe does not hold pressure, check joints and test fittings with soap solution.
 - 5. Repair or replace sources of leakage and completely retest entire section.
- B. Conduct a hydrostatic test (in ground – after pipe pullback).
 - 1. Fill the pipe with potable water and after free air is removed from the test section, raise the pressure at a steady rate to the required pressure. Measure pressure in the section with calibrated pressure gauges at each end of the pipe section.
 - 2. Test pressure shall not exceed 1.5 times the rated operating pressures (100 psi) of the pipe or the lowest rated component in the system. Apply initial pressure test and allow to stand without makeup water for a sufficient time to allow for diametric expansion or pipe stretching to stabilize. This usually occurs within 2-3 hours. After this equilibrium period, the test section can be returned to the 1.5 times operating pressure, the pump turned off, and a final test pressure held for three hours.

3. Immediately following the pressure test, the results shall be furnished to the Engineer or Inspector. Leaking pipes that cannot be repaired to meet pressure test shall be removed, filled with concrete, or otherwise placed out of service.

3.5 DAMAGED OR IMPROPERLY INSTALLED PIPE

- A. If the pipe is damaged before installation, or does not meet the specifications, it shall be replaced at no expense to Owner. If the pipe is damaged during installation by Contractor's operations, placed at the improper grade or line, or cannot be advanced because of an unseen obstruction or any other reason, it shall, at the discretion of the Engineer, be retrieved or abandoned in place and the void filled with concrete by pressure grouting as soon as possible. If it becomes necessary to drill another hole, an alternate installation shall be made as directed by the Engineer. Contractor shall re-drill the hole and furnish additional labor and materials required to complete the job as indicated on the plans and specifications at no additional cost to Owner. The cost for retrieval or abandonment of pipe shall be at the expense of Contractor. No additional payment shall be made for pipe which is retrieved, abandoned, or damaged beyond use, including dewatering, excavation, drilling, backfilling, etc.
- B. Sections of pipe having been discovered with cuts or gouges in excess of 10% of the pipe wall thickness shall be cut out and removed. Undamaged portions of the pipe shall be rejoined using one of the joining methods allowed in the Section.

END OF SECTION 33 05 07.13

SECTION 33 05 19 - PRESSURE PIPING TIED JOINT RESTRAINT SYSTEM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tied joint restraint system.

B. Related Requirements:

1. Section 31 23 17 - Trenching: Trenching and backfilling requirements for Site utilities.
2. Section 33 11 16 - Site Water Utility Distribution Piping: Execution requirements for piping Work as required by this Section.
3. Section 33 31 00 - Sanitary Utility Sewerage Piping: Pipe materials, manholes, and accessories from outside building to connection with municipal sewers.

1.2 REFERENCE STANDARDS

A. American National Standards Institute:

1. ANSI B1.1 - Unified Inch Screw Threads, UN and UNR Thread Form.

B. ASTM International:

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A36M - Standard Specification for Carbon Structural Steel.
3. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
7. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
8. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
9. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength.
10. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
11. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts.
12. ASTM A588 - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.
13. ASTM A588M - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.
14. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
15. ASTM F436 - Standard Specification for Hardened Steel Washers.

16. ASTM F436M - Standard Specification for Hardened Steel Washers.

C. American Water Works Association:

1. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.

1.3 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate Work of this Section with installation of fittings and joints that require restraint.

1.4 PREINSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Requirements for preinstallation meeting.

B. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit catalog data for restrained joint details and installation instructions.

C. Shop Drawings:

1. Indicate restrained joint details and materials being used.
2. Submit layout drawings showing piece numbers and locations.
3. Indicate restrained joint locations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Delegated Design Submittals:

1. Submit signed and sealed Shop Drawings with design calculations and assumptions for restrained lengths.
2. Submit joint restraint details.
3. Use joint restraint devices specifically designed for applications described in manufacturer's data.

F. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

G. Qualifications Statement:

1. Submit qualifications for manufacturer, fabricator, and licensed professional.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of joint restraints.

1.7 QUALITY ASSURANCE

- A. Perform Work according to City of Callaway standards.
- B. Maintain 1 copy of each standard affecting Work of this Section on Site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.
- C. Licensed Professional: Professional engineer experienced in design of specified Work and licensed at Project location.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Provide pressure pipeline with restrained joints at each bends, tees, and changes in direction.

2.2 TIED JOINT RESTRAINT SYSTEMS

- A. Furnish materials according to City of Callaway standards.
- B. Tie Bolts:
 - 1. Mechanical Joints, 2-inch and 3-inch:
 - a. 5/8 inch.
 - b. Comply with ASTM A588, Grade B.
 - c. Comply with ASTM A325, Type 3, except increase tensile strength of full-body threaded section to 40,000 lb. minimum for 5/8 inch and 60,000 lb. minimum for 3/4 inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.
 - 2. Mechanical and Flanged Joints, 4-inch to 12-inch:
 - a. 3/4 inch.
 - b. Comply with ASTM A588, Grade B.

- c. Comply with ASTM A325, Type 3, except increase tensile strength of full-body threaded section to 40,000 lb. minimum for 5/8 inch and 60,000 lb. minimum for 3/4 inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.
 3. Mechanical Joints, 14-inch to 24-inch:
 - a. 3/4 inch.
 - b. Comply with ASTM A588, Grade B and ASTM A325, Type 3.
 4. Mechanical and Flanged Joints, 30-inch and Larger:
 - a. 1 inch.
 - b. Comply with ASTM A588, Grade B.
 - c. Comply with ASTM A325, Type 3, except increase tensile strength of full-body thread section to 100,000 lb. minimum by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.
- C. Tie Nut:
 1. Description: Hex nut for each tie bolt and tie rods.
 2. Comply with ASTM A563, Grade C3.
 3. Zinc plated or Galvanized.
- D. Tiepin:
 1. Bends and Hydrants: 3/4 inch round bar stock.
 2. Size and Shape: 6 inch hairpin.
 3. Comply with ANSI B1.1 and ASTM A588.
 4. Finish: Zinc-plated or Galvanized.
- E. Tie Coupling:
 1. Description:
 - a. Extension of continuous-threaded rods.
 - b. Provide with center stop to aid installation.
 2. Comply with ASTM A588.
 3. Finish: Zinc plated or Galvanized.
- F. Tie Clamp:
 1. Description:
 - a. Retainer clamp for ductile iron, asbestos-cement, and polyvinyl chloride push-on pipe.
 - b. Locate in front of bell.
 2. Comply with ASTM A36, ASTM A307, Grade A, and ASTM A563, Grade A.
 3. Finish: Zinc plated or Galvanized.
- G. Tie Rod:
 1. Description: Continuous-threaded rod for cutting to desired lengths.
 2. Comply with ASTM A588, Grade B, ASTM A325, Type 3, and ANSI B1.1.
 3. Finish: Zinc plated or Galvanized.
- H. Tie Bar:
 1. Description: Steel bar used to restrain push-in plugs.
 2. Comply with ASTM A36.
 3. Finish: Zinc plated or Galvanized.

- I. Tie Washer:
 - 1. Description: Round flat washers.
 - 2. ASTM A588, ASTM F436, Type 1.
 - 3. Finish: Zinc plated or Galvanized.

2.3 MATERIALS

- A. Steel:
 - 1. High Strength Low-Alloy Steel: Comply with ASTM A588, heat treated.
 - 2. High Strength Low-Alloy Steel: Comply with ASTM A588.
 - 3. Carbon Steel: Comply with ASTM A36.

2.4 FINISHES

- A. Zinc-Plated or Galvanized Steel:
 - 1. Factory applied.
 - 2. Comply with ASTM B633 for electrodeposited coating of zinc on steel.
 - 3. Comply with ASTM A153 for galvanizing iron and steel hardware.
 - 4. Galvanizing:
 - a. Comply with ASTM A123.
 - b. Hot dip galvanize after fabrication.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that pipe and fittings are ready to receive Work.
- C. Field measure and verify conditions for installation of Work.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Clean surfaces of pipe and fittings that are to receive tied joint restraint systems.

3.3 INSTALLATION

- A. Install pipe and fittings according to AWWA C600.
- B. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.
- C. Installation Standards: Install Work according to City of Callaway standards.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Requirements for tolerances.
- B. Torque nuts on mating threaded fasteners from 45 ft. lb. to 60 ft. lb. for 5/8 inch nuts.
- C. Torque nuts on mating threaded fasteners from 75 ft. lb. to 90 ft. lb. for 3/4 inch nuts.
- D. Torque 1 inch nuts from 100 ft. lb. to 120 ft. lb..

END OF SECTION 33 05 19

SECTION 33 11 16 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for Site water line, including domestic water line.
2. Tapping sleeves and valves.
3. Valves: Gate, ball, swing check, and butterfly.
4. Hydrants and yard hydrants.
5. Positive displacement meters.
6. Reduced-pressure backflow preventers.
7. Underground pipe markers.
8. Precast concrete vaults.
9. Valve boxes.
10. Bedding and cover materials.

B. Related Requirements:

1. Section 03 30 00 - Cast-in-Place Concrete: Concrete.
2. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill.
3. Section 31 23 17 - Trenching: Execution requirements for trenching.
4. Section 31 23 23 - Fill: Requirements for backfill to be placed by this Section.
5. Section 33 13 00 - Disinfecting of Water Utility Distribution: Disinfection of Site service utility water piping.

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME B16.18 - Cast Copper Alloy Solder-Joint Pressure Fittings.
3. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

C. American Society of Sanitary Engineering:

1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.

2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.

D. ASTM International:

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A48M - Standard Specification for Gray Iron Castings.
3. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
4. ASTM B88M - Standard Specification for Seamless Copper Water Tube.
5. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures.
6. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³)).
7. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
8. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
9. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
10. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
11. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
12. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
13. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
14. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

E. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
5. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
6. AWWA C502 - Dry-Barrel Fire Hydrants.
7. AWWA C504 - Rubber-Seated Butterfly Valves, 3 In. (75 mm) Through 72 In. (1,800 mm).
8. AWWA C508 - Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS.
9. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
10. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
11. AWWA C606 - Grooved and Shouldered Joints.
12. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
13. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
14. AWWA C702 - Cold-Water Meters - Compound Type.
15. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.
16. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.

17. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm) for Water Service.
18. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.
19. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

F. American Welding Society:

1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS A5.8M - Specification for Filler Metals for Brazing and Braze Welding.

G. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

H. UL:

1. UL 246 - Hydrants for Fire-Protection Service.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on pipe materials, pipe fittings, valves, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

- A. Perform Work according to City of Callaway standards.
- B. Maintain 1 copy of each standard affecting Work of this Section on Site.

PART 2 - PRODUCTS

2.1 WATER PIPING

A. Ductile Iron Pipe:

1. Comply with AWWA C151 or C104.
2. Fittings:
 - a. Material: Ductile iron.
 - b. Thickness: Standard.
3. Joints:
 - a. Comply with AWWA C111.
 - b. Provide rubber gasket with rods.
4. Jackets: AWWA C105, polyethylene jacket.

B. Copper Tubing:

1. Comply with ASTM B88.
2. Type K, annealed.
3. Fittings: ASME B16.18, cast copper or ASME B16.22, wrought copper.
4. Joints: Compression connection or AWS A5.8 BCuP silver braze.

C. PVC Pipe:

1. ASTM D1785, Schedule 80.
2. Fittings: ASTM D2466, PVC.
3. Joints:
 - a. Comply with ASTM D2855.
 - b. Type: Solvent weld.

D. PVC Pipe:

1. Comply with AWWA C900, Class 165.
2. Fittings:
 - a. Material: Cast iron.
 - b. Comply with AWWA C111.
3. Joints:
 - a. Comply with ASTM D3139.
 - b. Provide compression gasket ring.

E. Polyethylene Pipe:

1. Pipe: Comply with AWWA C901 or AWWA C906.
2. Fittings:
 - a. Comply with AWWA C901.
 - b. Type: Molded or fabricated.
3. Joints: Butt fusion.

2.2 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves:

1. Furnish materials according to City of Callaway standards.

B. Description:

1. Material: Ductile or cast iron.
2. Type: Dual compression.
3. Outlet Flange Dimensions and Drilling: Comply with ASME B16.1, Class 125 and MSS SP-60.

C. Tapping Valves:

1. Furnish materials according to City of Callaway standards.

D. Description:

1. Comply with AWWA C500.
2. Type: Double disc with non-rising stem.
3. Inlet Flanges: Comply with ASME B16.1, Class 125, and MSS SP-60.
4. Mechanical Joint Outlets: Comply with AWWA C111.
5. Mark manufacturer's name and pressure rating on valve body.

2.3 GATE VALVES

A. Furnish materials according to City of Callaway standards.

B. 2-1/2 Inch and Smaller: Brass or bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, with control rod, valve box, and valve key.

C. 3 Inch and Larger: AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint ends, control rod, valve box, and valve key.

D. Mark manufacturer's name and pressure rating on valve body.

2.4 BALL VALVES

- A. Furnish materials according to City of Callaway standards.
- B. 2 Inch and Smaller: Brass body, TEFC-coated brass ball, rubber seats and stem seals, tee stem pre-drilled for control rod, IPS inlet end, IPS outlet with electrical ground connector, with control rod, valve box, and valve key.
- C. Mark manufacturer's name and pressure rating on valve body.

2.5 SWING CHECK VALVES

- A. Furnish materials according to City of Callaway standards.
- B. 2 Inches to 24 Inches: AWWA C508, iron body, bronze trim, 45-degree swing disc, renewable disc and seat, and flanged ends.
- C. Mark manufacturer's name and pressure rating on valve body.

2.6 BUTTERFLY VALVES

- A. Furnish materials according to City of Callaway standards.
- B. 2 Inches to 24 Inches: AWWA C504, iron body, bronze disc, resilient replaceable seat, water or lug ends, 10-position lever handle.
- C. Mark manufacturer's name and pressure rating on valve body.

2.7 POSITIVE DISPLACEMENT METERS

- A. Furnish materials according to City of Callaway standards.
- B. Description:
 - 1. Comply with AWWA C700 C701 or C702.
 - 2. Type: Positive displacement disc.
 - 3. Case Material: Bronze.
 - 4. Bottom Cap:
 - a. Material: Cast iron.
 - b. Type: Frost-proof, breakaway.
 - 5. Register: Hermetically sealed.
 - 6. Remote Reading: Comply with AWWA C706.
- C. Meter:

1. Description: Brass body turbine meter with magnetic drive register.
2. Service: Cold water, 122 degrees F.

2.8 REDUCED-PRESSURE BACKFLOW PREVENTERS

A. Furnish materials according to City of Callaway standards.

B. Description:

1. Comply with ASSE 1013.
2. Materials:
 - a. Body: Bronze.
 - b. Internal Parts: Bronze.
 - c. Springs: Stainless steel.
3. Check Valves:
 - a. Quantity: Two.
 - b. Description: Independently operating, spring-loaded.
 - c. Type: Diaphragm type, differential pressure relief, located between check valves.
 - d. Provide third check valve opening under back pressure in case of diaphragm failure.
 - e. Vent Outlet: Non-threaded.
4. Provide two gate valves, one strainer, and four test cocks.

C. Double Check Valve Assemblies:

1. Comply with ASSE 1012.
2. Description: Two independently operating check valves, with intermediate atmospheric vent.
3. Materials:
 - a. Body: Bronze.
 - b. Internal Parts: Corrosion resistant.
 - c. Springs: Stainless steel.

2.9 UNDERGROUND PIPE MARKERS

A. Pipe markers shall be per City of Callaway standard detail.

B. Plastic Ribbon Tape:

1. Brightly colored, continuously printed.
2. Minimum 6 inches wide by 4 mil thick.
3. Manufactured for direct burial service.

C. Trace Wire:

1. Electronic detection materials for nonconductive piping products.
2. Unshielded, 10 AWG, THWN-insulated copper wire.
3. Conductive tape.

2.10 VALVE BOXES

- A. Furnish materials according to City of Callaway standards.
- B. Description:
 1. Valve boxes and covers, including position indicators and valve extensions, and as indicated on Drawings.
 2. Material: Cast iron.
 3. Type: Extension, with slide adjustment.
 4. Covers marked water to indicate utility.

2.11 MATERIALS

- A. Bedding and Cover:
 1. Bedding: Fill Type A1 A2 or A3, as specified in Section.
 2. Cover: Fill Type A1 A2 or A3, as specified in Section.
 3. Soil Backfill from Above Pipe to Finish Grade:
 - a. Soil Type S1, as specified in Section.
 - b. Subsoil with no rocks over 6 inches in diameter, frozen earth, or foreign matter.

2.12 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type as specified in Section 03 30 00 - Cast-in-Place Concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that building service connections and municipal utility water main sizes, locations, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.
- E. Protect and support existing distribution piping and appurtenances as Work progresses.

3.3 INSTALLATION

A. Bedding:

- 1. Excavate pipe trench as specified in Section 31 23 17 - Trenching.
- 2. Place bedding material at trench bottom.
- 3. Level fill materials in continuous layers not exceeding 8 inches compacted depth.
- 4. Compact to 95 percent of maximum density.
- 5. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 95 percent of maximum density.

B. Piping:

- 1. Maintain separation of water main from sewer piping according to code.
- 2. Group piping with other Site piping work whenever practical.
- 3. Install pipe to elevations indicated on Drawings.
- 4. Install ductile iron piping and fittings according to AWWA C600.
- 5. Route pipe in straight line.
- 6. Install access fittings to permit disinfection of water system performed under Section 33 13 00 - Disinfecting of Water Utility Distribution.
- 7. Thrust Restraints:
 - a. Form and place concrete for pipe thrust restraints at each elbow or change of pipe direction.
 - b. Place concrete to permit full access to pipe and pipe accessories.
 - c. Provide bearing area as indicated on Drawings.
- 8. Establish elevations of buried piping with not less than 3 feet of cover.
- 9. Pipe Markers:
 - a. Install plastic ribbon tape and trace wire continuous over top of pipe.
 - b. Coordinate with trench Work as specified in Section 31 23 17 - Trenching.
- 10. Installation Standards: Install Work according to City of Callaway standards.

C. Meters:

1. Install positive displacement meters according to AWWA M6 with isolating valves on inlet and outlet.
2. Installation Standards: Install Work according to City of Callaway standards.

D. Service Connections:

1. Install water service according to utility company requirements with reduced-pressure backflow preventer double check valve backflow preventer, and water meter with bypass valves as required.
2. Install water meter and backflow preventer in concrete vault located on Site as specified in Section as shown on drawings.
3. Installation Standards: Install Work according to City of Callaway standards.

E. Disinfection:

1. Flush and disinfect system as specified in Section 33 13 00 - Disinfecting of Water Utility Distribution.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Requirements for tolerances.
- B. Install pipe within tolerance of 5/8 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.
- B. Pressure test system according to AWWA C600 and following:
 1. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
 2. Conduct hydrostatic test for at least two hours.
 3. Slowly fill with water section to be tested and expel air from piping by installing corporation cocks at high points.
 4. Close air vents and corporation cocks after air is expelled and raise pressure to specified test pressure.
 5. Observe joints, fittings, and valves under test. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage and retest.
 6. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
 7. Maintain pressure within plus or minus 5 psi of test pressure.
 8. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
 9. Compute maximum allowable leakage using following formula:

$L = SD \times \sqrt{P}/C$
L = testing allowance, in gph
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during hydrostatic test, in psig

C = 148,000
When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

10. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
 11. Correct visible leaks regardless of quantity of leakage.
 12. Testing shall be in accordance with City of Callaway standards.
- C. Compaction Testing for Bedding: Comply with ASTM D1557.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
- E. Frequency of Compaction Tests: 1 every 2,000 Sq. Ft but not less than three.

END OF SECTION 33 11 16

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SECTION 33 12 16 - WATER UTILITY DISTRIBUTION VALVES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Valves.
2. Valve boxes.

B. Related Requirements:

1. Section 03 30 00 - Cast-in-Place Concrete: Concrete for thrust restraints.
2. Section 33 11 16 - Site Water Utility Distribution Piping: Piping trenching, backfilling, and compaction requirements.
3. **Section 33 12 13 - Water Service Connections**: Pipe materials, fittings, and service connection appurtenances and installation requirements.
4. Section 33 13 00 - Disinfecting of Water Utility Distribution: Flushing and disinfection requirements.

1.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
2. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
3. AWWA C550 - Protecting Interior Coatings for Valves and Hydrants.
4. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.

B. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 COORDINATION

A. **Section 01 30 00 - Administrative Requirements**: Requirements for coordination.

B. Coordinate Work of this Section with City of Callaway standards and utilities within construction area.

1.4 PREINSTALLATION MEETINGS

A. **Section 01 30 00 - Administrative Requirements**: Requirements for preinstallation meeting.

B. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit manufacturer's latest published literature. Include illustrations, installation and maintenance instructions, and parts lists.
- C. Shop Drawings: Submit description of proposed installation.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- F. Qualifications Statements:
 - 1. Submit qualifications for manufacturer and installer.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.
- C. Operation and Maintenance Data: Submit information for valves.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Tools: Furnish one tee wrench of required length to Owner.

1.8 QUALITY ASSURANCE

- A. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.
- B. Perform Work according to City of Callaway standards.
- C. Maintain 1 copy of each standard affecting Work of this Section on Site.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Prepare valves and accessories for shipment according to applicable AWWA standards.

- C. Seal valve and ends to prevent entry of foreign matter.
- D. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- E. Storage:
 - 1. Store materials in areas protected from weather, moisture, or other potential damage.
 - 2. Do not store materials directly on ground.
- F. Handle products carefully to prevent damage to interior or exterior surfaces.

PART 2 PRODUCTS

2.1 DOUBLE-DISC GATE VALVES

- A. Furnish materials according to City of Callaway standards.
- B. Description:
 - 1. Comply with AWWA C500 and NSF 61 and 372.
 - 2. Materials:
 - a. Body: Iron.
 - b. Trim: Bronze.
 - 3. Gate: Double-disc parallel seat.
 - 4. Stem: Non-rising.
 - 5. Stem Seals: O-ring.
 - 6. Operation:
 - a. Square operating nut.
 - b. Open counterclockwise unless otherwise indicated.
 - 7. End Connections: Flanged or mechanical joint.
 - 8. Coatings:
 - a. Comply with AWWA C550.
 - b. Interior and exterior.
 - 9. Furnish 16-inch diameter valves and larger with bypass valves and gear operators.
 - 10. Pressure Rating:
 - a. 12-inch Diameter and Smaller: 200 psig.
 - b. 14-inch Diameter and Larger: 150 psig.

2.2 RESILIENT WEDGE GATE VALVES

- A. Furnish materials according to City of Callaway standards.
- B. Description:
 - 1. Comply with AWWA C509.
 - 2. Materials:
 - a. Body: Ductile iron.
 - 3. Seats: Resilient.
 - 4. Stem:
 - a. Type: Non-rising.
 - b. Material: Bronze.

5. Operation:
 - a. Square operating nut.
 - b. Open counterclockwise unless otherwise indicated.
6. End Connections: Flanged or mechanical joint.
7. Coatings:
 - a. Comply with AWWA C550 and coating specification.
 - b. Interior and exterior.
8. Pressure Rating:
 - a. 12-inch Diameter and Smaller: 200 psig.
 - b. 16-inch Diameter and Larger: 150 psig.

2.3 VALVE BOXES

- A. Furnish materials according to City of Callaway standards.
- B. Description:
 1. 12-inch Diameter Valves and Smaller:
 - a. Material: Cast iron.
 - b. Type: Two-piece, screw.
 2. Valves Larger than 12-inch Diameter:
 - a. Material: Cast iron.
 - b. Type: Three-piece, screw.
 - c. Base: Round.
 3. Lid Inscription: WATER.

2.4 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type as specified in Section 03 30 00 - Cast-in-Place Concrete.
- B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Determine exact location and size of valves from Drawings.
- C. Verify that invert elevations of existing work prior to excavation and installation of valves are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Conduct operations to not interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures, utilities, and landscape in immediate or adjacent areas.
- C. Identify required lines, levels, contours, and datum locations.
- D. Locate, identify, and protect from damage utilities to remain.
- E. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
 - 1. Notify Engineer not less than 3 days in advance of proposed utility interruption.
 - 2. Do not proceed without written permission from Engineer.

3.3 INSTALLATION

- A. Perform trench excavation, backfilling, and compaction as specified in the contract documents.
- B. Install valves in conjunction with pipe laying.
- C. Set valves plumb.
- D. Provide buried valves with valve boxes installed flush with finished grade.
- E. Disinfection of Water Piping System:
 - 1. Flush and disinfect system as specified in Section 33 13 00 - Disinfecting of Water Utility Distribution.

3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Pressure test system according to AWWA C600 and following:
 - 1. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
 - 2. Conduct hydrostatic test for at least two hours.
 - 3. Slowly fill section to be tested with water and expel air from piping at high points.
 - 4. Install corporation cocks at high points.
 - 5. Close air vents and corporation cocks after air is expelled.
 - 6. Raise pressure to specified test pressure.
 - 7. Observe joints, fittings, and valves under test.
 - 8. Remove and replace cracked pipes, joints, fittings, and valves that show visible leakage and retest.
 - 9. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate, maintaining test pressure within plus or minus 5.0 psi.

10. Leakage is defined as quantity of water supplied to piping as necessary to maintain test pressure during testing period.
11. Compute maximum allowable leakage using following formula:

$L = [SD \times \text{sqrt}(P)]/C$
L = testing allowance, gph
S = length of pipe tested, feet
D = nominal diameter of pipe, inches
P = average test pressure during hydrostatic test, psig
C = 148,000
If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

12. If test of pipe indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
13. Correct visible leaks regardless of quantity of leakage.
14. Perform pressure testing on water distribution system according to City of Callaway standards.

END OF SECTION 33 12 16

SECTION 33 13 00 - DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Disinfection of potable water distribution system.
 - 2. Testing and reporting of results.

1.2 REFERENCE STANDARDS

- A. American Water Works Association:
 - 1. AWWA B300 - Hypochlorites.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 - Closeout Procedures: Requirements for submittals.
- B. Disinfection Report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Name of person collecting samples.
 - 5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
 - 6. Date and time of flushing start and completion.
 - 7. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological Report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Submit bacteriologist's signature and authority associated with testing.

1.5 QUALITY ASSURANCE

- A. Perform Work according to AWWA C651.

PART 2 PRODUCTS

2.1 DISINFECTION CHEMICALS

- A. Chemicals:
 - 1. Hypochlorite: Comply with AWWA B300.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 73 00 - Execution: Requirements for installation examination.
- B. Verify that piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

3.2 INSTALLATION

- A. Provide and attach required equipment to perform Work of this Section.
- B. Introduce treatment into piping system.
- C. Maintain disinfectant in system for 24 hours.
- D. Flush, circulate, and clean until required cleanliness is achieved using municipal domestic water.
- E. Replace permanent system devices that were removed for disinfection.

3.3 FIELD QUALITY CONTROL

- A. Disinfection, Flushing, and Sampling:
 - 1. Disinfect pipeline installation according to AWWA C651.
 - 2. Use of liquid chlorine is not permitted.
 - 3. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
 - 4. Disposal:
 - a. Legally dispose of chlorinated water.
 - b. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

END OF SECTION 33 13 00

SECTION 33 31 00 - SANITARY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewerage piping.
2. Bedding and cover materials.

1.2 DEFINITIONS

- A. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.

1.3 RELATED WORK (REQUIREMENTS)

- A. Construction Drawings, Agreement Declarations, Exhibits and other Technical Specification Sections apply to this Section.
- B. Section 40 05 13 - PROCESS PIPE AND FITTINGS

1.4 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Water Works Association:
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
 2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
 3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 4. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
 5. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
 6. AWWA C153 - Ductile-Iron Compact Fittings.
- C. ASTM International:
1. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
 2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).

3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
4. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
5. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
6. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer information indicating pipe material to be used, pipe accessories.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- E. Qualifications Statement:
 1. Submit qualifications for manufacturer and installer.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record finished locations of pipe runs, connections, manholes, cleanouts, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 QUALITY ASSURANCE

- A. Perform Work according to specification and utility standards.
- B. Maintain one copy of each standard affecting Work of this Section on Site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store valves in shipping containers with labeling in place.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

- A. Ductile-Iron Pipe:
 - 1. Comply with AWWA C150 or AWWA C151.
 - 2. Minimum Pressure Class: 150.
 - 3. End Connections: Bell and spigot.
 - 4. Outside Coating:
 - a. Type: Asphaltic.
 - b. Minimum Uniform Thickness: 1 mil.
 - c. Comply with AWWA C151.
 - 5. Lining:
 - a. Phenicon HS by Sherwin Williams.
 - b. Apply in accordance with manufacturers recommendations.
 - 6. Joints:
 - a. Rubber gasket joint devices.
 - b. Comply with AWWA C111.

B. Plastic Pipe:

1. Material: PVC compliant with ASTM D1784.
2. Rating: Comply with ASTM F679, 115psi
3. End Connections: Bell and spigot with rubber-ring-sealed gasket joint compliant with ASTM D3212.
4. Fittings: Ductile-Iron.
5. Joints:
 - a. Elastomeric gaskets.
 - b. Comply with ASTM F477.

2.2 FLEXIBLE PIPE BOOTS FOR MANHOLE PIPE ENTRANCES

A. Manufacturers:

1. Trelleborg "Kor-N-Seal" Boot.
2. A-Lok "Z-Loc" Connector
3. Substitutions: Engineer approved only.

B. Description:

1. Material: EPDM.
2. Comply with ASTM C923.
3. Attachment: Series-300 stainless-steel clamp and hardware.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive Work of this Section.
- B. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Correct over-excavation with coarse aggregate.
- B. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities, and appurtenances.
- D. Utilities:
 1. Maintain profiles of utilities.
 2. Coordinate with other utilities to eliminate interference.
 3. Notify Architect/Engineer if crossing conflicts occur.

3.3 INSTALLATION

A. Piping:

1. Install pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
2. Lay pipe to slope gradients as indicated on Drawings.
3. Begin at downstream end of system and progress upstream.

3.4 TOLERANCES

- #### A. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.

3.5 PROTECTION

- #### A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
- #### B. Cap open ends of piping during periods of Work stoppage.

END OF SECTION 33 31 00

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SECTION 33 32 13 - SUBMERSIBLE CENTRIFUGAL PUMPS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The Contractor shall furnish and install the submersible non-clog pumps, related piping, supports, and all other necessary appurtenances as shown on the drawings and specified in these specifications.

1.2 SUBMITTALS

- A. Submit shop drawings, technical data, and pump curves in accordance with Section 01 33 00. Submit operation and maintenance data in accordance with Section 01 78 23.

1.3 QUALITY ASSURANCE

- A. All pumps shall be furnished by a single manufacturer. Non-clog Pumps shall be Flygt or approved equal.

1.4 PUMP WARRANTY

- A. The pump manufacturer shall warrant the units being supplied to the owner against defects in workmanship and material for a period of five (5) years. Warranty period shall begin on the date of project substantial completion.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Contractor shall furnish and install two (2) submersible non-clog sewage pumps for the lift station. The working load rating of the lifting system shall be a minimum of 50% greater than the pump weight. Each pump motor shall be equipped with 50 feet of power and control cable sized in accordance with NEC and CSA standards.

2.2 REQUIREMENTS

Primary Design Point	High Condition: 113 GPM @ 90' TDH Low Condition: 113 GPM @ 40' TDH
Maximum Motor Horse Power	20
Voltage	230
Minimum Pump Solids Passing Capability	3"
Motor Rating	FM Explosion Proof

Pumps shall be Flygt or approved equal

2.3 PUMP DESIGN

- A. The heavy duty submersible wastewater pumps shall be capable of handling raw unscreened sewage, storm water, and other similar solids-laden fluids without clogging. The pump shall be driven by a premium efficiency motor, providing the highest levels of operational reliability and energy efficiency.

2.4 PUMP CONSTRUCTION

- A. Major pump components shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be stainless steel 1.4401 (AISI type 316) construction. All metal surfaces coming into contact with the pumped media (other than the stainless steel components) shall be protected by a factory applied spray coating of high solids two part epoxy paint finish on the exterior of the pump. The pump shall be equipped with an open lifting hoop suitable for attachment of standard chain fittings, or for hooking from the wet well surface. The hoop shall ductile cast iron EN-GJS-400-18 (ASTM A536; 60-40-18) with an option of stainless steel 1.4462, and shall be rated to lift a minimum of four times the pump weight.
- B. Sealing design for the pump/motor assembly shall incorporate machined surfaces fitted with Nitrile (Buna-N) rubber O-rings. Sealing will be the result of controlled compression of rubber O-rings in two planes of the sealing interface. Housing interfaces shall meet with metal to metal contact between machined surfaces, and sealing shall be accomplished without requiring a specific torque on the securing fasteners. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered equal. No secondary sealing compounds shall be required or used.

2.5 REQUIREMENTS GUIDE RAIL BASE ASSEMBLY

- A. There shall be no need for personnel to enter the wet well to remove or reinstall the pumps. In a wet pit installation, the discharge base & elbow assembly shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pumps shall connect to the guide rail base automatically and firmly, guided by one 2 inch guide pipe (two 2 inch pipes optional) extending from the base elbow to the top of the station. Systems using guide cable in lieu of rigid guide bars or pipes shall not be considered acceptable. The sliding guide bracket shall be a separate part of the pumping unit, capable of being attached to standard 6 inch ANSI class 125 or metric DN150 pump flanges, so that the pump mounting is nonproprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or nonstandard flange dimensions shall not be considered acceptable.

- B. A field replaceable Nitrile (Buna-N) rubber profile gasket or O-ring shall accomplish positive sealing of the pump flange/guide rail bracket to the discharge elbow. Base assemblies which rely solely on metal to metal contact between the pump flange and discharge base elbow as a means of sealing are inherently leak prone, and shall not be considered equal. No portion of the pump shall bear directly on the floor of the sump. The guide rail system shall be available in an optional non-sparking version, approved by Factory Mutual for use in NEC Class 1, Division 1, Group C&D hazardous locations.

2.6 MECHANICAL SEAL

- A. Each pump shall be equipped with a triple seal system consisting of tandem mechanical shaft seals, plus a radial lip seal; providing three complete levels of sealing between the pump wet end and the motor. The mechanical seal system shall consist of two totally independent seal assemblies operating in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of nonproprietary design, and shall be manufactured by a major independent manufacturer specializing in the design and manufacture of mechanical seals. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty solid silicon-carbide seal ring and one rotating industrial duty solid silicon-carbide seal ring. The stationary ring of the primary seal shall be installed in a seal holding plate of gray cast iron EN-GJL-250 (ASTM A-48, Class 35B). The seal holding plate shall be equipped with swirl disruption ribs to prevent abrasive material from prematurely wearing the seal plate. The upper, secondary seal unit, located between the lubricant chamber and the sensing chamber, shall contain one stationary industrial duty solid silicon-carbide seal ring, and one rotating one rotating industrial duty solid silicon-carbide seal ring. Each seal interface shall be held in contact by its own spring system. A radial lip seal shall be positioned above the sensing chamber, preventing any liquid which accumulates in the sensing chamber from entering the lower bearing and motor. The seals shall not require routine maintenance, or adjustment, and shall not be dependent on the direction of rotation for proper sealing. Each pump shall be provided with a lubricant chamber for the shaft sealing system which shall provide superior heat transfer and maximum seal cooling. The lubricant chamber shall be designed to prevent overfilling, and to provide lubricant expansion capacity. The drain and inspection plug shall have a positive anti-leak seal, and shall be easily accessible from the outside of the pump. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. Lubricant in the chamber shall be environmentally safe nontoxic material.
- B. The following seal types shall not be considered equal: Seal systems with less than three complete levels of sealing between the pump wet end and the motor. Seals of proprietary design, or seals manufactured by other than major independent seal manufacturing companies. Seals requiring set screws, pins, or other mechanical locking devices to hold the seal in place, conventional double mechanical seals containing either a common single or double spring acting between the upper and

lower seal faces, any system requiring a pressure differential to seat the seal and ensure sealing.

2.7 MECHANICAL SEAL PROTECTION SYSTEM

- A. The primary mechanical seal shall be protected from interference by particles in the waste water, including fibrous materials, by an active Seal Protection System integrated into the impeller. The back side of the impeller shall be equipped with a sinusoidal cutting ring, forming a close clearance cutting system with the lower submersible motor housing or seal plate. This sinusoidal cutting ring shall spin with the pump impeller providing a minimum of 75 shearing actions per pump revolution. Large particles or fibrous material which attempt to lodge behind the impeller or wrap around the mechanical seal, shall be effectively sheared by the active cutting system into particles small enough to prevent interference with the mechanical seal. The Seal Protection System shall operate whenever the pump operates, and shall not require adjustment or maintenance in order to function. Submersible pump designs which do not incorporate an active cutting system to protect the primary mechanical seal shall not be considered acceptable for wastewater service.

2.8 SEAL FAILURE EARLY WARNING SYSTEM

- A. The integrity of the mechanical seal system shall be continuously monitored during pump operation and standby time. An electrical probe shall be provided in a sensing chamber positioned above the mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be air filled, and shall have a drain / inspection plug with a positive anti-leak seal which is easily accessible from the outside of the pump. A solid-state relay mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe, continuously monitoring the conductivity of the liquid in the sensing chamber. If sufficient water enters the sensing chamber through the mechanical seal system, the probe shall sense the increase in conductivity and signal the solid state relay in the control panel. The relay shall then energize a warning light on the control panel, or optionally, cause the pump shut down. This system shall provide an early warning of mechanical seal leakage, thereby preventing damage to the submersible pump, and allowing scheduled rather than emergency maintenance. Systems utilizing float switches or any other monitoring devices located in the stator housing rather than in a sensing chamber between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable.
- B. As an option, two additional moisture sensing probes, one in the electrical connection chamber, and one in the motor chamber shall be available. These optional probes shall send separate signals to the control panel as described above, so that maintenance personnel are given an early warning of the presence of moisture in the respective sensing chambers.

2.9 BEARINGS

- A. Each pump shaft shall rotate on high quality permanently lubricated, greased bearings. The upper bearing shall be a cylindrical roller bearing and the lower bearings shall be a matched set of at least three heavy duty bearings, two angular contact ball bearings and one cylindrical roller bearing. All three lower bearings shall have identical outer race diameters to provide maximum bearing load capacity. Designs which utilize a roller bearing with a smaller outer diameter than the other bearings in the assembly do not provide maximum load capacity and shall not be considered equal. Bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. L-10 bearing life shall be a minimum of 100,000 hours at flows ranging from ½ of BEP flow to 1½ times BEP flow (BEP is best efficiency point). The bearings shall be manufactured by a major internationally known manufacturer of high quality bearings, and shall be stamped with the manufacturer's name and size designation on the race. Generic or unbranded bearings from other than major bearing manufacturers shall not be considered acceptable.
- B. Provide two totally independent mechanical shaft seals, installed in tandem, each with its own independent single spring system acting in a common direction. Install the upper seal in an oil-filled chamber with drain and inspection plug (with positive anti-leak seal) for easy access from external to the pump. Provide seals requiring neither routine maintenance nor adjustment, but capable of being easily inspected and replaced. Provide seals which are non-proprietary in design, with replacements available from a source other than the pump manufacturer or its distributors. Do not provide seals with the following characteristics: conventional double mechanical seals with single or multiple springs acting in opposed direction; cartridge-type mechanical seals; seals incorporating coolant circulating impellers, seals with face materials other than those specified.

2.10 PUMP SHAFT

- A. The pump shaft and motor shaft shall be an integral, one piece unit adequately designed to meet the maximum torque required at any normal start-up condition or operating point in the system. The shaft shall have a full shutoff head design safety factor of 1.7, and the maximum shaft deflection shall not exceed .05 mm (.002 inch) at the lower seal during normal pump operation. Each shaft shall be stainless steel 1.4021 (AISI 420) material, and shall have a polished finish with accurately machined shoulders to accommodate bearings, seals and impeller. As an option, the shaft shall be available in stainless steel 1.4462 (UNS S31803). Carbon steel, chrome plated, or multi piece welded shafts shall not be considered adequate or equal.

2.11 IMPELLER

- A. The impeller shall be of "Hard Iron". The impeller shall be of the semi-open, non-clogging, two vane design, meeting the Ten State Standards requirement for minimum solids passage size of 3 inches. The impeller shall be capable of passing a minimum of 3x4 inch spherical solids as are commonly found in waste water. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely

fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt shall be effectively recessed within the impeller bore or supporting washer to prevent disruption of the flow stream and loss of hydraulic efficiency. The impeller shall be dynamically balanced to the ISO 10816 standard to provide smooth vibration free operation. Impeller designs which do not meet the Ten State Standards requirement for 3 inch solids passage size, those that rely on retractable impeller designs to pass 3 inch solids, or those that rely on fins or pins protruding into the suction path to assist in the handling of fibrous material shall not be considered equal.

2.12 VOLUTE

- A. The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. Discharge size shall be as specified on the pump performance curve. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be drilled to accept both 6 inch ANSI class 125 and metric DN150 (PN 10) metric flanged fittings. Proprietary or nonstandard flange dimensions shall not be considered acceptable. The maximum working pressure of the volute and pump assembly shall be 10 bar (145 psi).

2.13 REQUIREMENTS MOTOR DESIGN

- A. The premium efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 and NEMA Premium*. Motor rating tests shall be conducted in accordance with IEC 60034-2-1 requirements and shall be certified accurate and correct by a third party certifying agency. A certificate shall be available upon request.

* IE3 and NEMA premium efficiency levels are equivalent, however the NEMA Premium standard is intended to cover dry installed motors only, not integrated submersible motors.

- B. The motor shall be housed in a water tight gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) enclosure capable of continuous submerged operation underwater to a depth of 20 meters (65 feet), and shall have an IP68 protection rating. The motor shall be of the squirrel-cage induction design, NEMA type B, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation material, rated for 180oC (356oF). The stator shall be press fitted into the stator housing. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is unacceptable. The rotor bars and short circuit rings shall be made of cast aluminum
- C. The motor shall be designed for continuous duty. The maximum continuous temperature of the pumped liquid shall be 40°C (104°F), and intermittently up to 50°C (122°F). The motor shall be capable of handling up to 15 evenly spaced starts

per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be 1.3. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase to phase voltage imbalance tolerance of 1%. The motor shall have a NEMA Class A temperature rise, providing cool operation under all operating conditions. The premium efficiency motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C. The motor shall meet the requirements of NEMA MG1 Part 30 and 31 for operation on PWM type Variable Frequency Drives.

- D. The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet pit) applications, the motor shall be self-cooling via the process fluid surrounding the motor.

2.14 THERMAL PROTECTION

- A. Each phase of the motor shall contain a normally closed bi-metallic temperature monitor switch imbedded in the motor windings. These thermal switches shall be connected in series and set to open at 140oC +/- 5oC (284oF). They shall be connected to the control panel to provide a high stator temperature shutdown signal, and are used in conjunction with external motor overload protection. As an option, bi-metallic temperature switches shall be available for the upper and lower bearings to provide high bearing temperature warning signals. As an alternate option, RTD (PT100) type temperature measuring devices shall be available for the motor winding and bearings to provide actual temperature measurement at these locations. When the RTD option is supplied for the motor winding, bi-metallic switches shall also be supplied in the winding. The bi-metallic system must be connected to the control to provide positive shutdown of the motor in the event of an overheat condition. This is required in order to conform to FM and CSA rules for explosion proof equipment.

2.15 POWER CABLE

- A. The power cables shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil, water, and UV resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.
- B. Provide motors which are FM listed for use in Class I Division 1 Groups C&D hazardous locations as defined by the National Electric Code.

2.16 CABLE ENTRY/JUNCTION CHAMBER

- A. The cable entry design shall not require a specific torque to insure a watertight seal. The cable entry shall consist of cylindrical elastomer grommets, flanked by stainless steel washers. A cable cap incorporating a strain relief and bend radius limiter shall mount to the cable entry boss, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry. The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a

compression or post type terminal board, allowing for easy disconnection and maintenance.

PART 3 - EXECUTION

3.1 INSTALLATION OF EQUIPMENT

- A. The Contractor shall install equipment as required by the manufacturer's written installation instructions and approved shop drawings unless otherwise directed by the Engineer.
- B. Excess motor and control wire shall be carefully coiled and hung inside the wet well. These wires shall not be cut and all identification tags shall be in place. Cables shall be supported with S.S. basket weave type strain reliefs hung in wet well and be routed in a manner that will not interfere with access to any equipment or terminals in the control panels.

3.2 SPARE PARTS

- A. The following spare parts shall be supplied by the contractor for each of the pump stations:
 - (1) Set of upper and lower shaft seals
 - (1) Set of upper and lower bearings
 - (1) O-ring kit
 - (1) Volute wear ring
 - (1) Impeller wear ring
 - (1) Oil inspection port o-ring

3.3 PUMP TEST

- A. The pump manufacturer shall perform the following inspections and tests on each pump before shipment from factory:
 - 1. Impeller, motor rating and electrical connections shall first be checked for compliance to the customer's purchase order.
 - 2. A motor and cable insulation test for moisture content or insulation defects shall be made.
 - 3. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
 - 4. The pump shall be run for 30 minutes submerged under a minimum of six (6) feet under water.
 - 5. After operational test No. 4, the insulation test (No. 2) is to be performed again.
- B. A written report stating the foregoing steps have been done shall be supplied with

each pump at the time of shipment upon request.

- C. The pump cable end will be sealed with a high quality protective covering, to make it impervious to moisture or water seepage prior to electrical installation.

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SECTION 40 05 13 - LIFT STATION PROCESS PIPE AND FITTINGS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The CONTRACTOR shall furnish all labor, materials, equipment, and incidentals required to install ductile iron pipe and fittings complete, tested, and ready for use, as shown on the Drawings and/or as specified herein.

1.2 RELATED WORK (REQUIREMENTS)

- A. Construction Drawings, Agreement Declarations, Exhibits and other Technical Specification Sections apply to this Section.

1.3 SUBMITTALS

- A. The CONTRACTOR shall submit to the ENGINEER, within twenty (20) calendar days after receipt of Notice to Proceed, a list of materials to be furnished, and the names of the suppliers and the date of delivery of materials to the site.
- B. Submit shop drawings to the ENGINEER for review in accordance with Section 01 33 00 Submittal Procedure, showing the complete laying plan of all pipe, including all fittings, adapters, valves, and specials along with the MANUFACTURER's drawings and specifications indicating complete details of all items. The pipe details shall include a **pipe class laying schedule** which specifies pipe class, class coding, joints, station limits, and transition stations, and a list of abbreviated terms with their full meaning. The pipe class laying schedule shall also show the required bedding class as required for the pipes pressure class and bury depth according to the drawings and specifications herein. The CONTRACTOR shall provide details of fittings to be furnished. The above shall be submitted to the ENGINEER for approval before fabrication and shipment of these items. The locations of all pipes shall conform to the locations indicated on the Drawings. In most cases, a certain amount of flexibility in the positioning of pipes will be allowed. Horizontal and vertical deflections may require beveled, special deflection; or short pipes. The deflections at joints shall not exceed 75 percent of that recommended by the MANUFACTURER.
- C. Furnish in duplicate to the ENGINEER, prior to each shipment of pipe, submit MANUFACTURER's certification and certified test reports that the pipe and linings and coating for this contract was manufactured and tested in accordance with the ASTM and ANSI/AWWA Standards specified herein.

1.4 QUALIFICATIONS

- A. All ductile iron pipe and fittings shall be furnished by MANUFACTURER's who are fully experienced in the U.S. for the manufacture of the material to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.
- B. All stainless steel pipe and fittings shall be furnished by MANUFACTURER's who are fully experienced in the U.S. for the manufacture of the material to be furnished. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

1.5 QUALITY ASSURANCE

- A. All HDPE DR13.5 pipe, PVC Schedule 80 pipe, and fittings shall be from a single MANUFACTURER. All HDPE DR13.5 pipe and PVC Schedule 80 pipe to be installed under this contract may be inspected at the foundry for compliance with these specifications by an independent testing laboratory provided by the OWNER. The CONTRACTOR shall require the MANUFACTURER's cooperation in these inspections. The cost of foundry inspection of all pipe approved for this contract will be borne by the OWNER.
- B. Inspection of the pipe will also be made by the ENGINEER or other representatives of the OWNER after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job.
- C. Testing may be performed prior to machining bell and spigot. Failure of HDPE DR13.5 pipe and PVC Schedule 80 pipe shall be defined as any rupture of pipe wall. Certified test certificates shall be furnished in duplicate to the ENGINEER prior to time of shipment. The standard 500 psi hydro test will be performed on 24" and smaller pipe.

1.6 CONNECTION TO EXISTING LINES

- A. For connections to the existing lines to which the piping of this Contract must connect, the following work shall be performed:
 - 1. Exposed buried lines to confirm or determine end connection, pipe material, and diameter.
 - 2. Furnish and install appropriate piping and make proper connections.

PART 2 - PRODUCTS

2.1 HDPE DR13.5

A. Carrier Pipe for Force Main:

1. Pipe and fittings shall be high-density polyethylene manufactured from NSF approved PLEXCO P34CH compound, PE 4710, or equal.
2. Pipe shall meet AWWA C-906, PE Pressure Pipe and Fittings 4” – 53” for Distribution and shall be marked with the NSF-pw logo. Force main shall be impregnated with three, 1” green stripes the length of the pipe, both equally spaced around the pipe.
3. Hydrostatic design stress (HDS) shall be 800 psi at 73.4°F with a minimum pipe DR of 13.5 and operating pressure of 160 psi at 73.4°F.
4. Pipe and fittings shall be produced by the same manufacturer from identical materials meeting the requirements of this specification.
5. Molded fittings shall meet the requirements of ASTM D-3261 and this specification. At the point of fusion, the outside diameter and minimum wall thickness of fitting butt fusion outlets shall meet the outside diameter and minimum wall thickness specifications of ASTM F-714 for the same size of pipe.
6. Pipe shall be manufactured in accordance with ASTM F-714, ASTM D-3035, or the applicable dedicated service specification. Print line markings shall include a production code from which the location and date of manufacture can be identified. Upon request, the manufacturer shall provide an explanation of his production code.
7. Pipe Marking: HDPE color coding shall be in accordance with the marking requirements specified herein.

Base Bid – High Density Polyethylene Pipe (HDPE) Pipe						
<u>Pipe Description</u>	<u>AWWA</u>	<u>Outside Di- ameter (in.)</u>	<u>DR</u>	<u>Color</u>	<u>Pressure Class (psig)</u>	<u>Inner Diameter (in.)</u>
4” HDPE FM (DIPS)	C-906	4.8	13.5	Green	160	4.045

B. ACCEPTABLE PIPE MANUFACTURER

1. Performance Pipe, Driscoplex 4000, PE 3408, AWWA C-906, DIPS sizing, Richardson TX, (800) 527-0662; Supplier: ISCO Industries, Grand Bay, AL, 1-800-345-4726
2. JM Eagle, 5200 West Century Blvd, Los Angeles, CA 90045, 1-800-621-4404
3. Engineer approved equal.

C. Butt fusion Fittings: HDPE fittings shall be PE 4710 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99, and approved for AWWA use. Butt fusion fittings shall have a manufacturing standard of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise

specified in the plans. Fabricated fittings shall be manufactured using Data Loggers. Temperature, fusion pressure, and a graphic representation of the fusion cycle shall be part of the Quality Control records. Fittings shall be suitable for use as pressure conduits, and per AWWA C906, shall have nominal burst values of three and one-half times the working pressure rating of the fitting.

- D. Transition Fittings: Terminate HDPE pipe with fusion welded flanges (125 lb bolt pattern). See below for alternate fusion procedures.
- E. Tracer wire shall be two strands of 6ga. Copper with green insulation.

2.2 JOINING METHODS

- A. Butt fusion joining: Plain end pipe and fittings shall be made using butt fusion. The butt fusion procedures shall be in accordance with the manufacturer or the PPI. The fusion equipment operator shall receive training using the recommended procedure. Contractor shall verify that the fusion equipment is in good operating condition and that the operator has been trained within the past twelve months. Fusion equipment shall be equipped with a Data Logger. Records of the welds (heater temperature, fusion pressure, and a graph of the fusion cycle) shall be maintained for five (5) years. Fusion beads shall not be removed.
- B. Mechanical Joining: Polyethylene pipe and fittings shall be joined together using flanges or mechanical joint adapters. These fittings shall be made from PE 3048 HDPE, with a Cell Classification of 345464C as determined by ASTM D3350-99. Flanged and MJ adapters shall have a manufacturing standard of ASTM D3261. They shall have a pressure rating equal to the pipe unless otherwise specified on the plans.
- C. Electrofusion couplings: Polyethylene pipe and fittings shall be joined using approved electrofusion couplings. Fittings shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-99. Electrofusion fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. Electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, shall have nominal burst values of three and one-half times the working pressure rating of the fitting.

2.3 Polyvinyl Chloride (PVC) Pipe Schedule 80

- A. Polyvinyl Chloride (PVC) Pipe (Class-Rated): WATER MAINS ONLY. PVC pressure pipe and accessories four to twelve inches (4"-12") in diameter, where shown or as specified on the Drawings, shall meet the requirements of AWWA Specification C-900 (DR 25) "Polyvinyl Chloride (PVC) Pressure Pipe" and AWWA C-905 for PVC pipe from fourteen to thirty-six inches (14"-36") in diameter. Each length of pipe shall be hydrotested to four (4) times its class pressure by the MANUFACTURER in accordance with AWWA C 900 and C 905. Pipe shall be listed by Underwriters

Laboratories. Provisions shall be made for expansion and contraction at each joint with a elastomeric ring, and shall have an integral thickened bell as part of each joint. PVC Class pipe shall be installed in accordance with the Uni-Bell Plastic Pipe Association Guide Specification UNI-B-3-76, and as recommended by the MANUFACTURER. Pipe shall be furnished in nominal lengths of approximately 20 feet, unless otherwise approved by the ENGINEER. Pipe and accessories shall bear the NSF mark indicating pipe size, MANUFACTURER's name, AWWA and/or ASTM Specification number, working pressure, and production code. Pipe and couplings shall be made from Class 12454-A or Class 12454-B virgin compound, as designed in ASTM D 1784. PVC pressure pipe less than 4 inches in diameter shall be ASDM D2241 Class 200.

B. Joints:

1. The PVC line joints for below ground piping four to thirty-six inches (4"-36") in diameter shall be of the push-on type unless otherwise approved by the ENGINEER so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint shall be a single rubber gasket joint designed to be assembled by the positioning of a continuous, molded rubber ring gasket in annular recess in the pipe or fitting socket and the forcing of the plain end of the entering pipe into the socket, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and annular recess shall be designed and shaped so that the gasket is locked in place against displacement as the joint is assembled. The rubber ring joint shall be designed for thermal expansion or contraction with a total temperature change of at least 75°F in each joint per length of pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric ring which shall meet requirements of ASTM D 1869. The thickened bell section shall be designed to be at least as strong as the pipe wall. Lubricant furnished for lubricating joints shall be nontoxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to the water.
2. PVC joints for pipe less than two inches (2") in diameter shall be threaded or solvent welded joints where called for on the Drawings, unless otherwise approved by the ENGINEER. Teflon thread tape or liquid teflon thread lubricant shall be used on all threaded joints to serve as both a sealer and lubricant. Threaded joints should be made hand tight (hard). When the joint is hand tight a strap wrench should be used to make up one to two (1-2) additional full turns past the hand tight point. Do not use pipe wrenches or pump pliers on plastic pipe or fittings.

C. Fittings: All fittings for pressure or class-rated PVC pipe for below ground piping of three to thirty-six inches (3"-36") in diameter shall be ductile iron with mechanical joints and shall conform to AWWA/ANSI specifications C110/A21.10 or C153/A21.53 for ductile iron fittings and Section 15062, unless otherwise approved by the ENGINEER.

1. Fittings for Schedule 80 PVC pipe less than three inches (3") in diameter shall be threaded or solvent weld and be PVC as shown on the Drawings, or as approved

by the ENGINEER. Threaded PVC fittings shall conform to ASTM Specification D 2464. All service tubing shall be polyethylene tubing (SDR 9) Orangeburg Driscoll.

2. The MANUFACTURER of the pipe shall supply all polyvinyl chloride accessories as well as any adaptors and/or specials required to perform the work as shown on the drawings and specified herein. Standard double bell couplings will not be accepted where the pipe will slip completely through the coupling.

- D. **Restrained Joints:** Restrained joints and fittings for PVC reclaimed water irrigation mains, sewer force mains and water mains shall be EBAA Iron, Inc., Megalug Retainer Glands, Series 1600 for bell and spigot pipe (4-inch through 12-inch sizes), Series 2800 for bell and spigot pipe (14-inch through 36-inch sizes), and Series 2000 PV for mechanical joint fittings (4-inch through 36-inch sizes). After installation, apply a heavy bitumastic coating to all bolts, nuts and accessories. Romac 600 Series pipe restraining systems can be used (4-inch through 12-inch sizes). The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil as shown on the drawings. All bolts and nuts for restrained joints shall be "Corten" type, low alloy, high strength steel.

2.4 LINING AND COATINGS

- A. All ductile fittings for wastewater service (including but not limited to raw sewage lines, and all process lines up to the filters including pressure and gravity mains, unless otherwise noted, shall have a Phenicon HS by Sherwin Williams lining on the interior and bituminous coating on the exterior except for 6 inches back from the spigot end. The bituminous coating shall not be applied to the first 6 inches of the exterior of the spigot ends. All fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. Because removal of old linings may not be possible, the intent of this specification is that the entire interior of the fittings shall be as cast without ever having been lined with any substance prior to the application of the specified lining. Any fittings furnished for this project must not have been lined prior to the awarding of the contract for this project.

1. **Lining Material** - The material used for the lining shall be Phenicon HS, an epoxy novolac phenolic coating by Sherwin Williams. The following test requirements shall be certified by the material supplier, and a history of satisfactory performance for the material in the service required and upon the surface specified shall be submitted. The following are the minimum requirements to be met:
 - a. A permeability rating of zero permeance when a film of at least 40 mils is tested according to ASTM D1653 or a permeability rating of 0.0 perms when measured using Method A of ASTM E66 procedure A with a test duration of 42 days.
 - b. The material shall contain at least 20 percent by volume of ceramic quartz pigment in the dried film.

- c. The following test and rating/method must be run on ductile iron panels with the results certified by the lining material supplier of the material being submitted.
 - 1) Direct Impact: ASTM D2794
 - 2) 3% Sulfuric Acid Immersion @ 120/F: ASTM D714
 - 3) 25% Sodium Hydroxide Immersion @ 140/ F: ASTM D714
 - 4) Deionized Water Immersion @ 160/ F: ASTM D714
 - 5) Moisture and Ultraviolet Light Cycle 8 Hours Light / 4 Hours 100% Humidity: ASTM G5377
2. Application of Lining – The lining shall be applied by a competent firm with at least a five-year history of applying linings to the interior of ductile pipe and fittings.
 - a. Surface Preparation: Prior to abrasive blasting the entire area which will receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease, or any substance which can be removed by solvent is present shall be solvent cleaned using the guidelines outlined in SSPC-SP-1 Solvent Cleaning. After the surface has been made free of grease, oil, or other substances, all areas which are to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The blast media shall strike 100 percent of the surface area at sufficient force to remove rust and oxides. The entire surface to be lined shall be struck with the blast media so that all rust, loose, oxides, etc., are removed from the surface. Only slight stains and specks of tightly adhering oxides may be left on the surface. Any area where rust appears before coating must be re-blasted to remove all rust.
 - b. Lining: After surface preparation and within 8 hours of surface preparation, the fittings shall receive a minimum coating of 40 mils dry film thickness of the protective lining. If flange fittings are included in the project the linings must not be used on the face of the flange; however, full face gaskets must be used to protect the ends of the pipe. All fittings shall be lined with a minimum of 40 mils of the protective lining. Push-on type fittings shall be lined from the gasket groove to the gasket groove. The 40 mils system shall not be applied in the gasket grooves.
 - c. Coating of Gasket Groove and Spigot Ends: Due to the tolerances involved, the gasket groove and spigot end up to 6 inches back from the end of the spigot end must be coated with a minimum of 10 mils dry of Phenicon. This coating shall be applied by brush to ensure coverage. Care should be taken that the coating is smooth without excess buildup in the gasket groove or on the spigot end. All materials for the gasket groove and spigot end shall be applied after the application of the lining.
 - d. Number of Coats: The number of coats of lining material applied shall be as recommended by the lining MANUFACTURER. However, in no case shall the material be applied above the dry thickness per coat recommended by the lining MANUFACTURER in printed literature. The time between coats shall never exceed that time recommended by the lining material MANUFACTURER. If at any time the lining must be recoated beyond the

lining material MANUFACTURER's recommended recoat time, the surface of the existing lining shall be roughened sufficiently to prevent delamination between coats.

3. Inspection:
 - a. All fittings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PA-2 film thickness testing.
 - b. The fittings shall be pinhole detected with a nondestructive 2,500-volt pinhole test.
 - c. Each fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on that date.
4. Certification: The pipe or fitting MANUFACTURER must supply a certificate attesting to the fact that the Applicator met the requirements of this specification, that the material used was as specified, and that the material was applied as required by the specification.
5. Repair: All pinholes and damaged lined areas shall be repaired in accordance with written repair procedure furnished by the MANUFACTURER of the lining material so that the repaired area is equal in performance to the undamaged lined areas.
6. Fittings exposed to view in the finished work and to be painted shall not receive the standard tar or asphalt coat on the outside surfaces but shall be shop primed on the outside.
7. All exposed fittings shall be painted with the Owner's standard color for each type of process pipe and labeled with the type of process flow (WAS, RAS, MLR, AIR, etc.) along with a flow directional arrow at a maximum spacing of every 10 feet in plain view.

2.5 IDENTIFICATION

- A. Each length of pipe and each fitting shall be marked with the name of the MANUFACTURER, size, and class. All gaskets shall be marked with the name of the MANUFACTURER, size, and proper insertion directions.
- B. All below ground PVC Schedule 80 pipe and fittings shall have an identification color code.
 1. Raw sewage force mains and gravity sewer pipe - Green.

PART 3 - EXECUTION

3.1 INSTALLING OF PROCESS PIPE AND FITTINGS

- A. All mains shall be installed in accordance with recommendations of the pipe MANUFACTURER and as specified herein.

- B. Care shall be taken in the handling, storage, and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before installing, and no pipe shall be installed which is found to be defective. Pipe or fittings shall not be dropped. All damage to the pipe coatings shall be repaired according to the MANUFACTURER's recommendations.
- C. All pipe and fittings shall be kept clean and shall be thoroughly cleaned before installation.
- D. Pipe shall be laid to the lines and grades shown on the Drawings with bedding and backfill as shown on the Drawings. Blocking under the pipe will not be permitted.
- E. When installation is not in progress, including lunchtime, or the potential exists for dirt of debris to enter the pipe, the open ends of the pipe shall be closed with watertight plugs or other approved means.
- F. Under no circumstances shall the pipe or accessories be dropped into the trench.
- G. All plugs, caps, bends and other locations where unbalanced forces exist shall be anchored by restrained joints. The length of pipe for which restrained joints shall be used are shown on the Drawings.
- H. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be jointed with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall be undamaged.

3.2 PUSH-ON JOINTS

- A. Push-on joints shall be made in accordance with the MANUFACTURER's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe, and the joint surfaces cleaned and lubricated. The plain end of the pipe to be laid shall then be aligned and inserted in the bell of the pipe to which it is to be joined, and pushed home with a jack or by other means. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.

3.3 MECHANICAL JOINTS

- A. Thoroughly clean and lubricate the joint surfaces and rubber gasket with soapy water before assembly. Bolts shall be tightened to the specified torques. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

3.4 FLANGED JOINTS

- A. Flanged joints shall be installed where shown on the Drawings and as specified herein. Extreme care shall be exercised to insure that there is no restraint on opposite ends of pipe or fitting which will prevent uniform gasket compression, cause unnecessary stress, bending or torsional strains to flanges or flanged fittings. Adjoining push-on joints shall not be assembled until flanged joints have been tightened. Bolts shall be tightened alternately and evenly.

3.5 RESTRAINED JOINTS

- A. Restrained joints shall be installed at all fittings as shown on the Drawings and specified herein. The joint assemblies shall be made in accordance with the MANUFACTURER's recommendations. After installation, apply a heavy bitumastic coating to all bolts, nuts and accessories.

3.6 FLEXIBLE JOINT PIPE

- A. The flexible joint pipe shall be installed in accordance with the MANUFACTURER's recommendations. In addition, the installed deflection shall be limited to 15 deg. per joint and provisions shall be made where required to prevent flotation or buoyancy of the pipe.

3.7 SLEEVE TYPE COUPLINGS

- A. Couplings shall be installed where shown. Couplings shall not be assembled until adjoining push-on joints have been assembled. After installation, apply a heavy bitumastic coating to all bolts, nuts and accessories.

3.8 CLEANING

- A. At the conclusion of the work the CONTRACTOR shall thoroughly clean all of the new pipelines.

END OF SECTION 40 05 13

SECTION 40 05 23.21 - PLUG VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Eccentric plug valves.

1.2 REFERENCE STANDARDS

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings.
 - 2. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 24 - Metric/Inch Standard.
 - 3. ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.
- B. ASME B1.20.1 - Pipe Threads, General Purpose (Inch).
- C. ASTM International:
 - 1. ASTM A536 - Standard Specification for Ductile Iron Castings.
 - 2. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
- D. American Water Works Association:
 - 1. AWWA C517 - Resilient-Seated Cast-Iron Eccentric Plug Valves.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit catalog information, indicating materials of construction and compliance with indicated standards.
- C. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

PART 2 - PRODUCTS

2.1 ECCENTRIC PLUG VALVES

A. Manufacturers:

1. DeZurik
2. Keystone
3. Engineer Approved Equal
4. Furnish materials according to City of Callaway standards.

B. Description:

1. Type: Non-lubricated, eccentric.
2. Minimum Working Pressure: 150 psig at 300 degrees F.
3. Ports: Port area shall be 100% of nominal pipe area.
4. Stem Bearings: Self-lubricating.
5. Stem Seals: Neoprene; V-ring type.
6. Packing and Gland: Accessible and externally adjustable.
7. End Connections: ASME B16.1, ASME B16.5, ASME B16.42, flanged.

C. Operation:

1. 3 inches and Smaller: Lever.
2. Greater than 3 inches: Worm gear manual operators with handwheel.
3. Furnish gear operators for valves 8 inches and larger, and chainwheel operators for valves mounted over 5 feet above floor.

D. Materials:

1. Body: AWWA C517, cast iron, lined with elastomer as recommended by valve manufacturer for service conditions.
2. Plug: Hard Rubber, lined with resilient coating as recommended by valve manufacturer for service conditions.
3. Seats: Nickel.
4. Stem: Type 316 stainless steel.
5. Stem Bearings: Stainless steel.
6. Seals: PTFE.
7. Connecting Hardware: Type 316 stainless steel.

E. Valve Box

1. Furnish Materials according to City of Callaway standards.

F. Finishes: As specified in City of Callaway standards.

2.2 SOURCE QUALITY CONTROL

- #### A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Performance Testing:

1. Operate each valve and actuator from fully CLOSED to fully OPEN to fully CLOSED under no-flow conditions.

C. Leakage Testing:

1. Test at indicated working pressure to ensure valves are drip-tight. Test with pressure in both directions for five minutes each way.

D. Hydrostatic Testing:

1. Perform test at twice rated pressure. Test for at least one minute to ensure no leakage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install valves according to AWWA C517 and as recommended by manufacturer.
- B. Install plug valves in horizontal piping with stem horizontal; install plug valves in vertical piping with plug at top when closed.
- C. Install such that plugs are on top when OPEN and on pressure side when CLOSED.

END OF SECTION 40 05 23.21

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SECTION 40 05 23.72 - MISCELLANEOUS PROCESS VALVES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal Swing Check Valves
2. Air & Vacuum Valves

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings.
2. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through 24 - Metric/Inch Standard.
3. ASME B16.11 - Forged Fittings, Socket-Welding and Threaded.
4. ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.
5. ASME B1.20.1 - Pipe Threads, General PurposeInch.

B. ASTM International:

1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.
3. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
4. ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data:

1. Submit catalog information, indicating materials of construction and compliance with indicated standards.

C. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

1.4 WARRANTY

- A. Section 01 77 00 – Closeout Procedures.
- B. Furnish five-year manufacturer's warranty for pressure-reducing and pressure-sustaining valves, against cavitation damage.

PART 2 PRODUCTS

2.1 HORIZONTAL SWING CHECK VALVES

- A. Manufacturers.
 - 1. DeZurik
 - 2. Keystone
 - 3. Engineer Approved Equal
 - 4. Furnish Materials According to City of Callaway Standards
- B. Swing-check valves shall be the clear waterway type - designed and fabricated in accordance with the current AWWA Standard C508
 - 1. Horizontal swing- check valves shall be iron body, bronze mounted with flanged ends rated for operation at 125 psi.
 - 2. The cover shall be cast iron with cover bolts of 316 stainless steel. The seating surface shall be bronze, and the disk shall be rubber-faced ductile or grey iron.
 - 3. The shaft shall be stainless steel with corrosion resistant bearing(s) at each end. Where extended outside the body, the shaft shall be sealed with double O-rings.
 - 4. There shall be a grease fitting between the O-rings. The check valve shall be of the lever and weight or adjustable external spring-loaded type, with springs made from 316 stainless steel. The Contractor shall adjust the tension in the spring as necessary to prevent slamming of the valve upon closing.

2.2 AIR & VACUUM VALVES

- A. Manufacturers
 - 1. ARI Flow Control Accessories
 - 2. Engineer Approved Equal
 - 3. The valve shall be designed to operate with liquids carrying solid particles such as raw sewage. The air and vacuum air valve shall discharge air at high flow rates during the filling of the system and admit air into the force main at high flow rates during its drainage. High velocity air cannot blow the float shut. Sewage entry to the lower portion of the valve will cause the sealing of the valve. At any time during system operation, should internal pressure of the system fall below atmospheric pressure, air will re-enter the system. The smooth release of air shall prevent

pressure surges and other destructive phenomena to the force main. Admitting air in response to negative pressure protects the force main from destructive vacuum conditions and prevents damage caused by water column separation. Air re-entry is essential to efficiently drain the force main.

4. Working pressure range: 3 – 230 psi. Testing Pressure: 360 psi.
5. The valve's design shall prevent any contact between sewage and the sealing mechanism by creating an air gap at the top of the valve, under all operating conditions.
6. The conical body shape shall be designed to maintain the maximum distance between the liquid and the sealing mechanism.
7. A spring-loaded joint is to be furnished between the stem and the upper float. Vibrations of the lower float will not unseal the automatic valve. Release of air will occur only after enough air accumulates.
8. The funnel-shaped lower body shall be designed to ensure that residue sewage matter will re-enter the force main and will not remain in the valve.
9. Maintenance flushing shall be provided while the valve is under pressure, by opening a full port type 316 S.S. ball valve in the valve's lower body.
10. All inner metal parts of the valve shall be made of stainless steel SAE 316.
11. The valve shall be provided with an AWWA/ANSI C115 flanged joint at the base of the body. Option for threaded connections to comply per recommendations/specifications of the manufacturer.

2.3 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Testing Pressure-Reducing and Pressure-Sustaining Valves:

1. Leakage Testing:
 - a. Test each assembled valve hydrostatically at 1-1/2 times rated working pressure for a minimum five minutes.
 - b. Test each valve for leakage at rated working pressure against closed valve.
 - c. Permitted Leakage: None.
2. Functional Testing:
 - a. Test each valve to verify specified performance.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with the drawings and manufacturer's recommendations and instructions.

- B. Install pipe supports as indicated and as required such that pipe loads are not transferred to the valve nor valve loads transferred to the piping.

END OF SECTION 40 05 23.72

SECTION 40 05 53 - IDENTIFICATION FOR PROCESS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nameplates.
2. Tags.
3. Stencils.
4. Pipe markers.
5. Labels.
6. Lockout devices.

B. Related Requirements:

1. Section 09 96 36 – Chemical-Resistant Coatings for Materials in Wastewater Facilities specified by this Section.

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 PREINSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing Work of this Section.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit manufacturer's catalog literature for each product required.

- C. Shop Drawings: Submit list of wording, symbols, letter size, and color-coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

- D. Samples: Submit one tag, label, and pipe marker for each size used on Project.

- E. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Qualifications Statement:
 - 1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for closeout procedures.
- B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Extra Stock Materials: Furnish two containers of spray-on adhesive.
- C. Tools: Furnish special crimpers and other devices required for Owner to reinstall tags.

1.7 QUALITY ASSURANCE

- A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.
- B. Perform Work according to City of Callaway standards.
- C. Maintain 1 copy of each standard affecting the Work of this Section on-Site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

PART 2 - PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. Provide manufacturer recommended nameplate data.
 - 2. Furnish materials according to City of Callaway standards.
- B. Description: Aluminum with engraved black letters on light, contrasting background color.

2.2 TAGS

A. Metal Tags:

1. Description:
 - a. Aluminum or Stainless-steel construction; stamped letters.
 - b. Minimum Tag Size and Configuration: 1-1/2 inches; square with finished edges.

B. Information Tags:

1. Description:
 - a. Clear plastic with printed CAUTION and message.
 - b. Minimum Tag Size: 3-1/4 by 5-5/8 inch.
 - c. Furnish grommet and self-locking nylon ties.
2. Tag Chart: Typewritten, letter-size list of applied tags and location, in anodized aluminum frame.

2.3 STENCILS

A. Furnish materials according to City of Callaway standards.

B. Description:

1. Clean-cut symbols.
2. Letters:
 - a. Up to 2-inch Outside Diameter of Insulation or Pipe: 1/2-inch-high letters.
 - b. 2-1/2- to 6-inch Outside Diameter of Insulation or Pipe: 1-inch-high letters.
 - c. Over 6-inch Outside Diameter of Insulation or Pipe: 1-3/4-inch-high letters.

C. Stencil Paint: Semigloss enamel.

D. Color-Coding and Lettering Size: Conform to ASME A13.1.

2.4 PIPE MARKERS

A. Color-Coding and Lettering Size: Conform to ASME A13.1.

B. Plastic Pipe Markers:

1. Description:
 - a. Factory-fabricated, flexible, semirigid plastic.
 - b. Preformed to fit around pipe or pipe covering.
 - c. Larger sizes may have maximum sheet size with spring fastener.

C. Plastic Tape Pipe Markers:

1. Description: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D. Plastic Underground Pipe Markers:

1. Description:
 - a. Brightly colored, continuously printed plastic ribbon tape.
 - b. Minimum 6 inches wide by 4 mil thick.
 - c. Manufactured for direct burial service.

2.5 LABELS

A. Furnish materials according to City of Callaway standards.

B. Description:

1. Aluminum construction.
2. Minimum Size: 1.9 by 0.75 inches.
3. Adhesive backed, with printed identification.

2.6 LOCKOUT DEVICES

A. Lockout Hasps:

1. Description:
 - a. Anodized aluminum construction.
 - b. Furnish hasp with erasable label surface.
 - c. Minimum Size: 7-1/4 by 3 inches.

B. Valve Lockout Devices:

1. Description:
 - a. Steel construction.
 - b. Furnish device preventing access to valve operator and accepting lock shackle.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

- B. Degrease and clean surfaces to receive adhesive for identification materials.
- C. Prepare surfaces as specified in Section 09 96 36 – Chemical-Resistant Coatings for Materials in Wastewater Facilities.

3.2 INSTALLATION

- A. Apply stencil painting as specified in Section 09 96 36 – Chemical-Resistant Coatings for Materials in Wastewater Facilities.
- B. Install identifying devices after completion of coverings and painting.
- C. Install plastic nameplates with corrosion-resistant mechanical fasteners or adhesive.
- D. Labels:
 - 1. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer.
 - 2. For unfinished covering, apply paint primer before applying labels.
- E. Tags:
 - 1. Install tags using corrosion-resistant chain.
 - 2. Number tags consecutively by location.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Identify valves in main and branch piping with tags.
- H. Piping:
 - 1. Identify piping, concealed or exposed, with plastic tape pipe markers.
 - 2. Use tags on piping 3/4-inch diameter and smaller.
 - 3. Identify service, flow direction, and pressure.
 - 4. Install in clear view and align with axis of piping.
 - 5. Locate identification not to exceed 20 feet on straight runs, including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 40 05 53

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SECTION 40 95 13 – CONTROL PANEL CONSTRUCTION

PART 1 - GENERAL

1.1 SCOPE

- A. The Supplier shall furnish, test, and startup all furnished electrical control panels and control system components related to their furnished equipment.
- B. This section applies specifically to the Lift Station Control Panel, CP-LS

1.2 SUBMITTALS

- A. Product Data: For each type of product supplied. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- C. Additional Shop Drawing Requirements:
 - 1. Point - to - Point Wiring Drawings.
 - 2. Loop Drawings
 - 3. Fabrication and nameplate legend drawings
 - 4. Systems schematic drawings illustrating all components being supplied complete with electrical interconnections.
 - 5. Computer input/output lists and a written description of the control strategy to be applied.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR CONTROL PANELS

- A. Control panel shall be constructed in accordance with the following standards: National Electrical Manufacturers Association (NEMA), Institute of Electrical and Electronics Engineers (IEEE), Underwriter Laboratories (UL), Nation Fire Protection Association (NFPA), and Instrumentation Systems and Automation Society (ISA)
- B. Control panel shall be constructed in a UL approved production facility and bear all applicable UL labels for panel construction.
- C. The completed panel shall be factory tested prior to shipment. Field installation by the Contractor shall consist only of setting the panel in place and making necessary pneumatic and/or electrical connections.
- D. Control panel shall be designed to operate at the 208Y/120 service voltage.

2.2 CONTROL PANEL ENCLOSURES

- A. Control panels and associated hardware shall be constructed of 316L stainless steel.
- B. Interior components shall be mounted with stainless steel hardware and shall be clearly identified with plastic identification nametags. The tags shall be white with black lettering.
- C. Control panels shall be NEMA 4X construction with a 3-point steel latching mechanism and padlocking stainless steel handles. Latch rods to have rollers for easier door closing.
- D. Door shall be provided with heavy gauge continuous stainless steel hinges.
- E. Control panels shall be constructed of 14 gauge stainless steel. Control panels shall also include a 10 gauge mild steel sub-panel mounted on collar studs for equipment mounting.
- F. Control panel seams shall be continuously welded and ground smooth.
- G. Exterior control panel doors shall be removable by pulling the stainless steel hinge pin.
- H. Data pockets shall be provide on all interior panel doors. The equipment supplier shall provide laminated schematics in each pocket for the associated control panel.
- I. Control panels shall be sized to accommodate the equipment required plus 25% spare space.
- J. Control panels shall be provided with a mild steel or aluminum dead front panel capable of protecting the operator from a bolted fault within the control panel with the outer door open.
- K. Control panels shall be provided with a battery back-up system that consists of a power supply / battery charger and re-chargeable batteries. The use of an off the shelf UPS shall not be considered acceptable.

2.3 CONTROL PANEL COOLING REQUIREMENTS

- A. NEMA 4X air conditioner shall be supplied as required to keep the equipment mounted inside the control panels operating within the manufacturers operating temperature requirements. The air conditioner unit shall not exchange the air inside the control panel with the air outside the control panel. The unit shall be coated to provide environmental protection.
- B. The manufacturer of the control panel and cabinet shall provide all necessary cooling/heating equipment required to maintain temperature and humidity within the operating requirements of all equipment located within panels and cabinets. Coordination for electrical/mechanical connection is the responsibility of the Contractor. At the time of submittals the Contractor shall submit calculations indicating that such requirements have been met.

2.4 SUPPORT BASE

- A. Control panel shall be mounted on a support base constructed of 2" stainless steel angle, welded to provide a 24" high support structure with stainless steel removable, ventilated panels on the front, rear and sides of the support structure. The maximum size of the removable panels shall be 24" x 24".

- B. Provide stainless steel fasteners to attached support base to the concrete housekeeping pad and the control panel enclosure.

2.5 POWER INFEED

- A. Provide main circuit breaker for the feeder conductors entering the control panel enclosure.
- B. Provide generator input circuit breaker with 200A generator input receptacle located on the side of the control panel enclosure to accommodate a temporary connection to a portable generator.
- C. The main circuit breaker and generator input circuit breaker shall be mechanically interlocked to ensure only one breaker is allowed to be closed at all times.
- D. Provide integral mounted surge protection device within the control panel enclosure.

2.6 MOTOR STARTER

- A. Provide Solid State Reduced Voltage (SSRV) type, Size 3 motor starter for each 20 HP submersible pump.
- B. Motor starters shall be provided with 120 VAC operating coils.
 - 1. A motor protection relay shall be furnished as part of the starting equipment. The motor protector shall be adjustable so that the range selected includes the motor nameplate listed FLA (full load amps) rating and the service factor.
 - 2. Repeated unsuccessful attempts to start the motor or a short circuit shall cause the motor protector to trip.
 - 3. Tripping of the motor protector shall stop the motor and flash the trip light. Resetting the relay shall allow the alarm circuitry to be reset.
 - 4. Output terminals shall be provided for connection of the motor leads exiting the enclosure.

2.7 TELEMETRY CONTROL UNIT (TCU)

- A. Control panel shall be provided with a telemetry control unit, Data Flow Systems Model TCU001, for monitoring and control of the lift station duplex submersible pump system and associated equipment as shown on drawings. Manufacturer representative contact information is:

Tom Hogeland
Data Flow Systems
Phone: 321.259.5009, ext. 1102
Email: tomh@dataflowsys.com

- B. The TCU shall be provided with the following communication modes:
 - 1. Ethernet communication module
 - 2. Radio Telemetry System consisting of 5W, synthesized 400 MHz, 9-18 VDC, 1.8A integrated radio and analog radio converter with Yagi antenna installed on concrete pole.

Coordinate communication interface with the City of Callaway for connection to the City's control system network for remote monitoring and control of the lift station.

- C. The TCU input/outputs shall include the following:
1. Analog Inputs (4-20mA)
 - a. Bubbler Level Device (TCU360)
 - b. SPARE
 2. Digital Inputs (Intrinsically Safe)
 - a. Low Level Float Switch (Both pumps stopped with alarm)
 - b. Off Level Float Switch (All pumps stopped)
 - c. Lead Level Float Switch (Lead pump started)
 - d. Lag Level Float Switch (Lag pump started)
 - e. High Level Float Switch (All pumps stagger started with alarm)
 3. Digital Inputs (120V)
 - a. SP-1, Motor Protection Relay – Thermal and Moisture Seal (Alarm)
 - b. SP-1, Ground Fault Monitor Relay (Alarm)
 - c. SP-2, Motor Protection Relay – Thermal and Moisture Seal (Alarm)
 - d. SP-2, Ground Fault Monitor Relay (Alarm)
 4. Digital Outputs (120V)
 - a. Pump, SP-1, start command
 - b. Pump, SP-1, On pilot light
 - c. Pump, SP-2, start command
 - d. Pump, SP-2, On pilot light
- D. The TCU shall include 4-line x 20 character LCD with a 12-key keypad that allows the operator to configure the TCU, viewing and resetting alarms, and analyzing status information.
- E. Control panel shall include wireless industrial Ethernet connections and shall be provided with industrial wireless Ethernet access points. The Radio Telemetry Unit (RTU) shall be provided by Data Flow Systems.
- F. The TCU shall include Hand-Off-Automatic (H-O-A) switches for each pump.
- G. The TCU shall include an internal power monitor for a 208Y/120V electrical system with phase monitor to disconnect power to the pump motors upon loss of a phase.
- H. TCU Programming:
1. All TCU code shall be written in either “Structured Text” or “Function Block” style using the manufacturer’s standard program, DFS Basic-52. The programming of the TCU shall be performed by the manufacturer, Data Flow Systems.
 2. All TCU code shall be supplied to the owner with fully descriptive instruction and rung comments. All code to be supplied to the owner with fully descriptive screen and tag data.
 3. The TCU manufacturer shall provide the owner with a flow chart of all TCU code as well as a written algorithm of the codes functions.
 4. The control panel manufacture shall provide the owner with an I/O map of all process variables in the TCU.
 5. All TCU code shall be the property of the owner.
 6. The Contractor shall provide three copies of all commented TCU and Operator Interface code/script/screen layouts to the Owner in electronic format prior to acceptance by the

Owner. Any documentation not containing symbol information or comments will not be considered acceptable.

2.8 BUBBLER SYSTEM – LIFT STATION BUBBLER LEVEL DEVICE (BLD)

- A. The primary lift station level monitoring device shall be a bubbler system, Data Flow Systems Model TBU360, for monitoring and control of the lift station duplex submersible pumps. Manufacturer representative contact information is:

Tom Hogeland
Data Flow Systems
Phone: 321.259.5009, ext. 1102
Email: tomh@dataflowsys.com

- B. The bubbler system shall be monitored via a 4-20 mA signal to the analog input of the Telemetry Control Unit (TCU) and include the following components installed within the control panel enclosure:
1. Bubbler Pressure Transducer
 2. Air Pump for Bubbler
 3. Check Valve
 4. Fittings and Adapters
 5. Tubing

2.9 CONTROL PANEL WIRING

- A. Wiring, where required, shall be general-purpose open type, neatly bundled and laced or installed in plastic wiring troughs. Wire shall be stranded No. 16 AWG minimum, with thermoplastic insulation rated for 600V and 90°C.
- B. All equipment mounting backboards shall be provided with nonmetallic slotted ducts. All nonmetallic slotted ducts shall have spare space equal to 40% of the depth of the duct.
- C. Wiring colors shall be as follows:
1. All ungrounded AC conductors operating at the supply voltage shall be “Black”
 2. All ungrounded AC control conductors operating at voltage less than supply shall be “RED”
 3. All ungrounded DC control conductors shall be “Blue”
 4. All ungrounded AC control conductors or wires that remain energized when the main disconnect is in the “OFF” position shall be “Yellow”
 5. All grounded AC current carrying conductors shall be “White”
 6. All grounded DC current carrying conductors shall be “White with a Blue stripe”
 7. All grounded AC current carrying conductors that remain energized when the main disconnect is in the “OFF” position shall be “White with a Yellow stripe”
 8. All ground conductors shall be “Green”
 9. A wiring color code legend shall be mounted inside the control panel door.
- D. All wires entering and leaving all panels shall be terminated at barrier type terminal strips with integral surge protection. All terminals shall be identified and labeled per the Owner’s standard

naming conventions. It shall be the Supplier's responsibility to coordinate with the Owner for the accepted naming conventions. (All terminal strips shall be designed for #12 AWG, XHHW-2, 90°C field wiring for terminations.)

- E. No terminal strip may be located closer than 8" from any side or bottom of the control panel. This is designed to allow for adequate wire bending radius for field terminations.
- F. All wiring shall be clearly marked with an identification number consistent with the wiring schematic.
- G. Devices mounted on the enclosure door or interior dead front panel shall be run in spiral wrap to avoid pinch points when opening and closing the enclosure door(s) or interior panels.

2.10 SURGE PROTECTION

- A. The main surge protective device shall be rated at 120 KA surge current per phase for 208Y/120V systems with L-L, L-N and L-G protection modes equal to Phoenix Contact "Trabtech" surge protectors.
- B. All control power and digital I/O signals shall be protected from surges at the control panel with suitable surge suppression devices. Panel mounted surge protection shall be Plug in Style & DIN rail mounted to allow for easy replacement. The power and digital I/O signals shall be protected with solid state surge suppression devices manufactured by Phoenix Contact or Engineer approved equal. MOV only type surge suppression is not acceptable.
- C. All analog I/O signals shall be protected by loop powered isolators manufactured by Phoenix Contact or Engineer approved equal.
- D. Lightning Protection and surge suppression devices shall be provided for all radio and telemetry equipment. The Lighting protection and surge suppression devices shall be manufactured by Phoenix Contact or Engineer approved equal.

2.11 PANEL MOUNTED DEVICES

- A. Pump run status indicating lights shall be provided on the control panel door and shall be heavy duty, push-to-test type, oil tight, industrial type for 120 VAC applications. Pump run pilot lights shall be red colored. Legend plates shall be factory engraved as required. – Allen-Bradley Bulletin 800T 30.5mm or approved equal.
- B. Current to voltage converters, 4-20mA_{dc} to 1-5V_{DC} shall be as manufactured by Phoenix Contact or Engineer approved equal.
- C. D.C. power supplies shall be as manufactured by PLC Manufacturer, Phoenix Contact, or approved equal and shall be sized for 1.5 times the application requirements. (No open power supplies will be allowed.)
- D. All relays shall Allen-Bradley. Units shall be hermetically sealed in metal can with octal plug. Contacts to be 120VAC/60Hz at 10 amps. Unit to incorporate lamp in parallel with relay coil. All relays to be DPDT. Provide hold down clamps for all relays.

- E. All circuit breakers shall have an Amp Interrupting Capacity (AIC) rating of 22,000 minimum.
- F. Provide ground fault monitoring relay
- G. Runtimes for each motor starter located in the control panel shall be tracked in the TCU and the motor control shall be programmed to alternate pumps to ensure equal run time for each motor.
- H. Power distribution blocks shall be block style distribution blocks manufactured by Ferraz Shawmut or Engineer approved equal. All distribution blocks shall be provided with polycarbonate safety covers to provide dead front protection. The safety cover shall have a test prod hole for testing purposes
- I. Fuse blocks/holders shall be UL style fuse blocks manufactured by Ferraz Shawmut or Engineer approved equal.
- J. General purpose fuses shall be Ferraz Shawmut UL Power Fuse style or Engineer approved equal. Unless otherwise noted the fuse rating and type shall be determined based on the equipment (which the fuse is protecting) manufacturer's recommendations for overcurrent protection.
- K. Semiconductor fuses shall be Ferraz Shawmut Amp Trap series fuses or Engineer approved equal. Unless otherwise noted the fuse rating and type shall be determined based on the equipment (which the fuse is protecting) manufacturer's recommendations for overcurrent protection.
- L. All control transformers shall be sized to provide 25% spare capacity. The transformer connections shall be provided with protective covers to guard against accidental contact, and the transformer shall be provided with primary and secondary fusing per the manufacturer's recommendations.
- M. Each control panel shall be provided with a ground fault duplex service receptacle that is accessible from the interior dead-front panel. The service receptacle shall be capable of providing 15A at 125VAC
- N. Each control panel shall be provided with a series connected suppression filter system to protect the programmable logic controller and instrumentation power from high-frequency noise and electrical transients. The suppression filter shall be a current technology LoadGuard or Engineer approved equal.
- O. All intrinsically safe barrier relays shall be UL listed and shall be manufactured by Warrick or Engineer approved equal.
- P. Pilot lights shall be provided for each starter located inside the control panel. The lights shall be as follows: Red (Run), Green (Off), Amber (Fault).
- Q. Control power transformers shall be provided in each control panel with a supply voltage other than 120V or 120/208V. Control power transformers shall be manufactured by Square D company and provided with both primary and secondary fuses per the NEC.

2.12 MISCELLANEOUS

- A. Engraved laminated plastic nameplates shall be furnished for each front panel mounted instrument. The Contractor shall coordinate with the Owner for nameplate color and naming conventions. All instruments and components shall be tagged on rear with embossed plastic tape labels.
- B. Provide convenience GFCI receptacle mounted within the control panel enclosure and a GFCI receptacle mounted on the exterior of the control panel enclosure in a cast aluminum outlet box with a while in use, weatherproof coverplate.
- C. Provide button type photocell and 20A/1P switch in weatherproof cast aluminum outlet boxes mounted on the exterior of the control panel to control the area light.
- D. Provide LED strip lights mounted within each section of the Lift Station Control Panel, CP-LS, controlled via door switches.

PART 3 - EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITY

- A. The Contractor shall coordinate the work of the service personnel during construction, testing, and acceptance of the work.
- B. The Contractor shall receive final approval on all panel, enclosure, and equipment layouts by the Engineer prior to fabrication or installation.

3.2 QUALITY ASSURANCE

- A. All control panels shall be factory tested and certified prior to releasing for shipment. The testing shall consist of but not limited to the following:
 - 1. Point to point testing of all wiring prior to application of power.
 - 2. The intended supply voltage shall be applied to the control panel and all components shall be tested for proper operation and calibration.
 - 3. The Telemetry Control Unit and operator interface code shall be loaded, and shall be tested for functionality.
 - 4. All components shall be checked to confirm that each device has been installed per the plans and specifications as well as the Manufacturer's recommendations.
 - 5. The enclosure shall be inspected for defects and shall be repaired or replaced if necessary.
 - 6. All labeling and identification tags shall be verified and be clean and visible.
- B. An Electrical Engineer, registered in the state of Florida, shall be required to document the results of the control panel testing. The documentation shall contain the results of the tests listed above as well as any rework items and subsequent repairs that were required prior to shipment. In addition he/she must certify this document prior to the release for shipment. Prior

to shipment all one copy of the applicable documentation shall be placed in the drawing pocket of each enclosure, and three copies shall be sent to the Engineer.

3.3 INSTALLATION

- A. All equipment and devices for the work shall be installed in the locations shown on the drawings, in accordance with the manufacturer's recommendations, and in compliance with the requirements of these specifications.
- B. The Contractor shall be responsible for coordinating the installation of all equipment in the proposed locations with all other trades performing work on the project that may be affected.

3.4 FINAL INSPECTION

- A. Include all changes and/or alterations in the control panels prior to final inspection and acceptance by the owner.
- B. Any changes and/or alterations in the Control Panels shall be reflected/updated in all Control Panel Schematics prior to acceptance by the Owner. This includes all electronic copies delivered to the Owner.

END OF SECTION 409513

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SECTION 43 41 45 - FIBERGLASS REINFORCED PLASTIC TANKS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements:

1. Section 03 30 00 - Cast-in-Place Concrete: Requirements for concrete support pad.
2. Division 40 - Process Interconnections: Pipes, tubes, fittings, and valves as apply to specific application.
3. Section 33 32 13 – Submersible Centrifugal Pumps.

1.2 DEFINITIONS

A. FRP: Fiberglass-reinforced plastic.

1.3 REFERENCE STANDARDS

A. ASME International:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.

B. ASTM International:

1. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
2. ASTM D2563 - Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
3. ASTM D3299 - Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
4. ASTM D4097 - Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
5. ASTM D883 - Standard Terminology Related to Plastics
6. ASTM D3753 - Standards Specifications for Glass-Fiber-Reinforced Polyester Manholes and Wet Wells

C. Code of Federal Regulations:

1. 29 CFR Part 1926.502.

1.4 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

- B. Coordinate Work of this Section with location and placement of utilities and piping.

1.5 SCHEDULING

- A. Schedule Work of this Section after concrete Work for support pad and prior to connecting utility and piping Work.

1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit data for expansion joint fittings and other pipe specialty fittings.
 - 2. Submit data for ladder and ladder safety devices.
 - 3. Submit information concerning materials of construction and fabrication.
- C. Shop Drawings:
 - 1. Indicate complete plan, elevation, and sectional drawings showing critical dimensions.
 - 2. Indicate supply and overflow piping details, including fittings, expansion joints, pipe support methods, and components of the fiberglass wet well.
 - 3. Indicate ladder and ladder safety device details.
 - 4. Indicate handrail details.
 - 5. Indicate access hatch details.
 - 6. Indicate anchoring system.
 - 7. Indicate submersible pumps and other attachments.
- D. Manufacturer's Certificate:
 - 1. Certify that products meet or exceed specified requirements.
 - 2. Submit certified list of tank installations storing same liquid and concentration, in service for period of not less than five years.
- E. Owner Installation Certificate: Obtain from tank manufacturer's representative and submit, attesting that tank has been properly installed and is ready for startup and testing.
- F. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for determination of shell thickness, nozzle reinforcement, and special elements of vessel construction and support.
- G. Test and Evaluation Reports:
 - 1. Submit certified data on physical properties of laminates being used to include laminate tensile modulus and flexural modulus in hoop and axial directions, and data on laminate makeup to include number and thickness of layers and layer glass content.
 - 2. Submit certified factory test results.

- H. Manufacturer Instructions: Submit detailed instructions on installation requirements, including tank handling procedures, anchoring, and layout.
- I. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- J. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- K. Manufacturer Reports: Certify that tank has been installed according to manufacturer instructions.
- L. Qualifications Statements:
 - 1. Submit qualifications for manufacturer, installer, and licensed professional.
 - 2. Submit manufacturer's approval of installer.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations and final orientation of tank and accessories.

1.8 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified according to NSF 61 and 372.
- B. Perform Work according to The City of Callaway standards.
- C. Maintain one copy of each standard affecting Work of this Section on Site.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

1.12 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish one-year manufacturer's warranty for replacement due to breakage, yellowing, abrasion, loss of light transmission, or coating delamination.

PART 2 - PRODUCTS

2.1 FIBERGLASS REINFORCED (FRP) WET WELL

A. Loading Conditions

1. Wet well FRP wall laminate must be designed to withstand wall collapse or buckling based on the following assumed physical parameters. The wet well shall be designed and constructed to withstand or exceed wall collapse and buckling based upon three (3) times the assumed loading conditions listed under (1) (a.), (1)(b.), and (1)(c.).
 - a. Unit weight of water is 62.4 lbs. per cubic foot.
 - b. Saturated soil unit weight of 120 lbs. per cubic foot.
 - c. Modulus of soil reaction of 700 lbs. per square foot.
2. Wet well bottom shall not have more than 3/8" inches of center deflection with vessel empty and water table located @ finished grade.
3. Wet well, when installed according to wet well manufacturers current Wet Well Installation Instruction and Operating Guidelines, shall support accessory equipment – such as submersible pumps, rails, valves, and ladders as shown on drawings.

B. Product Storage

1. Wet Well shall be vented to atmospheric pressure.
2. Wet Well shall be capable of storing products identified in the manufacturer's limited warranty for underground wet wells in effect at the time of purchase.

C. Materials

1. Wet well shall be manufactured with 100% premium resin (such as isophthalic or terephthalic resin) and glass-fiber reinforcement. No sand fillers.
2. Wet Well shall be tested by the manufacturer to a Barcol Hardness of at least 80% of the resin manufacturer's specific hardness for fully cured resin.
3. The following pertinent average material properties shall be used in analysis for fiberglass composite in the Wet Well.
 - a. Tensile Modulus 900,000 psi
 - b. Flexural Modulus 900,000 psi
 - c. Tensile Strength 10,000 psi
 - d. Compressive Strength 20,000 psi
 - e. Poisson's Ratio 0.33

D. Wet Well Dimensions

1. Wet well shall have an overall depth of 16.82 feet.
2. Wet well shall have nominal diameter of 96" inches.

2.2 ACCESSORIES AND FEATURES

A. Wet Well Top Flange

1. The wet well flange shall have an outside diameter of at least 4.0 inches greater than the diameter of the wet well.

B. Anti-Flotation Flange

1. The manufacturer shall provide anti-flotation calculations for the designed wet well based on specifics of ground water depth and soil properties for the specific site location as supplied by the design engineer.

C. Stub – Outs and Connections

1. Stub-outs must be installed by the manufacturer. Installations in the field are not recommended and may void the manufacturer's warranty. Installation of FRP pipe will be performed using resin and reinforced hand lay up procedures. All resin and fiberglass shall be the same type and grade as used in the manufacturer of the basin.

D. Wet Well Wall Reinforcement Rib

1. All 6' diameter and larger wet wells shall be constructed using and integral constructed trapezoidal rib for superior strength and support of the wet well wall.

E. Optional Ladders

1. Ladders shall be the standard ladder as supplied by wet well manufacturer and or a material specified by the owner.

F. Pump Mounting Base and Studs

1. The pump base mounting studs shall be 300 series stainless steel threaded studs.
2. The pump mounting base detail shall be provided by the owner.

2.3 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Certify through visual inspection of tanks after fabrication that Acceptance Level II requirements of ASTM D2563 are met.

C. Certify following during shop inspection:

1. Compliance with Drawing dimensions.
2. Surface cure by acetone wipe test; no surface tackiness is permitted.
3. Liquid tightness by minimum 24-hour hydrostatic test.

D. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

E. Marking and Identification:

1. The wet well shall be marked on the inside and outside with the following information:
 - a. Manufacturer's trade name or trademark
 - b. Manufacturer's location
 - c. Serial Number
 - d. Total height and diameter of wet well
 - e. Date of manufacturer

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify layout and orientation of tank accessories, utilities, and piping connections.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Thoroughly clean chemical storage tank pad, removing loose concrete, dust, and other debris.
- C. Place two layers of building paper on pad according to tank manufacturer instructions prior to placing tank.

3.3 INSTALLATION

- A. Support Pad: Using templates furnished with tank, install anchor bolts and accessories for mounting and anchoring tank.
- B. Install FRP tanks as indicated on Drawings and according to manufacturer instructions.
- C. Connect piping to tank.
- D. Install tank accessories not factory mounted to complete installation.
- E. Wet Well shall be installed per manufacturers recommendation.

3.4 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Field Testing:
 - 1. Hydrostatically test each FRP tank by filling with water to the overflow pipe level.
 - 2. Conduct test minimum 48 hours.
 - 3. No leakage permitted.
- C. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
- D. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

END OF SECTION 43 41 45

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SECTION 46 05 53 - IDENTIFICATION FOR WATER AND WASTEWATER EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nameplates.
2. Tags.
3. Stencils.
4. Labels.
5. Lockout devices.

B. Related Requirements:

1. Section 09 96 36 – Chemical-Resistant Coatings for Materials in Wastewater Facilities specified by this Section.
2. Section 40 05 53 – Identification for Process Piping

1.2 PREINSTALLATION MEETINGS

- A. Convene minimum one week prior to commencing Work of this Section.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturers catalog literature for each product required.
- C. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for equipment identification and schedule, including equipment number, location, function, and manufacturer's name and model number.
- D. Samples: Submit one nameplate, label and tag for each size used on Project.
- E. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Qualifications Statement:
1. Submit qualifications for manufacturer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 77 00 - Closeout Requirements: Requirements for maintenance materials.
- B. Extra Stock Materials: Furnish two containers of spray-on adhesive.
- C. Tools: Furnish special crimpers and other devices required for Owner to reinstall tags.

1.5 QUALITY ASSURANCE

- A. Perform Work according to City of Callaway standards.
- B. Maintain 1 copy of each standard affecting the Work of this Section on-Site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

PART 2 - PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. Furnish nameplates according to equipment manufacturer recommendations.
 - 2. Furnish materials according to City of Callaway standards.
- B. Description: Aluminum with engraved black letters on light, contrasting background color.

2.2 TAGS

- A. Metal Tags:
 - 1. Description:
 - a. Aluminum or Stainless steel construction; stamped letters.
 - b. Minimum Tag Size and Configuration: 1-1/2-inch square with finished edges.
- B. Information Tags:
 - 1. Description:
 - a. Clear plastic with printed CAUTION and message.
 - b. Minimum Tag Size: 3-1/4 by 5-5/8 inch.

- c. Furnish grommet and self-locking nylon ties.
2. Tag Chart: Typewritten, letter-size list of applied tags and location, in anodized aluminum frame.

2.3 STENCILS

- A. Furnish materials according to City of Callaway standards.
- B. Description:
 1. Clean-cut symbols.
 2. Letter Height: 1-3/4 inch.
- C. Stencil Paint: As specified in Section 09 96 36 – Chemical-Resistant Coatings for Materials in Wastewater Facilities.

2.4 LABELS

- A. Furnish materials according to City of Callaway standards.
- B. Description:
 1. Aluminum construction.
 2. Minimum Size: 1.9 by 0.75 inch.
 3. Adhesive backed, with printed identification.

2.5 LOCKOUT DEVICES

- A. Lockout Hasps:
 1. Description:
 - a. Anodized aluminum construction.
 - b. Furnish hasp with erasable label surface.
 - c. Minimum Size: 7-1/4 by 3 inches.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Section 01 77 00 - Closeout Requirements: Requirements for installation preparation.
- B. Degrease and clean surfaces to receive adhesive for identification materials.

02/25/2021

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27656.01 IDENTIFICATION FOR WATER AND WASTEWATER EQUIPMENT 46 05 53 - 3

- C. Prepare surfaces as specified in Section 09 96 36 – Chemical-Resistant Coatings for Materials in Wastewater Facilities.

3.2 INSTALLATION

- A. Identify equipment with metal nameplates.
- B. Identify inline pumps and other small devices with tags.
- C. Identify control panels and major control components outside panels with plastic nameplates.
- D. Apply stencil painting as specified in Section 09 96 36 – Chemical-Resistant Coatings for Materials in Wastewater Facilities.
- E. Install identifying devices after completion of coverings and painting.
- F. Install plastic nameplates with corrosion-resistant mechanical fasteners or adhesive.
- G. Labels:
 - 1. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer.
 - 2. For unfinished covering, apply paint primer before applying labels.
- H. Install tags using corrosion-resistant chain.

END OF SECTION 46 05 53

**AGREEMENT FOR CONTRACTOR SERVICES
CITY OF CALLAWAY S. BERTHE AVENUE LIFT STATION
& SEWER REHABILITATION
BID NO: CM2021-02**

This Agreement made as of this ___ day of, _____, 2021, by and between the **City of Callaway**, Florida - (the "CITY"), and _____ authorized to do business in the State of Florida (the "CONTRACTOR"), and whose address is _____, Phone: _____ Fax: _____.

In consideration of the mutual promises contained herein, the CITY and the CONTRACTOR agree as follows:

ARTICLE 1 - SERVICES

This is a FEMA funded project and is subject to Special Federal Provisions (ATTACHED HERETO AS EXHIBIT A). CONTRACTOR shall comply with all applicable procedures, guidelines, manuals, standards and directives as described therein, along with the Davis-Bacon Act (ATTACHED HERETO AS EXHIBIT B). The contractor will also be responsible for including these requirements in any subcontract.

The CONTRACTOR'S responsibility under this Agreement is to furnish, deliver, and construct all materials, labor, and equipment and to perform all operations in accordance with the plans and specifications and as listed in the Bid Form for the **CITY OF CALLAWAY S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION BID NO: CM2021-02.**

Services of the CONTRACTOR shall be under the general direction of the CITY MANAGER, who may designate a person to act as the CITY'S representative (hereinafter "REPRESENTATIVE") during the performance of this Agreement.

The CITY shall furnish to the CONTRACTOR up to four (4) sets of the Contract Documents for execution of the Work. Additional copies of the Contract Documents are available at the cost of reproduction.

ARTICLE 2 – SCHEDULE

The Substantial Completion date for this project will be 180 days from the date of the Notice to Proceed with an additional 30 days for Final Completion.

ARTICLE 3 - PAYMENTS TO CONTRACTOR

- A. The CITY shall pay to the CONTRACTOR for services satisfactorily performed \$_____, which includes all direct charges, indirect charges and reimbursable expenses, if any. The CONTRACTOR will bill the CITY monthly.
- B. The invoices received from the CONTRACTOR pursuant to this Agreement will be reviewed and approved by the City Manager's office, indicating that services have been rendered in conformity with the Agreement, and then will be sent to the Finance Department for payment. The invoice must specify the work performed. Ten percent (10%) of each invoiced amount will be withheld and retained by the CITY until completion of the work to the satisfaction of the CITY.
- C. In order for both parties herein to close their books and records, the CONTRACTOR will clearly state "final invoice" on the CONTRACTOR'S final/last billing to the CITY. This indicates that all

services have been performed and all charges and costs have been invoiced to the CITY. Since this account will thereupon be closed, any and other further charges if not properly included on this final invoice shall be waived by the CONTRACTOR.

- D. CONTRACTOR acknowledges that it has reviewed the scope of work and inspected the work site and does not anticipate having any CONTRACTOR requested change orders.

ARTICLE 4 - TERMINATION

This Agreement may be terminated by the CONTRACTOR on 60 days prior written notice to the CITY in the event of substantial failure by the CITY to perform in accordance with the terms hereof through no fault of the CONTRACTOR. It may also be terminated by the CITY, with or without cause, immediately upon written notice to the CONTRACTOR. Unless the CONTRACTOR is in breach of this Agreement, the CONTRACTOR shall be paid for services rendered to the CITY'S satisfaction through the date of termination. After receipt of a termination notice and except as otherwise directed by the CITY the CONTRACTOR shall:

- A. Stop work on the date and to the extent specified.
- B. Terminate and settle all orders and subcontracts relating to the performance of the terminated work.
- C. Transfer all work in process, completed work, and other material related to the terminated work to the CITY.
- D. Continue and complete all parts of the work that have not been terminated.

ARTICLE 5 - PERSONNEL

The CONTRACTOR represents that it has or will secure at its own expense all necessary personnel required to perform the services under this Agreement. Such personnel shall not be employees of or have any contractual relationship with the CITY.

All of the services required herein under shall be performed by the CONTRACTOR or under its supervision, and all personnel engaged in performing the services shall be fully qualified and, if required, authorized or permitted under State and local law to perform such services.

The CONTRACTOR warrants that all services shall be performed by skilled and competent personnel to the highest professional standards in the field.

ARTICLE 6 - SUBCONTRACTING

The CITY reserves the right to accept the use of a subcontractor or to reject the selection of a particular subcontractor and to inspect all facilities of any subcontractors in order to make a determination as to the capability of the subcontractor to perform properly under this Agreement. The CONTRACTOR is encouraged to seek minority and women business enterprises for participation in subcontracting opportunities.

If a subcontractor fails to perform or make progress, as required by this Agreement, and it is necessary to replace the subcontractor to complete the work in a timely fashion, the CONTRACTOR shall promptly do so, subject to acceptance of the new subcontractor by the CITY.

ARTICLE 7 - FEDERAL AND STATE TAX

The CONTRACTOR shall be responsible for payment of its own FICA and Social Security benefits with respect to this Agreement and the personnel it employs.

ARTICLE 8 – INSURANCE & BONDS

- A. The CONTRACTOR shall not commence work under this Agreement until it has obtained all insurance and bonds required under this paragraph and such insurance has been verified by the CITY.
- B. All insurance policies shall be issued by companies authorized to do business under the laws of the State of Florida.

The CONTRACTOR shall maintain, during the life of this Agreement, comprehensive automobile liability insurance in the amount of \$1,000,000 and \$2,000,000 combined single limit for property damage and bodily injury liability covering claims which may arise from the ownership, use, or maintenance of owned and non-owned automobiles, including rented automobiles, whether such operations be by the CONTRACTOR or by anyone directly or indirectly employed by the CONTRACTOR. CONTRACTOR shall purchase and maintain a policy or policies of commercial general liability insurance satisfactory in all respects to CITY, and casualty and extended coverage insurance. All policies shall be occurrence form policies and shall name CITY as an additional insured, with the premium thereon fully paid by CONTRACTOR on or before their due date. The general liability insurance policy shall afford minimum protection of \$1,000,000 and \$2,000,000 combined single limit coverage for bodily injury.

Required insurance shall be documented in Certificates of Insurance which provide that CITY shall be notified at least 30 days in advance of cancellation, non-renewal or adverse change. New Certificates of Insurance are to be provided to CITY at least 15 days prior to coverage renewals. City of Callaway, Florida is to be named as an additional insured entity.

If requested by CITY, CONTRACTOR shall furnish complete copies of its insurance policies, forms and endorsements.

For commercial general liability coverage, CONTRACTOR shall, at the option of CITY, provide an indication of the amount of claims, payments or reserves chargeable to the aggregate amount of liability coverage.

Receipt of certificates or other documentation of insurance or policies or copies of policies by CITY, or by any of its representatives, which indicate less coverage than required does not constitute a waiver of CONTRACTOR'S obligation to fulfill the insurance requirements herein.

CONTRACTOR shall also purchase and maintain workers compensation insurance for all obligations imposed by law, with employer's liability limits of at least the statutory limit, or provide notarized affidavit of exemption listing relevant statutes. CONTRACTOR shall also purchase any other coverage required by law.

CONTRACTOR'S maintenance of the insurance policies required hereunder shall not limit or otherwise affect its liability hereunder.

- C. In the event that a performance or payment bond is required due to use of grant funds for the project, by City Commission or as otherwise required, the CONTRACTOR shall not commence work under this Agreement until it has obtained the required bonds and provided such bonds to the CITY. All bonds will be issued on the bonding company's forms.

ARTICLE 9 - EXCUSABLE DELAYS

The CONTRACTOR shall not be considered in default by reason of any failure in performance if such failure arises out of causes reasonably beyond the CONTRACTOR'S control and without its fault or negligence. Such causes may include, but are not limited to: acts of God; the City's omissive and commissive failures; natural or public health emergencies; labor disputes; freight embargoes; and severe weather conditions. If failure to perform is caused by the failure of the CONTRACTOR'S subcontractor(s) and is without the fault or negligence of them, the CONTRACTOR shall not be deemed to be in default.

Upon the CONTRACTOR'S request, the CITY shall consider the facts and extent of any failure to perform the work and, if the CONTRACTOR'S failure to perform was without its fault or negligence as determined by the CITY, any affected provision of this Agreement shall be revised accordingly; subject to the CITY's rights to change, terminate, or stop any or all of the work at anytime.

ARTICLE 10 - LIQUIDATED DAMAGES

Liquidated damages shall be paid to the CITY at the rate of \$1,500 per day for all work awarded under the contract until the work has been satisfactorily completed as provided by the Contract Documents. Sundays and Legal Holidays shall be excluded in determining days in default.

It is agreed that the amount is the per-diem rate for damage incurred by reason of failure to complete the work. The said amount is hereby agreed upon as the reasonable costs which may be accrued by the CITY after the expiration of the time of completion. It is expressly understood and agreed that this amount is not to be considered in the nature of a penalty, but as liquidated damages which have accrued against the CONTRACTOR. The CITY shall have the right to deduct such damages from any amount due, or that may become due the CONTRACTOR, or the amount of such damages shall be due and collectable from the CONTRACTOR or Surety.

ARTICLE 11 - ARREARS

The CONTRACTOR shall not pledge the CITY'S credit or make it a guarantor of payment or surety for any contract, debt, obligation, judgment, lien, or any form of indebtedness.

ARTICLE 12 - DISCLOSURE AND OWNERSHIP OF DOCUMENTS

The CONTRACTOR shall deliver to the CITY for approval and acceptance, and before being eligible for final payment of any amount due, all documents and materials prepared by and for the CITY under this Agreement.

All written and oral information not in the public domain or not previously known, and all information and data obtained, developed, or supplied by the CITY or at its expense will be kept confidential by the CONTRACTOR and will not be disclosed to any other party, directly or indirectly, without the CITY'S prior written consent.

Such information and data shall be and will remain the CITY'S property and may be reproduced and reused at the discretion of the CITY.

All products generated by the CONTRACTOR for the CITY become the property of the CITY. The CITY may require submission of any electronic file version of reports, data, maps, or other submission of documentation produced for or as a result of this project in addition to paper documents.

The CITY and the CONTRACTOR shall comply with the provisions of the Florida Public Records Law. **PUBLIC RECORDS LAW.** CONTRACTOR acknowledges that it is familiar with the provisions of the Public Records Law of the State of Florida.

CONTRACTOR agrees to comply with Chapter 119, Florida Statutes, and specifically per Florida Statute 119.0701, CONTRACTOR agrees to keep and maintain public records that would be required by the City of Callaway in order to perform the services provided for in this Agreement; CONTRACTOR agrees to provide public access to any required public records in the same manner as a public agency; CONTRACTOR agrees to protect exempt or confidential records from disclosure; CONTRACTOR agrees to meet public records retention requirement; and CONTRACTOR agrees that at the end of term of this Agreement, to transfer all public records to the City of Callaway and destroy any duplicate exempt or confidential public records.

All products generated by the CONTRACTOR for the CITY become the property of the CITY. The CITY may require submission of any electronic file version of reports, data, maps or other submission of documentation produced for or as a result of this Bid/Proposal in addition to paper documents.

Further, in accordance with the Public Records Laws of the State of Florida, Section 119.0701, (2013), Contractor must:

- A. Keep and maintain public records that ordinarily and necessarily would be required by the public agency in order to perform the service.
- B. Provide the public with access to public records on the same terms and conditions that the public agency would provide the records and at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law.
- C. Ensure that public records that are exempt or confidential and exempt from public records are not disclosed except as authorized by law.
- D. Meet all requirements for retaining public records and transfer, at no cost, to the public agency all public records in possession of the contractor upon termination of the contract and destroy any duplicate public records that are exempt or confidential and exempt from public record disclosure requirements. All records stored electronically must be provided to the public agency in a format that is compatible with the information technology systems of the public agency.
- E. If a contractor does not comply with a public records request, the public agency shall enforce the contract provision in accordance with the contract.

All covenants, agreements, representations, and warranties made herein, or otherwise made in writing by any party pursuant hereto shall survive the execution and delivery of this Agreement and the consummation of the transactions contemplated hereby.

If the CONTRACTOR has questions regarding the application of Chapter 119, Florida Statutes, to the CONTRACTOR'S duty to provide public records relating to this contract, contact the custodian of public records, Janice Peters, City Clerk, at 850-215-6694, by email at jpeters@cityofcallaway.com, or via mail, at 6601 E. Hwy. 22, Callaway, FL 32404.

ARTICLE 13 - INDEPENDENT CONTRACTOR RELATIONSHIP

The CONTRACTOR is, and shall be, in the performance of all work services and activities under this Agreement, an independent contractor, and not an employee, agent, or servant of the CITY. All persons

engaged in any of the work or services performed pursuant to this Agreement shall at all times, and in all places, be subject to the CONTRACTOR'S sole direction, supervision, and control. The CONTRACTOR shall exercise control over the means and manner in which it and its employees perform the work, and in all respects the CONTRACTOR'S relationship and the relationship of its employees to the CITY shall be that of an independent contractor and not as employees or agents of the CITY.

The CONTRACTOR does not have the power or authority to bind the CITY in any promise, agreement or representation.

The CONTRACTOR shall hold the CITY, its officers, agents and employees harmless and free from any loss, damage or expense arising out of any occurrence relating to this Agreement or its performance and shall indemnify the CITY, its officers, agents and employees, customers, and successors against any damage or claim of any type arising from the negligent or intentional acts or omission of the CONTRACTOR.

ARTICLE 14 - CONTRACT ASSIGNMENT

The CONTRACTOR shall not sublet, sell, transfer, assign or otherwise dispose of the CONTRACT or any portion thereof, or of his right, title, or interest therein, without written consent of the CITY. The CONTRACTOR shall complete the work contemplated by the terms and conditions of this Agreement in an amount equivalent to at least 50 percent (50%) of the dollar value of work to be performed under this Contract utilizing its own business or corporate entity, so that no single labor, material man, or subcontractor shall be permitted to perform more than 50% of the work contemplated by this Contract.

ARTICLE 15 - AMENDMENT

None of the provisions, terms and conditions contained in this Agreement may be added to, modified, superseded or otherwise altered, except by a written instrument executed by the parties hereto.

ARTICLE 16 - ENFORCEMENT COSTS

If any legal action or other proceeding is brought for the enforcement of this Agreement, or because of an alleged dispute, breach, default, or misrepresentation in connection with any provision, the successful or prevailing party or parties shall be entitled to recover reasonable attorney's fees, court costs and all expenses even if not taxable as court costs (including, without limitation, all such fees, costs and expenses incident to appeals), incurred in that action or proceeding, in addition to any other relief to which such party or parties may be entitled.

ARTICLE 17 - AUTHORITY TO PRACTICE

The CONTRACTOR hereby represents and warrants that it has and will continue to maintain all licenses and approvals required to conduct its business, and that it will at all times conduct its business activities in a reputable manner.

ARTICLE 18 - SEVERABILITY

If any term or provision on this Agreement, or the application thereof to any person or circumstances shall, to any extent, be held invalid or unenforceable, the remainder of this Agreement, or the application of such terms or provisions to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected, and every other term and provision of this Agreement shall be deemed valid and enforceable to the extent permitted by law.

ARTICLE 19 - CITY'S REPRESENTATIVE AND AUTHORITY

The person designated by the CITY MANAGER shall serve as the CITY'S REPRESENTATIVE and shall decide questions which may arise as to quality and acceptability of materials furnished and work performed, and shall interpret the intent of the Contract Documents with reasonable promptness.

The REPRESENTATIVE will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

The REPRESENTATIVE may assign Project Inspector(s) who shall serve to assist the REPRESENTATIVE in determining if the work performed and the materials used meet the Contract requirements. The Project Inspector shall be authorized to issue Field Orders. The Project Inspector shall be authorized to stop all or any portion of the work if in his opinion the work is not proceeding according to the requirements of the plans and specifications.

ARTICLE 20 - MODIFICATION

The CITY reserves the right to make changes in the work, including alterations, reductions therein or additions thereto. Upon receipt by the CONTRACTOR of the CITY'S notification of a contemplated change, the CONTRACTOR shall (1) if requested by CITY, provide an estimate for the increase or decrease in cost due to the contemplated change, (2) notify the CITY of any estimated change in the completion date, and (3) advise the CITY in writing if the contemplated change shall affect the CONTRACTOR'S ability to meet the completion dates or schedules of this Agreement.

If the CITY so instructs in writing, the CONTRACTOR shall suspend work on that portion of the work affected by a contemplated change, pending the CITY'S decision to proceed with the change.

If the CITY elects to make the change, the CITY shall issue a contract amendment or change order and the CONTRACTOR shall not commence work on any such change until such written amendment or change order has been issued and signed by each of the parties.

ARTICLE 21 - CONTRACT DOCUMENTS

The other documents which comprise the entire Agreement are attached hereto, made a part hereof and consist of the following:

- A. Advertisement for Bids
- B. Special Instructions and Conditions
- C. General Instructions and Conditions
- D. Minimum Technical Specifications
- E. Bid Forms
 - Bid Certification Form
 - Drug-Free Workplace Certification
 - Public Entity Crimes Statement
- F. Addenda (if any)
- G. Change Orders (if any)
- H. Notice of Award
- I. Notice to Proceed
- J. Anti-Collusion Clause Form
- K. Proprietary/Confidential Information Disclosure Form
- L. Sales Tax Exemption Purchasing Agreement
- Exhibit A Special Federal Provisions
- Exhibit B Current Davis Bacon Act Wage Determination

In the event of a conflict between the terms of the above documents and the terms of this Agreement, the terms of this Agreement shall prevail.

There are no contract documents other than those listed above and there are no promises or understandings other than those stated herein.

ARTICLE 22 - VENUE

All applicable laws, regulations and ordinances of the State of Florida, Bay County and the City of Callaway will apply to consideration and award of any Bid/Proposal and the performance of the bidder/proposal pursuant thereto, and shall be governed by the laws of the State of Florida both as to intention and performance. The venue for any action arising from the award or subsequent performance shall lie exclusively in the Circuit Court of Bay County, Florida, or the United States District Court for the Northern District of Florida, as applicable.

ARTICLE 23 - NOTICE

All notices required in this Agreement shall be sent by certified mail, return receipt requested, and if sent to the CITY shall be mailed to:

City of Callaway
6601 East Hwy. 22
Callaway, Florida 32404
Attention: Janice L. Peters, City Clerk
Phone: (850) 215-6694
Fax: (850) 871-2224
Email: jpeters@cityofCallaway.com

With a copy to: Kevin D. Obos, Esq. City Attorney
Hand Arendall Harrison Sale
P.O. Drawer 1579
Panama City, FL 32402
Phone: (850) 769-3434
Fax: (850) 769-6121

and if sent to the CONTRACTOR shall be mailed to:

Either party may change its address noted above by giving written notice to the other party in accordance with the requirements of the Section.

This Agreement is entered into as of the day and year first written above and is executed in at least two original copies of which one is to be delivered to the CONTRACTOR, and one to the CITY CLERK for filing in the official records.

CITY CLERK

CITY OF CALLAWAY, FLORIDA

Attest: _____
Janice L. Peters, MMC
City Clerk

By: _____
Eddie Cook, City Manager

Contractor Witnesses:
(2 REQUIRED)

Contractor:

Witness: _____
Name

Signature

Business Name
By: _____
Signature

Witness: _____
Name

Signature

Print Name and Title

APPROVED AS TO FORM FOR THE RELIANCE OF THE
CITY OF CALLAWAY ONLY:

KEVIN D. OBOS, CITY ATTORNEY
HAND ARENDALL HARRISON SALE

EXHIBIT A
SPECIAL FEDERAL PROVISIONS

A. GRANT CONDITIONS

FEMA funding requirements apply to projects funding in part or in whole with funds made available by the Federal government.

1. Goals for Women and Minorities in Construction

Department of Labor regulations set forth in 41 CFR 60-4 establish goals and timetables for participation of minorities and women in the construction industry. These regulations apply to all Federally-assisted construction contracts in excess of \$10,000. The recipient must comply with these regulations and must obtain compliance with 41 CFR 60-4 from contractors and subcontractors employed in the completion of the project by including such notices, clauses and provisions in the Solicitations for Offers or Bids as required by 41 CFR 60-4. The goal for participation of women in each trade area must be as follows:

- a. From April 1, 1981, until further notice: 6.9 percent;
- b. All changes to this goal, as published in the Federal Register in accordance with the Office of Federal Contract Compliance Programs regulations at CFR 60- 4.6, or any successor regulations, must hereafter be incorporated by reference into these Special Award Conditions; and,
- c. Goals for minority participation must be as prescribed by Appendix B-Federal Register, Volume 45, No. 194, October 3, 1980, or subsequent publications. The Recipient must include the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" (or cause them to be included if appropriate) in all federally assisted contracts subcontracts. The goals and timetables for minority and female participation may not be less than those published pursuant to 41 CFR 60-6.

2. Contracting with small and minority businesses, women's business enterprise, and labor surplus area firms

The non-federal entity must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible. Affirmative steps must include:

- a. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
- b. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
- c. Dividing total requirements, when economically feasible, into smaller tasks quantities to permit maximum participation by small and minority business, and women's business enterprises;
- d. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;

- e. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce; and,
- f. Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in (a) — (e) of this paragraph.

3. Davis Bacon Act, as amended (40 U.S.C.3141—3148)

Davis-Bacon Act-related provisions are applicable for a construction project if it is for the construction of a project that can be defined as a “treatment works” in 33 U.S.C 1292; or for a construction project regardless of whether it is a “treatment works” project if it is receiving federal assistance from another federal agency operating under an authority that requires the enforcement of Davis-Bacon Act-related provisions. When required, all prime construction contracts in excess of \$2,000 awarded by the non-Federal entity must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141—3144, and 3146—3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specific in a wage determination made by the Secretary of Labor. In addition contracts must be required to pay wages not less than once a week.

The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to Treasury. The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contracts and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or sub-recipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation or which he or she is otherwise entitled. The non-federal entity must report all suspected or reported violations to Treasury. See Attachment Nos. 1, 2, and 3 of this Section.

4. Equal Opportunity Clause

Pursuant to 41 CFR 60-1.4(b), Federally assisted construction contracts, for construction which is not exempt from the requirements of the equal opportunity clause, 41 CFR Part 60-1—Obligations of Contractors and Subcontractors, [t]he [recipient] hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the federal government or borrowed on the credit of the federal government pursuant to a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

41 CFR §60-1.4 Equal opportunity clause. During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during

employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

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

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

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

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

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

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

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

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

5. Revised ADA Standards for Accessible Design for Construction Awards

The U.S. Department of Justice has issued revised regulations implementing Title II of the ADA (28 C.F.R. Part 35) and Title III of the ADA (28 C.F.R. Part 36). The revised regulations adopted new enforceable accessibility standards called the "2010 ADA Standards for Accessible Design" (2010 Standards). The 2010 Standards are an acceptable alternative to the Uniform Federal Accessibility Standards (UFAS). Treasury deems compliance with the 2010 Standards to be an acceptable means of complying with the Section 504 accessibility requirements for new construction and alteration projects.

6. Historic Artifact Discovery

If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the vicinity of the discovery. The applicant shall contact the Florida Department of State, Division of Historical Resources, Compliance Review Section at (850)-245-6333. Project activities shall not resume without verbal and/or written authorization. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, Florida Statutes.

EXHIBIT B

CURRENT DAVIS BACON WAGE DETERMINATION

DAVIS-BACON ACT

General Decision Number: FL20210158 01/01/2021

Superseded General Decision Number: FL20200158

State: Florida

Construction Type: Highway

County: Bay County in Florida.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number Publication Date

0 01/01/2021

* SUFL2013-019 08/19/2013

	Rates	Fringes
CARPENTER	\$ 13.71	0.00
CEMENT MASON/CONCRETE FINISHER, Includes Form Work	\$ 11.61	0.00
ELECTRICIAN	\$ 22.11	0.00
HIGHWAY/PARKING LOT STRIPING: Operator (Striping Machine).....	\$ 13.81	0.00
HIGHWAY/PARKING LOT STRIPING: Painter.....	\$ 12.13	0.00
IRONWORKER, ORNAMENTAL	\$ 13.48	0.00
IRONWORKER, REINFORCING.....	\$ 16.24	0.00
IRONWORKER, STRUCTURAL	\$ 16.42	0.00
LABORER (Traffic Control Specialist)	\$ 11.51	0.00
LABORER: Asphalt, Includes Raker, Shoveler, Spreader and Distributor	\$ 10.91	0.00
LABORER: Common or General.....	\$ 10.16	0.00
LABORER: Flagger.....	\$ 10.25	0.00
LABORER: Grade Checker.....	\$ 10.83	0.00
LABORER: Mason Tender - Cement/Concrete	\$12.81	0.00
LABORER: Pipelayer.....	\$11.70	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$13.13	0.00

OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$14.07	0.00
OPERATOR: Broom/Sweeper	\$11.10	1.89
OPERATOR: Bulldozer.....	\$14.29	0.00
OPERATOR: Concrete Finishing Machine.....	\$15.44	0.00
OPERATOR: Crane.....	\$21.23	0.00
OPERATOR: Curb Machine	\$19.21	0.00
OPERATOR: Distributor.....	\$14.54	0.00
OPERATOR: Drill.....	\$14.78	0.00
OPERATOR: Forklift	\$12.29	0.00
OPERATOR: Gradall	\$14.71	0.00
OPERATOR: Grader/Blade.....	\$16.50	0.00
OPERATOR: Loader.....	\$11.66	0.00
OPERATOR: Mechanic.....	\$15.84	0.00
OPERATOR: Milling Machine	\$13.29	1.92
OPERATOR: Oiler	\$16.32	0.00
OPERATOR: Paver (Asphalt, Aggregate, and Concrete)	\$12.43	0.00
OPERATOR: Piledriver.....	\$17.23	0.00
OPERATOR: Post Driver (Guardrail/Fences).....	\$17.02	0.00
OPERATOR: Roller	\$10.99	0.00
OPERATOR: Scraper	\$12.01	0.00
OPERATOR: Screed	\$13.13	0.00
OPERATOR: Trencher.....	\$16.04	0.00
PAINTER: Spray	\$19.57	0.00
TRAFFIC SIGNALIZATION: Traffic Signal Installation....	\$15.44	0.00
TRUCK DRIVER: Dump Truck	\$10.77	0.00
TRUCK DRIVER: Flatbed Truck	\$14.28	0.00
TRUCK DRIVER: Lowboy Truck	\$13.35	0.00
TRUCK DRIVER: Slurry Truck	\$11.96	0.00
TRUCK DRIVER: Water Truck.....	\$12.90	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four-letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union, which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
 Wage and Hour Division
 U.S. Department of Labor
 200 Constitution Avenue, N.W.
 Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
 U.S. Department of Labor
 200 Constitution Avenue, N.W.
 Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
 U.S. Department of Labor
 200 Constitution Avenue, N.W.
 Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION



PROPOSAL CHECKLIST
CITY OF CALLAWAY
S. BERTHE AVENUE LIFT STATION
& SEWER REHABILITATION
BID NO: CM2021-02

FORMS/ITEMS TO BE RETURNED
WITH YOUR PROPOSAL!

The following forms are to be completed/signed by the Proposer and submitted to the City:

1. Bid/RFP Certification Form(s),
2. One (1) unbound set of bid packet with original notarized signatures, plus three (3) copies
3. Bid Bond or Cashier's Check/Certified Check in the amount of 5% of bid,
4. Proof of Insurance in amounts required by the City with the City listed as Certificate Holder and Additionally Insured (See Special Instructions & Conditions),
5. State of Florida or Bay County Contractor License or Certificate
6. Public Entity Crime Statement, [Complete items 1 and 6; notarized signature required]
7. Drug-Free Workplace Certification Form, [Complete Part I; notarized signature, or sign Part II]
8. List of Subcontractors with names of directors or owners, addresses, telephone numbers, and email address (if applicable),
9. List of references for similar type work with contact information.
10. Proprietary/Confidential Information Form
11. Anti-Collusion Clause Form
12. Sales Tax Exemption Purchasing Agreement

Note: Incomplete Bid/Proposal submissions may not be accepted/considered. Do not modify the forms! Any additional information you desire to present may be included as an attachment.

Reminder: Submit requested number of copies! (See Special Instructions and Conditions)

BID/RFP CERTIFICATION FORM
CITY OF CALLAWAY
S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION
BID NO: CM2021-02

PROPOSERS CERTIFICATION TO THE CITY OF CALLAWAY:

1. The undersigned warrants that: (A) This Proposal is submitted in response to, and is in compliance with, all terms and conditions applicable thereto as set forth in the Advertisement, Instructions to Proposers, General Instructions and Conditions, Special Instructions and Conditions, Bid/RFP Certification Forms, the Minimum Technical Specifications, Addendum, Exhibits, Agreement, Bonds, and Insurance Requirements, each of which has been carefully examined, (B) Proposer or Proposer's representative has made such investigation as is necessary to determine the character and extent of the work and their capability to perform the work, and (C) agrees that if the Proposal is accepted by the City, Proposer will provide the necessary labor, materials, machinery, equipment, tools or apparatus, and perform all the work or services required to complete the assignment and/or contract within the time specified according to the requirements of the City as herein and hereinafter set forth, and (D) he/she is authorized to legally execute binding contracts for and on behalf of the Proposer.
2. Please check one:
 Proposer declares that the only person, persons, company, or parties interested in this Proposal are named in the Proposal.
 Proposer, or one or more of Proposer's officers, principals, or any owner of more than 5% in or of proposer, or members of their immediate families: (A) have a financial interest in another company, project, or property that could benefit financially from this proposed project; and/or (B) another individual or business will be compensated by (or on behalf of proposer) if Proposer is selected by the City for the requested services. (Attach a detailed explanation for either.)
3. Bid Bond - If the Proposal is accepted by the City, it will become a binding contract on both parties. If a Bid Bond or Cashier's Check/Certified Check is required, it shall be submitted with the Proposal. If the undersigned shall fail to deliver or perform, or if applicable, execute a Contract as stated herein, then the City may, at its option, determine that the undersigned has abandoned the Award/Contract, and thereupon such Bid and/or Award shall be null and void, and any Cashier's Check/Certified Check or Bond accompanying this Bid shall be forfeited to and become the property of the City, and the full amount of said check, or if a Bid Bond, the full amount of such bond, shall be paid to the City as partial liquidated damages; otherwise, any Bond or Cashier's Check/Certified Check accompanying this Bid shall be returned to the undersigned within 30 calendar days from the date of Award, or if provisions for a Notice to Proceed are included, from the date of the Notice to Proceed.
4. Vendor proposes and agrees to provide all materials, services or equipment required for the City of Callaway **S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION BID NO: CM2021-02**, for the Total Sum(s) as follows: *(Totals must match breakdown of costs for each part on next page.)* Dollar Amount (\$ _____)
Written Amount: _____
5. Number of days from date of the Notice to Proceed that will be required for the final completion of all work as described herein.

(Maximum 210 Calendar Days)
6. The City reserves the right to accept any or all prices itemized in any combination that best serves the interests of the City. The City further reserves the right to accept or reject any of the components of this Proposal, including alternates.
7. BIDDER HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDUMS: _____

BASIS OF BID

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QTY</u>	<u>UNIT PRICE</u>	<u>TOTAL</u>
1.	GENERAL PROVISIONS	LS	1	\$ _____	\$ _____
2.	BERTHE BRIDGE LIFT STATION	LS	1	\$ _____	\$ _____
TOTAL LUMP SUM OF 1 & 2: \$					_____

FEES FOR ADDITIVE WORK:

The undersigned agrees that he will, when so instructed by the Engineer, perform additional work (for which the Unit Prices stated above are not applicable) at the following rates:

1. For extra work performed by your Subcontractors, the net amount of the Subcontractor's charge plus a percentage fee of 10%, which fee shall include all charges for supervision, overhead and profit, bonds, taxes and insurance.
2. For work performed by the Contractor's own forces, a reasonable estimate of the net cost of the work (less all discounts) plus a fee of 18% which fee shall include all charges for supervision, field office, general expenses, overhead and profit. Net cost, to which the percentage fee shall be applied, is understood to include state sales taxes, bonds, and delivery expenses of materials: cost of labor is to include all union fringe benefits, applicable insurance and payroll taxes.

Provide the subcontractors or vendors requested below. Failure to submit this information shall result in a bid rejection and non-compliance with the bid requirements. If any category will be self-performed, please indicate.

All changes after bid award must be approved by the City.

Respectfully submitted:

Signature

Company

Title

Address

License Number

Date

Name of Bidder: _____

Business structure: () Corporation, () Partnership, () Individual, () Other: _____

If a Partnership: _____

Name(s) of Partner(s): _____

If a Corporation: _____

Incorporated in State of: _____ Date of Incorporation: _____

Business Address: _____

City: _____ State _____ Zip _____

Telephone Number: () _____ Fax () _____

E-mail Address: _____

Submitted By: _____
(Print)

Affix Corporate Seal
(If Corporation)

Title: _____

Signature: _____

ATTEST: _____

Secretary

By: _____
Print Name

State of Florida
County of _____

The foregoing instrument was acknowledged before
me by means of Physical Presence or
 Online Notarization

The foregoing instrument was acknowledged before me this ___ day of _____, 20__, by _____,
who is personally known to me or who presented _____ as identification, and who (did) (did not) take
an oath.

[Signature of Notary Public]

[Printed, typed or stamped name of Notary Public]

**NOTE: BIDS MAY BE REJECTED IF ALL DOCUMENTS ARE NOT COMPLETE AND EXECUTED, AND
THE NUMBER OF COPIES SPECIFIED/REQUESTED OF EACH ARE NOT SUBMITTED WITH THE
BID.**

**SWORN STATEMENT PURSUANT TO SECTION 287.133(3)(a),
FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES**

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to City of Callaway, Florida, a Municipal Corporation, 6601 East Hwy. 22, Callaway, Florida 32404 by _____
[print individual's name and title]
for _____ whose business
[print name of entity submitting sworn statement]
address is _____
_____ and (if applicable) it's Federal Identification Number
(FEIN) is _____ (If the entity has no FEIN, include the Social Security
Number of the individual signing this sworn statement _____)
2. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), **Florida Statutes**, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or any agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.
3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), **Florida Statutes**, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.
4. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), **Florida Statutes**, means:
 - a. A predecessor or successor of a person convicted of a public entity crime; or
 - b. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.
5. I understand that a "person" as defined in Paragraph 287.133(1)(e), **Florida Statutes**, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. **[Indicate which statement applies.]**

_____ Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July, 1 1989.

_____ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. **[attach a copy of the final order]**

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES FOR CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

[signature]

CM2021-02

[Reference: RFP Number]

Sworn to and subscribed before me this ___ day of _____, 20___. Personally known _____ or produced identification _____.

[Type of identification]

The foregoing instrument was acknowledged before me by means of Physical Presence
or
 Online Notarization

Notary Public - State of _____

My Commission expires: _____

[Signature of Notary]

[Printed, typed or stamped commissioned name of Notary Public]

CITY OF CALLAWAY
DRUG-FREE WORKPLACE CERTIFICATION

Please complete Part I or Part II as applicable.

In order to be given preference in the award process for having implemented a drug-free workplace program prior to the Bid/Proposal submission date, the Bidder/Proposer is requested to certify that as part of their drug-free workplace program, they have:

1. Published a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specified the actions that will be taken against employees for violations of such prohibition.
2. Informed employees about the dangers of drug abuse in the workplace, the business policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Given each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in Subsection 1.
4. In the statement specified in Subsection 1, notified the employees that, as a condition of working on the commodities or contractual services that are under bid, 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 Chapter 893 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.
5. Imposed a sanction on, or required 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. Made a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

Part I - PROGRAM IMPLEMENTED

I certify that I/we have established a drug-free workplace program meeting the foregoing minimum requirements.

[Printed, typed name]

[Signature]

State of Florida

County of _____

The foregoing instrument was acknowledged before me this ____ day of _____, 20__, by _____, who appeared by means of Physical Presence or Online Notarization, is personally known to me or who presented _____ as identification, and who (did) (did not) take an oath.

[Signature of Notary Public]

[Printed, typed or stamped name of Notary Public]

[Commission Number of Notary Public]

Part II - PROGRAM NOT IMPLEMENTED

A program meeting the above stated requirements has not been established or has not been fully implemented prior to Bid/Proposal closing date, and therefore I/we are not eligible for certification as a drug-free workplace.

[Signature]

[Date]

PROPRIETARY/CONFIDENTIAL INFORMATION
CITY OF CALLAWAY S. BERTHE AVENUE LIFT STATION & SEWER
REHABILITATION
BID NO. CM2021-02

Name of Firm of Bidder/Vendor: _____

Trade secrets or proprietary information submitted by a Vendor shall not be subject to public disclosure under the Freedom of Information Act; however, the Vendor must invoke such protections provided by state law, in writing, either before or at the time the data or other material is submitted. The written notice must specifically identify the data or materials to be protected, including the section of the proposal in which it is contained, as well as the page number(s), and state the reasons why protection is necessary. The proprietary or trade secret material submitted must be identified by some distinct method such as highlighting or underlining and must indicate only the specific words, figures, or paragraphs that constitute a trade secret or proprietary information. In addition, a summary of proprietary information provided shall be submitted on this form. The designation of an entire proposal document, line item prices, and/or total proposal prices as proprietary or trade secrets is not acceptable. If, after being given reasonable time, the Vendor refuses to withdraw such a classification designation, the proposal will be rejected.

SECTION/TITLE	PAGE NUMBER(S)	REASON(S) FOR WITHHOLDING FROM DISCLOSURE

Check this box if there are none.
This document must be completed and returned with proposal.

CITY OF CALLAWAY
S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION
BID NO. CM2021-02

ANTI-COLLUSION CLAUSE FORM

The award of a bid or acceptance of proposal is subject to Chapter 112, Florida Statutes*. All Bidders/Proposers must disclose with their Bid/Proposal the name of any officer, director, or agent who is a city official or employee, or a member of an official's or employee's immediate family. Further, Bidders/Proposers must disclose the name of any city official or employee, or a member of an official's or employee's immediate family, who owns directly or indirectly an interest of ten percent (10%) or more in the bidder's/proposer's firm or related business.

CERTIFICATION

- I declare that I do not have any matters which might give rise to a real or perceived conflict of interest.

- I hereby disclose that the following named person(s) is an Officer, Director, or Agent who is also a City Official, Employee, or member of a City Official or Employee's immediate family and could pose a possible conflict of interest:

Name: _____

Affiliation: _____

By signing below, I affirm that I have read and understood the principles of conflict of interest disclosure and I have made full disclosure of all matters that may put me in a conflict of interest situation in performing my role.

I acknowledge that non-disclosure could result in action being taken to terminate my work with the City of Callaway and potentially bar me from submissions of Bids/RFPs in the future.

Signature

Printed Name

Company

Project/Bid/RFP Number: _____ Date: _____

*Florida Statutes Chapter 112.311(5) It is hereby declared to be the policy of the state that no officer or employee of a state agency or of a county, city, or other political subdivision of the state, and no member of the Legislature or legislative employee, shall have any interest, financial or otherwise, direct or indirect; engage in any business transaction or professional activity; or incur any obligation of any nature which is in substantial conflict with the proper discharge of his or her duties in the public interest.

CITY OF CALLAWAY
SALES TAX EXEMPT PURCHASING AGREEMENT

THIS SALES TAX EXEMPT PURCHASING AGREEMENT made as of _____, 20__, between _____ hereinafter called the “Contractor” and the City of Callaway, Florida, hereinafter called the “Owner.”

RECITALS

1. Contractor and Owner entered a contract dated _____, 20__, for Bid No. _____, and the performance of the work described therein.
2. Contractor and Owner desire to enter into an arrangement whereby certain purchases under the Contract may be made through the Owner as a means of taking advantage of the Owner’s status of being exempt from sales and use taxes.
3. The Owner is exempt from sales and use taxes. As such it is exempt from the payment of sales and use tax on purchases of tangible property, materials, etc., necessary for the performance of work under construction contracts, provided the Owner determines it is to its best interest to do so, and provided the purchase of such properties, materials, et cetera, are handled in the manner hereinafter described.
4. Should the Owner determine that it is in its best interest to provide the opportunity to eliminate the payments of sales tax for tangible property, materials, etc., to be used in the construction of this project, it will notify the Contractor of its intent to do so.

AGREEMENT

1. The parties intend by this Agreement to comply with the procedures and elements described in Florida Department of Revenue Technical Assistance Advisements 01A-003 (January 8, 2001) and 00A-083 (December 21, 2000), and any conflict or ambiguity in this Agreement shall be resolved in favor of meeting the elements necessary to make tax exempt the purchases contemplated by this Agreement.
2. The Owner shall, at its sole discretion, have the option to purchase directly from the supplier or vendor, any supplies, materials or equipment included in the Contractor’s bid for the Contract. The Owner reserves the right to require Contractor to assign to the Owner agreements with suppliers for such goods. Contractor shall, from time to time submit, update and keep current, for consideration by the Owner, a list of all materials, supplies and equipment to be purchased, organized by supplier or vendor. Such list shall include a brief description of the materials, supplies and equipment and the name and address of the supplier or vendor. Suppliers or vendors reasonably anticipated to furnish material, supplies and equipment with an aggregate purchase value of less than \$5,000 need not be listed. Contractor’s initial list is attached, incorporated and marked “Exhibit B.” Goods not required for the performance of the Contract shall not be purchased under this Agreement. The Owner reserves the right to delete or add items from this Agreement when it is in the Owner’s best interest.

3. The Owner will be liable for the payment of all purchases properly made hereunder.
4. Contractor shall notify all suppliers not to make sales to the Contractor under this Agreement.
5. For each purchase approved by the Owner to be made under this Agreement, the Contractor shall furnish the Owner, in writing, information sufficient for the Owner to issue to the supplier its Owner purchase order for the requested item, which shall include as an attachment the Owner's Certificate of Exemption. Suppliers will render statements for materials purchased to the Owner in care of the Contractor. After accepting the goods, reviewing and approving the invoices, Contractor will forward the invoices to the Owner's Engineer for approval, processing and delivery to the Owner for payment. Contractor will keep and furnish to the Owner all such records, summaries, reports of purchase orders and invoices, and reports of the status and use of goods handled under this Agreement, as the Owner may reasonably require.
6. The Contract provides that Contractor will perform the work under the Contract for a total lump sum of \$ _____, as may be amended from time to time as provided in the Contract. Said amount, as amended, due Contractor under the Contract, shall be reduced by the sum of all amounts paid by the Owner for materials and equipment purchased under this Agreement, including any shipping, handling, insurance or other, similar charges paid by the Owner, and all of the savings of sales and use tax on the purchase of such items.
7. The Contractor shall submit his proposal for base bid and proposals for each Alternate with the inclusion of all required taxes including applicable sales and use tax, the same is if tax were to be paid in the normal manner. Any sales and use tax savings will be effected during the performance of the Contract.
8. Contractor shall immediately notify all subcontractors and material and equipment dealers of the Owner's intent to possibly reduce the construction cost of the project by the purchase of properties, materials, et cetera, in the manner herein described and the Contractor shall not withhold his consent to the arrangement.
9. Administrative costs incurred by the Contractor with this Agreement, including administering the purchases in the name of the Owner, shall be considered to be included in the base bid proposal for work. No addition shall be added to the Contract amount because of the service provided by the Contractor in the purchase of property, materials, et cetera, in the name of the Owner.
10. All sales and use tax savings on the purchase of property, materials, et cetera, shall be credited to the Owner and the amount of the Contract shall be reduced by the full amount of savings which are affected by the omission of payment of sales and use tax.

11. By virtue of its payment of material and equipment invoices, the Owner further intends to benefit from any discounts offered for timely payment to the extent of one-half of the discount offered, the remaining one-half to accrue to the Contractor as an incentive for the Contractor to process invoices well within the discount period. The Contractor shall pay any late penalties caused by their failure to facilitate the processing of invoices within allotted time.
12. The Contractor, notwithstanding this special purchase arrangement, shall select, describe, order, obtain approvals, submit samples, coordinate, process, prepare shop drawings, pursue, receive, inspect, store, protect, guarantee and otherwise be responsible for all materials, the same as would have been the case if the tax saving procedures were not implemented.
13. The Contractor as bailee shall have the obligation of receiving, inspecting, storing and safekeeping all goods and materials purchased on behalf of the Owner pursuant to this Agreement. Further, the Contractor shall be responsible for the cost of replacing or repairing any goods or materials lost, stolen, damaged or destroyed while in the Contractor's possession or control as bailee, as well as processing all warranty claims for defective goods and materials to the same extent as if such goods had been Contractor-supplied or purchased in the name of the Contractor.
14. Contractor shall maintain separate accounting records for all transactions carried out under the authority granted to it under this Agreement. Such records shall be open to the Owner or its authorized agent during normal business hours of Contractor.
15. As equitable and legal owner of the materials and equipment purchased under this Agreement, the Owner shall bear the risk of loss thereto and shall have the insurable interest therein. Therefore, Contractor shall, at no additional cost to Owner, cause the Owner to be insured or named as an additional insured as its interest may appear against any loss or damage to such goods to the extent of their full insurable value. All such insurance shall be in such form and through such companies as may be reasonably acceptable to Owner and Contractor shall provide Owner certificates thereof requiring each insurer to provide the Owner ten (10) days written notice in advance of cancellation or modification of coverage.
16. Contractor shall be fully responsible for all matters relating to the procurement of materials and equipment covered by this Agreement, including but not limited to, overseeing that the correct materials and the correct amounts are received timely with appropriate warranties; for inspecting and accepting the goods; and for unloading, handling and storing the materials until installed. Contractor shall inspect the materials when they arrive at the job site, verify that all necessary documentation accompanies the delivery and conforms with the Owner's purchase order, and forward the invoice to the Owner for payment if the goods are conforming and acceptable. Contractor shall verify that the materials conform to plans and specifications and determine before installation that such materials are not defective. Contractor shall manage and enforce the warranties on all materials and equipment covered by this Agreement. Contractor shall be responsible to the Owner for its failure to fully and timely perform its obligations under this paragraph, and this Agreement generally.

17. Whenever title to the materials and equipment covered by this Agreement passes to the Owner prior to being incorporated into the work, the Contractor's possession of the goods is a bailment until such time as each of such goods is returned to the Owner by being incorporated into the work.
18. The Owner shall not be liable for delays in the work caused by delays in delivery of or defects in the goods covered by this Agreement, nor shall such delays or defects excuse Contractor in whole or in part from its obligation to timely perform the Contract.
19. In the event Contractor objects to the payment of any invoice for goods covered by this Agreement, Contractor shall at no additional cost to the Owner, provide all assistance, records and testimony necessary or convenient for the Owner to resolve the supplier's claim for payment.
20. This Agreement and the authority granted to Contractor hereunder may be revoked by the Owner at any time upon verbal or written notice to Contractor at its offices located at _____, during normal business hours.

IN WITNESS WHEREOF the parties have caused these presents to be executed in their names as of the date and year first above written.

CONTRACTOR:

By: _____

Printed Name

Title

OWNER:

CITY OF CALLAWAY

By: _____
Eddie Cook, City Manager

Date: _____

Attest: _____
Janice L. Peters, City Clerk

CONSTRUCTION PLANS FOR

THE CITY OF CALLAWAY S. BERTHE AVENUE LIFT STATION & SEWER REHABILITATION



PREPARED FOR:
CITY OF CALLAWAY


MARCH 2021



CITY OF CALLAWAY
CITY COMMISSION

PAMN HENDERSON	MAYOR
SCOTT DAVIS	WARD I COMMISSIONER
DAVID GRIGGS	WARD II COMMISSIONER
BOB PELLETIER	WARD III COMMISSIONER
FRANK MANCINELLI	WARD IV COMMISSIONER
EDDIE COOK	CITY MANAGER
BILL FRYE	PUBLIC WORKS DIRECTOR

PREPARED BY:

 **BASKERVILLE-DONOVAN, INC.**
Innovative Infrastructure Solutions

14101 PANAMA CITY BEACH PARKWAY, SUITE 110
PANAMA CITY BEACH, FLORIDA 32413 (850) 230-6150
PENSACOLA - PANAMA CITY BEACH - TALLAHASSEE - MOBILE

ENGINEERING BUSINESS: EB-0000340

ENGINEER'S PROJECT NO.: 27656.01




LOCATION MAP
NOT TO SCALE

48 HOURS BEFORE YOU DIG
CALL SUNSHINE
1-800-4-32-4770
IT'S THE LAW IN FLORIDA
FL STATUTE 553.851 (1979) REQUIRES
MIN. OF 2 DAYS AND MAX. OF 5 DAYS
NOTICE BEFORE YOU EXCAVATE.

SHEET INDEX

G-000	COVER SHEET
G-001	GENERAL NOTES AND LEGEND
C-001	CIVIL LEGEND AND SYMBOL
C-100	EXISTING CONDITIONS PLAN
C-101	DEMOLITION & EROSION CONTROL PLAN
C-102	OVERALL PLAN
C-103	CONTROL PLAN
C-104	SANITARY SEWER PLAN AND PROFILE
C-105	LIFT STATION SITE DETAILS
C-200	DIRECTIONAL DRILL DETAIL AND SCHEDULE
C-900	DETAILS
M-100	PROPOSED LIFT STATION SITE PLAN
M-101	PROPOSED LIFT STATION EQUIPMENT & PIPING PLAN & SECTIONS
M-900	LIFT STATION DETAILS
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E-001	LEGEND AND ABBREVIATIONS
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E-111	LIFT STATION AREA PLAN
E-311	DIAGRAMS
E-411	DETAILS

RELEASE FOR BID

UTILITY CONTACT INFORMATION	
UTILITY	CONTACT
WATER - CITY OF CALLAWAY	DAVID KUBAN 850-871-1033
SEWER - CITY OF CALLAWAY	JOHN FRANKLIN 850-215-7232
	JEFFREY SMITH 850-770-8056
COMCAST	4001 W. 23RD ST, SUITE A, PANAMA CITY, FL 32405
	SANDRA PERRY 850-872-3315
GULF POWER	12425 HUTCHINSON BLVD, PANAMA CITY BEACH, FL 32407
AT&T DISTRIBUTION	AL RUDOLPH 850-436-1488
TECO	MIKE MCQUIRE 850-914-6104
	3706 W. 23RD ST., PANAMA CITY, FL 32405

GENERAL NOTES:

- THE CONTRACTOR IS CAUTIONED TO VISIT THE SITE AND FAMILIARIZE HIMSELF WITH THE PROJECT PRIOR TO BIDDING.
- B.M. DATUM IS 1988 NAVD.
- THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE EXACT LOCATIONS AND DEPTHS OF ALL UTILITIES INCLUDING, BUT NOT LIMITED TO, WATER LINES, FORCEMAINS, BURIED TELEPHONE LINES, BURIED ELECTRICAL LINES AND GAS MAINS PRIOR TO COMMENCEMENT OF CONSTRUCTION. CONTRACTOR IS TO COORDINATE WITH UTILITY COMPANIES FOR REMOVAL AND/OR RELOCATION OF EXISTING UTILITY POLES, AERIAL LINES, BURIED CABLE AND OTHER UTILITIES.
- THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICTS BETWEEN CONTRACT DOCUMENTS AND EXISTING CONDITIONS. THESE DRAWINGS REPRESENT KNOWN STRUCTURES AND UTILITIES LOCATED IN THE PROJECT AREA. THE CONTRACTOR IS CAUTIONED THAT OTHER STRUCTURES AND UTILITIES, ABOVE OR BELOW GROUND, MAY BE ENCOUNTERED DURING THE COURSE OF THE PROJECT. THE CONTRACTOR SHOULD NOTIFY THE UTILITY, THEN THE ENGINEER, IMMEDIATELY UPON ENCOUNTERING ANY UNEXPECTED STRUCTURE, UTILITY LINE, OR OTHER UNUSUAL CONDITION.
- CONTRACTOR SHALL SAFETY-BARRICADE ALL EXCAVATIONS AND OTHER HAZARDS.
- CONTRACTOR SHALL PROVIDE ACCESS TO PROPERTIES ADJACENT TO THE CONSTRUCTION AREAS. ADEQUATE BARRICADES, CONSTRUCTION SIGNAGE AND OTHER TRAFFIC CONTROL DEVICES SHALL BE PROVIDED IN ACCORDANCE WITH FDOT CONSTRUCTION STANDARDS.
- THE CONTRACTOR SHALL EMPLOY THE USE OF SILT FENCES, HAY BALES, DITCHES OR WHATEVER MEANS NECESSARY TO CONTROL EROSION AND SEDIMENTATION AT ALL TIMES. WATERS OF THE STATE, ADJACENT PROPERTIES, AND ANY NEW DRAINAGE CONSTRUCTION SHALL BE PROTECTED DURING THE CONSTRUCTION PERIOD. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND SHALL REMAIN UNTIL THE COMPLETION OF CONSTRUCTION AND ACCEPTANCE BY THE OWNER.
- ADEQUATE PROVISIONS SHALL BE MADE FOR THE FLOW OF SEWERS, DRAINS, WATER COURSES AND OTHER UTILITIES ENCOUNTERED DURING CONSTRUCTION.
- ALL PAVEMENT CUTS SHALL BE SAW CUT.
- ALL NEW CONCRETE FOR SITE WORK SHALL ACHIEVE A 28 DAY STRENGTH OF 3000 PSI (MIN.), UNLESS OTHERWISE SPECIFIED.
- ALL ON-SITE GRADING, DRAINAGE AND PAVEMENT WORK SHALL BE IN ACCORDANCE WITH FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DUST CONTROL.
- THE CONTRACTOR SHALL RESTORE ALL DISTURBED RIGHTS-OF-WAY IN ACCORDANCE WITH THE EDITION OF THE FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.
- THE CONTRACTOR SHALL HIRE A SURVEYOR LICENSED IN THE STATE OF FLORIDA IN ACCORDANCE WITH SECTION 12.0 OF THE GENERAL CONDITIONS.
- THE CONTRACTOR SHALL ENSURE THAT ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL LAWS.
- CONTRACTOR SHALL COMPLY FULLY WITH ALL PERMIT REQUIREMENTS IMPOSED BY THE REGULATORY AUTHORITIES.
- NOTIFY SUNSHINE UTILITIES TWO FULL BUSINESS DAYS IN ADVANCE PRIOR TO DIGGING WITHIN THE RIGHT-OF-WAY; 1-800-432-4770. CONTRACTOR SHALL VERIFY DEPTH AND LOCATION AND IMMEDIATELY NOTIFY ENGINEER OF CONFLICTS.
- THE CONTRACTOR SHALL NOTIFY THE CITY OF CALLAWAY 48 HOURS PRIOR TO INITIATING ANY WORK IN THE CITY OF CALLAWAY RIGHTS-OF-WAY.
- TYPE B STABILIZATION IS INCIDENTAL TO EARTHWORK.
- ALL PIPE JOINTS, INCLUDING CONNECTIONS TO STRUCTURES, SHALL BE WRAPPED WITH FILTER FABRIC IN ACCORDANCE WITH FDOT DESIGN STANDARDS AND THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

**S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION**

JAMES ERIC ANDERSON, P.E.
FL Reg. Engineer #67494

14101 PANAMA CITY BEACH PARKWAY, SUITE 110 PANAMA CITY BEACH, FL 32413 (850) 230-6150
ENGINEERING BUSINESS: EB-0000340
Panama City Beach - Tallahassee - Mobile
BASKERVILLE-DONOVAN, INC.
Innovative Infrastructure Solutions

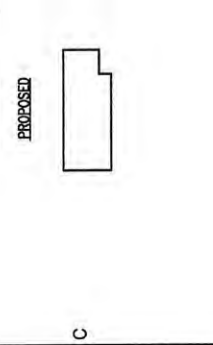
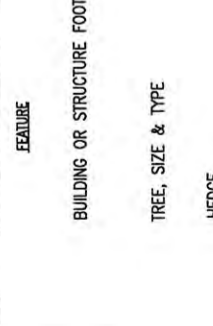
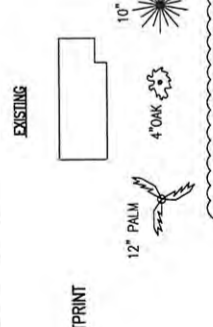
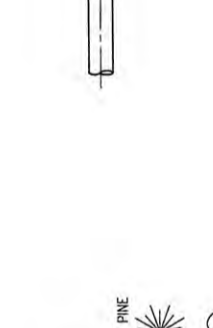
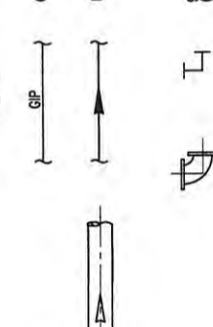
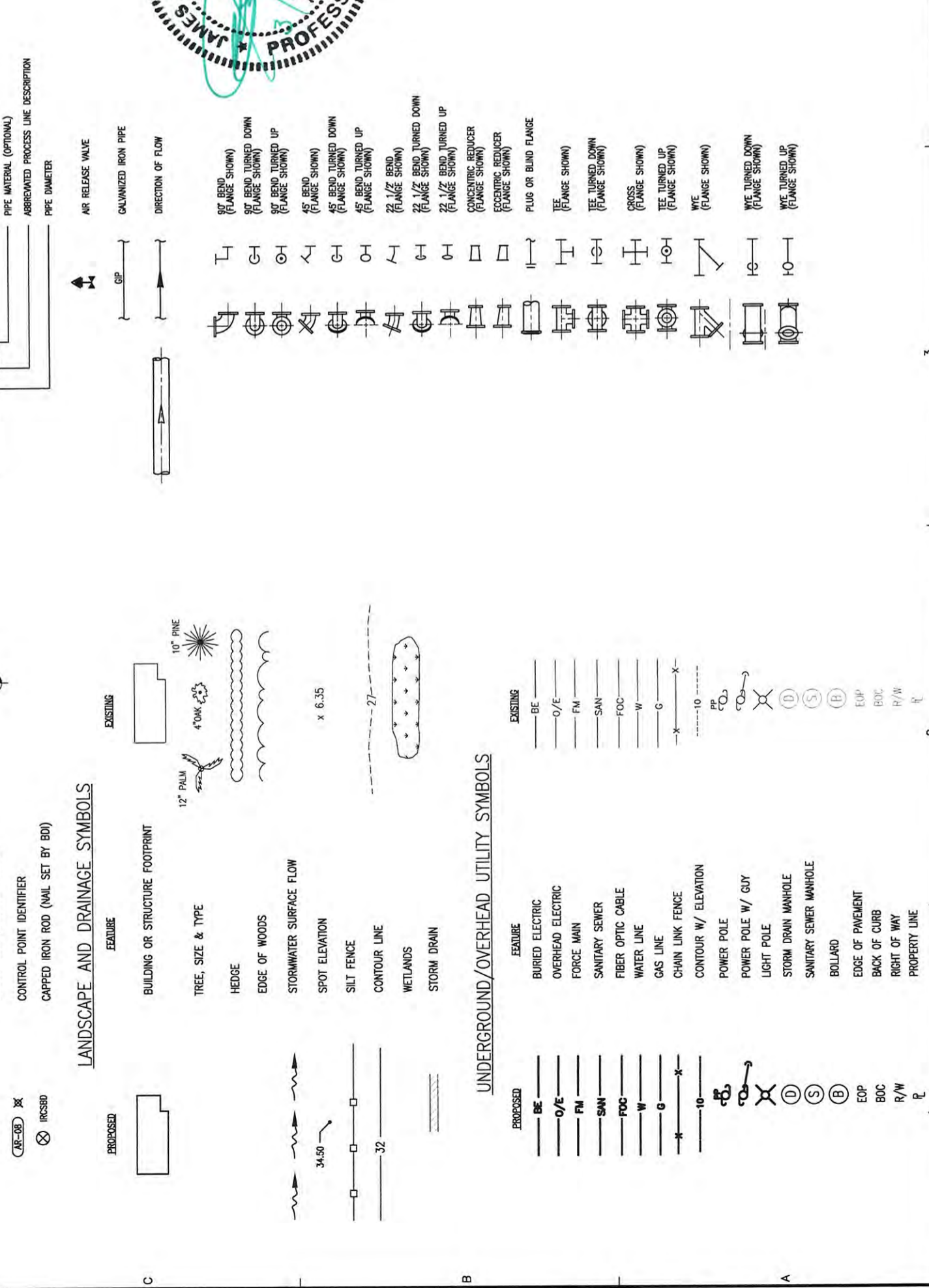
**GENERAL NOTES
AND LEGEND**

G-001

PROJECT NO:	27656.01
DESIGNED BY:	JCP
DRAWN BY:	RG6
CHK'D BY:	BAH
PROJ. MGR:	JCP
DATE:	
APPR.	
REVISION/ACTION TAKEN	
NOT RELEASED FOR CONSTRUCTION BY	DATE

DATE: MARCH 2021

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EXISTING CONDITIONS
PLAN

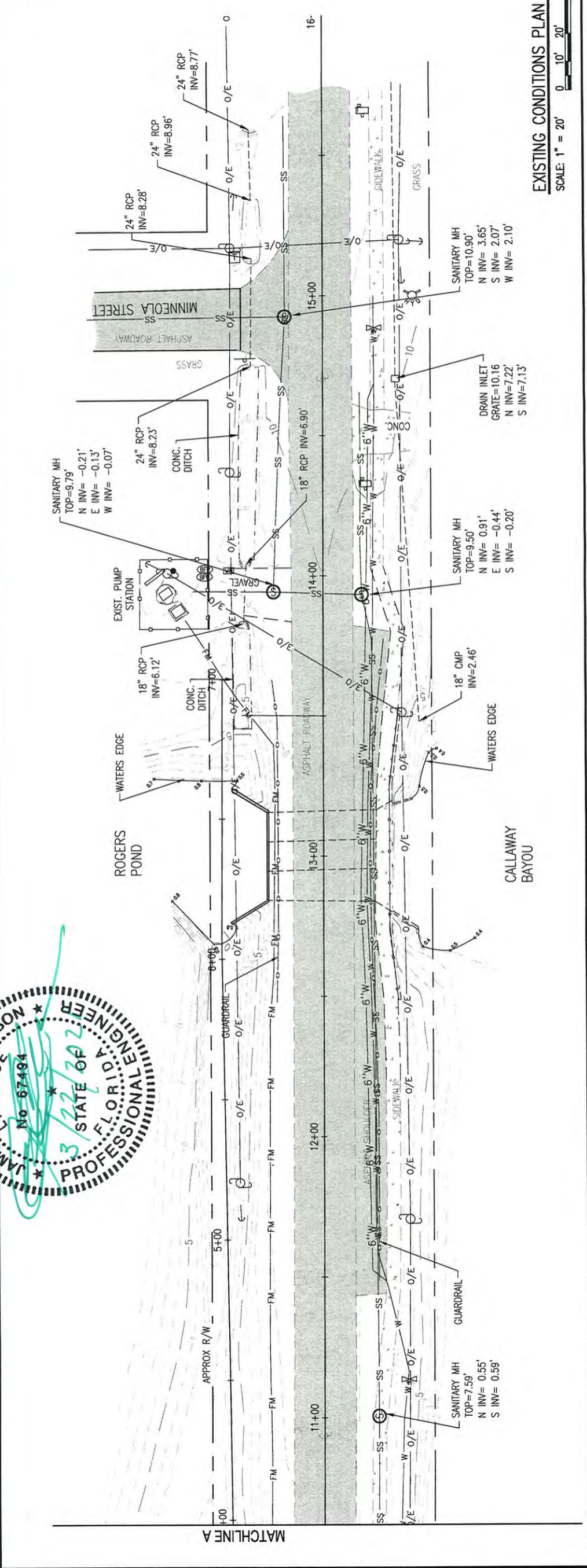
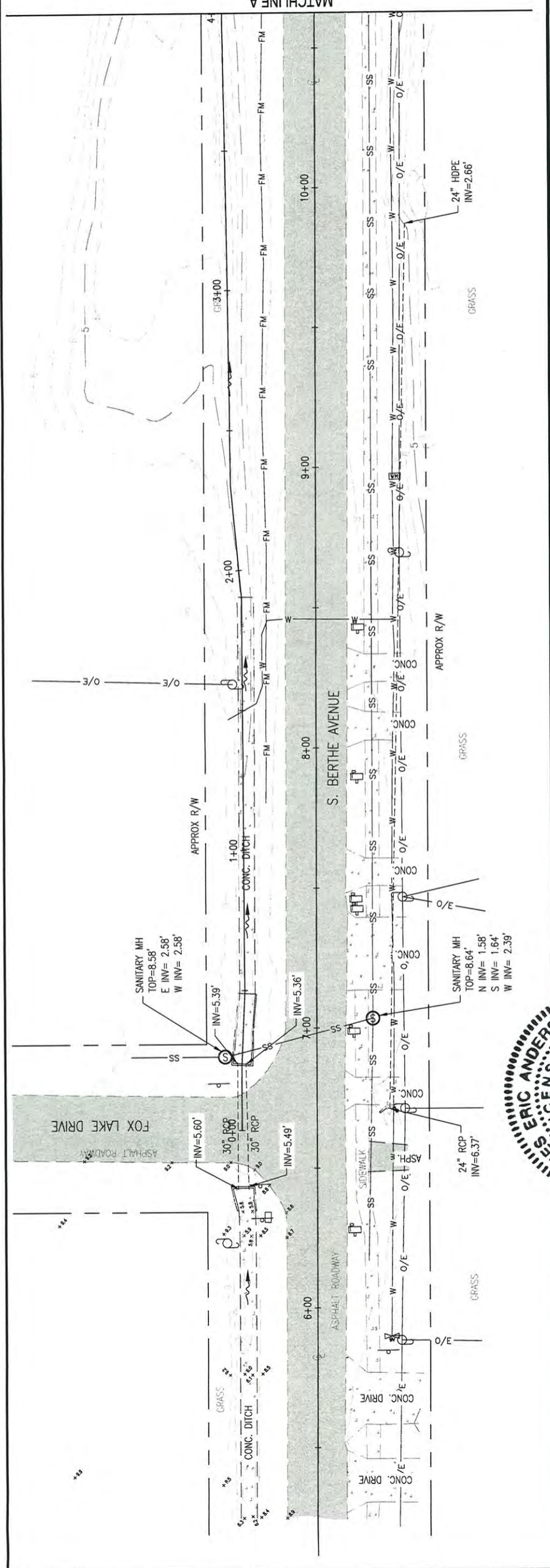
PROJECT NO:	27656.01
DESIGNED BY:	JCP
DRAWN BY:	RGG
CHK'D BY:	BAH
PROJ. MGR:	JCP
DATE:	MARCH 2021
NOT RELEASED FOR CONSTRUCTION BY DATE / /	
NO.	DATE
APPR.	REVISION/ACTION TAKEN

S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

JAMES ERIC ANDERSON, P.E.
FL. Reg. Engineer #67494

BASKERVILLE-DONOVAN, INC.
Innovative Infrastructure Solutions
14101 PANAMA CITY BEACH PARKWAY, SUITE 110 PANAMA CITY BEACH, FL 32413 (850) 230-6150
ENGINEERING BUSINESS: EB-0000340
Panama City Beach - Tallahassee - Mobile

EXISTING CONDITIONS PLAN
SCALE: 1" = 20' 0" 10' 20' 40'



DEMOLITION AND EROSION CONTROL PLAN

PROJECT NO.	27656.01
DESIGNED BY:	JCP
DRAWN BY:	RGJ
CHK'D BY:	BAH
PROJ. MGR:	JCP
DATE:	MARCH 2021
NOT RELEASED FOR CONSTRUCTION BY DATE	

S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

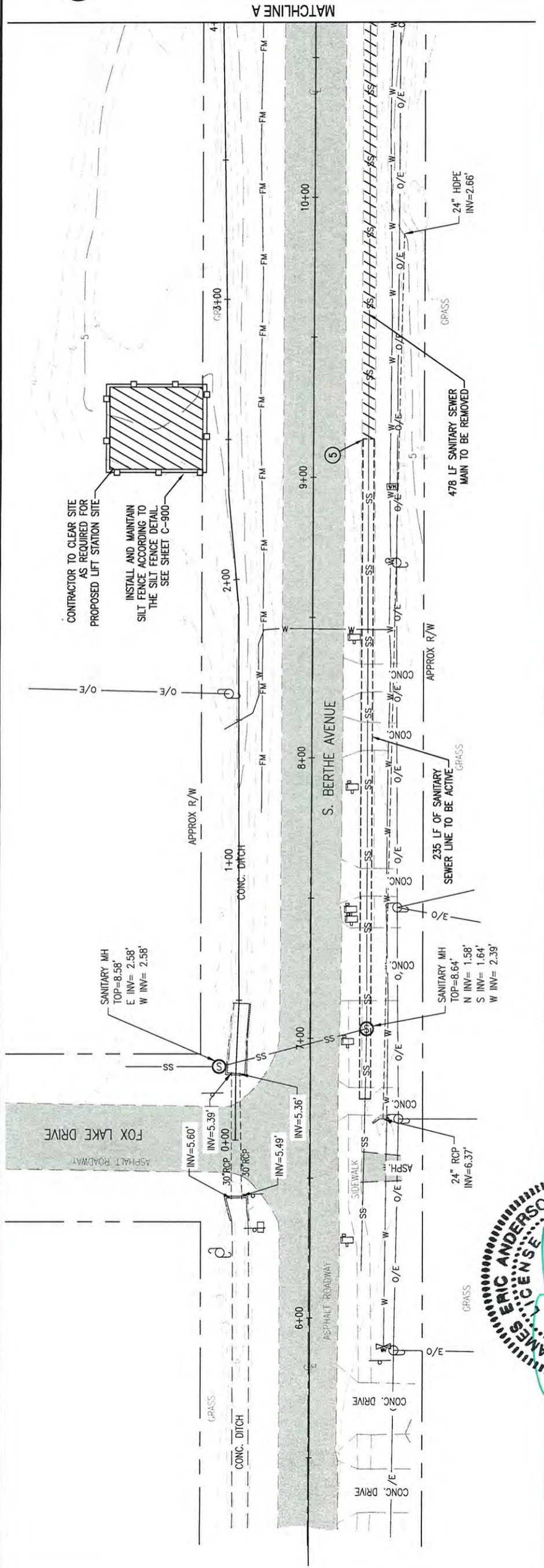
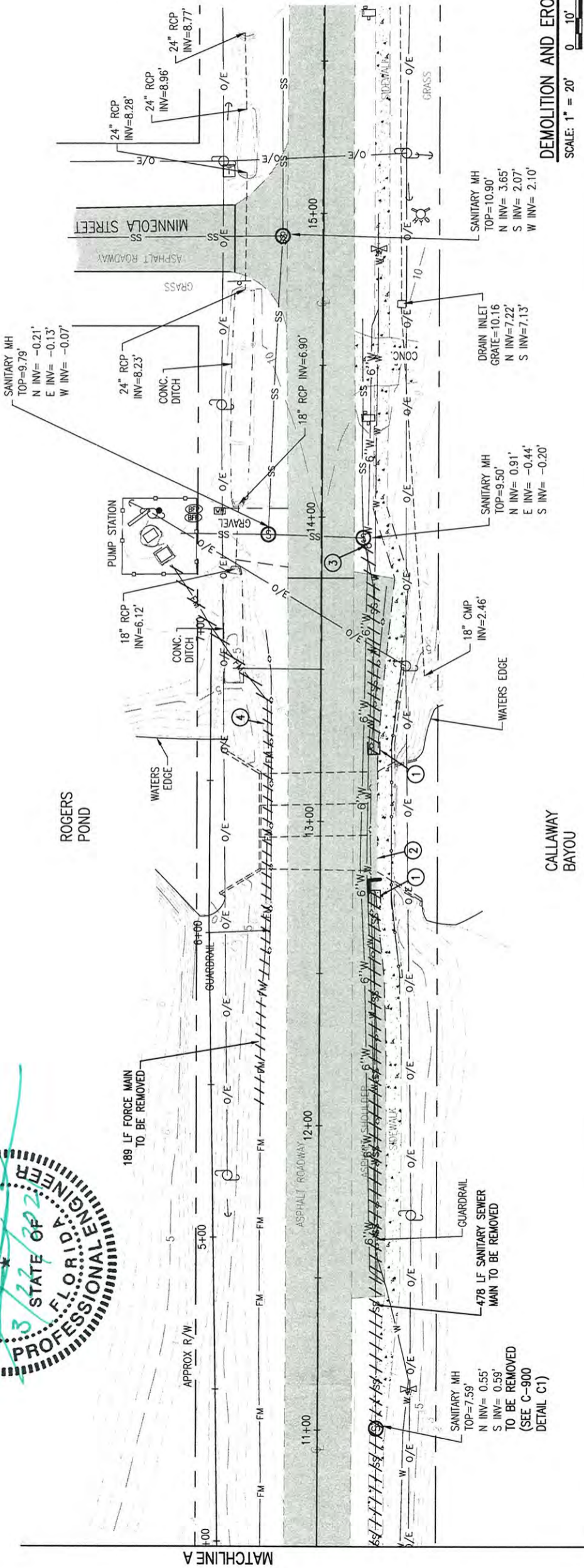
JAMES ERIC ANDERSON, P.E.
FL Reg. Engineer #67494

BASKERVILLE-DONOVAN, INC.
Innovative Infrastructure Solutions
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ENGINEERING BUSINESS, EB-0000340
Panama City Beach - Tallahassee - Mobile

DEMOLITION AND EROSION CONTROL PLAN

SCALE: 1" = 20' 0' 10' 20' 40'

- CONSTRUCTION KEY NOTES**
- CONTRACTOR TO CUT PIPE AND INSTALL MJ PLUG. ABANDONED PIPE SHALL REMAIN IN PLACE AND BE GROUT FILLED WITH FLOWABLE FILL.
 - CONTRACTOR TO REMOVE SANITARY SEWER PIPE CROSSING CALLAWAY BAYOU.
 - CONTRACTOR TO INSTALL PERMANENT PLUG ON SOUTH INVERT.
 - CONTRACTOR SHALL LEAVE EXISTING 4" FM IN SERVICE UNTIL THE NEW 4" FM IS INSTALLED. SEE SHEET C-102.
 - CONTRACTOR SHALL COORDINATE SANITARY SEWER REMOVAL WITH DOGHOUSE MANHOLE INSTALLATION. SEE SHEET C-102 & C-103.

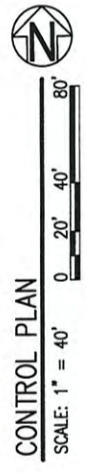
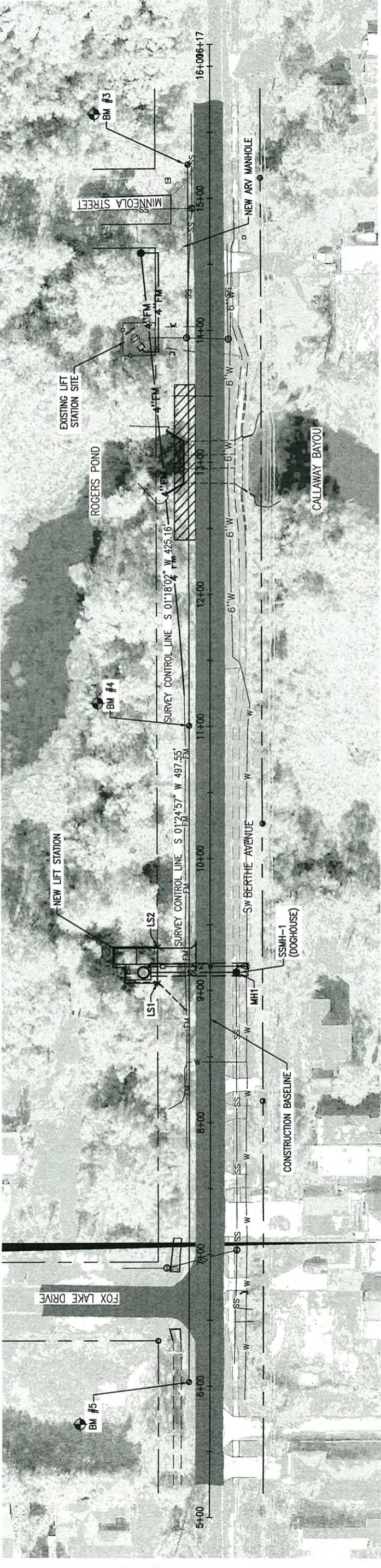


CONTROL PLAN

PROJECT NO:	27656.01
DESIGNED BY:	JCP
DRAWN BY:	RG
CHK'D BY:	BAH
PROJ. MGR:	JCP
DATE:	MARCH 2021
NOT RELEASED FOR CONSTRUCTION BY	DATE
REVISION/ACTION TAKEN	
NO.	DATE
APPR.	

S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

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Panama City Beach - Tallahassee - Mobile



CONTROL COORDINATE TABLE			
CONTROL POINT	DESCRIPTION	STATION	OFFSET
LS1	SOUTH CORNER OF LIFT STATION SITE	9+5.65	40.25'L
LS2	NORTH CORNER OF LIFT STATION SITE	9+33.15	40.32'L
MH1	CENTER OF PROPOSED MANHOLE	9+13.74	19.97'R

- BENCH MARK DATA**
- BM #3
STA 15+25.76, OFF 16.86' LT
SET CAPPED IRON ROD No. 0304
ELEVATION = 11.42
 - BM #4
STA 11+00.60, OFF 16' LT
SET CAPPED IRON ROD No. 0304
ELEVATION = 7.83
 - BM #5
STA 15+25.76, OFF 16' LT
SET CAPPED IRON ROD No. 0304
ELEVATION = 8.85

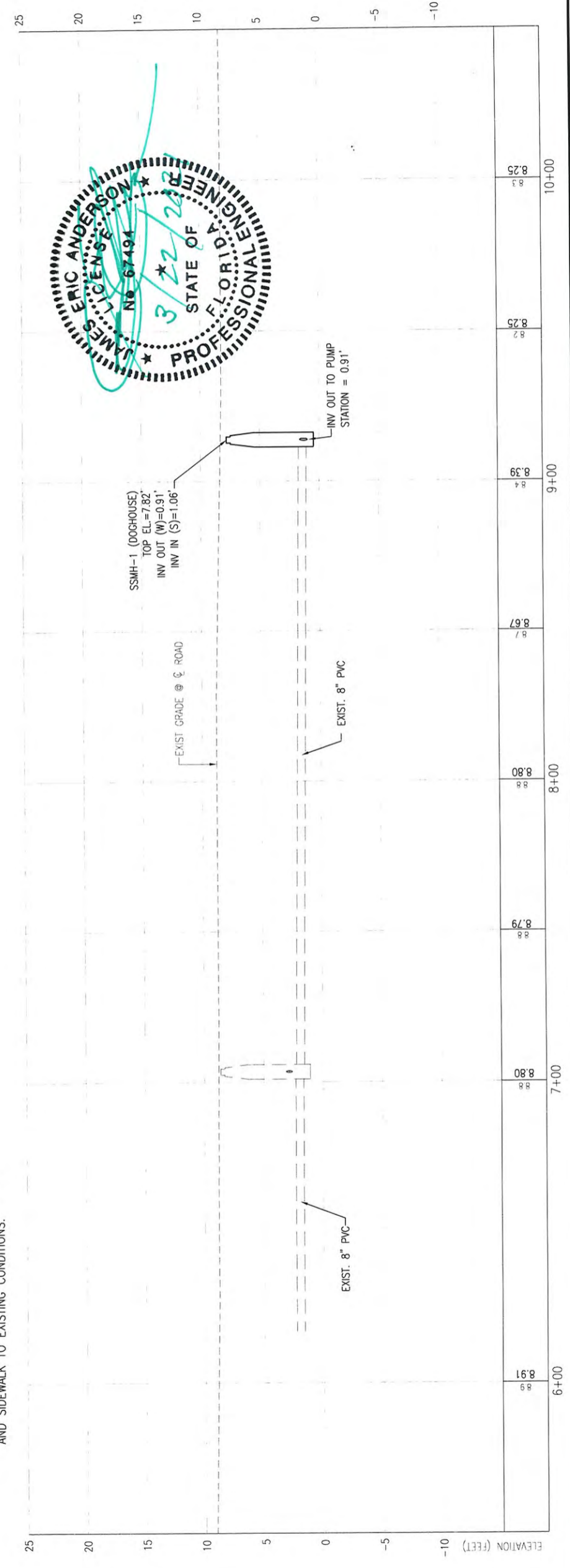
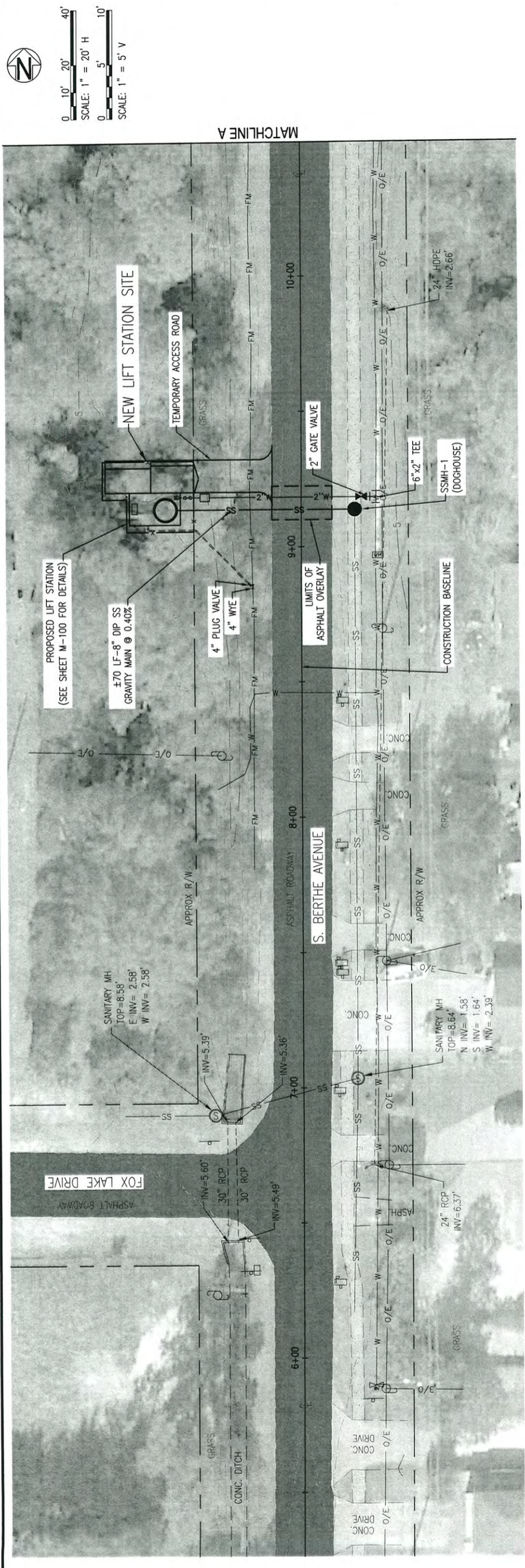


SANITARY SEWER
PLAN AND PROFILE

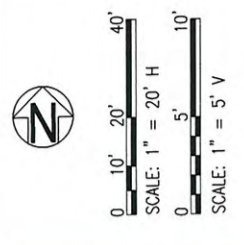
PROJECT NO	27656.01
DESIGNED BY	JCP
DRAWN BY	RCG
CHK'D BY	BAH
PROJ MGR	JCP
DATE	MARCH 2021
NOT RELEASED FOR CONSTRUCTION BY	DATE

S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

JAMES ERIC ANDERSON, P.E.
FL Reg. Engineer #67494
Innovative Infrastructure Solutions, Inc.
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NOTE:
1. CONTRACTOR SHALL MATCH DISTURBED ASPHALT AND SIDEWALK TO EXISTING CONDITIONS.



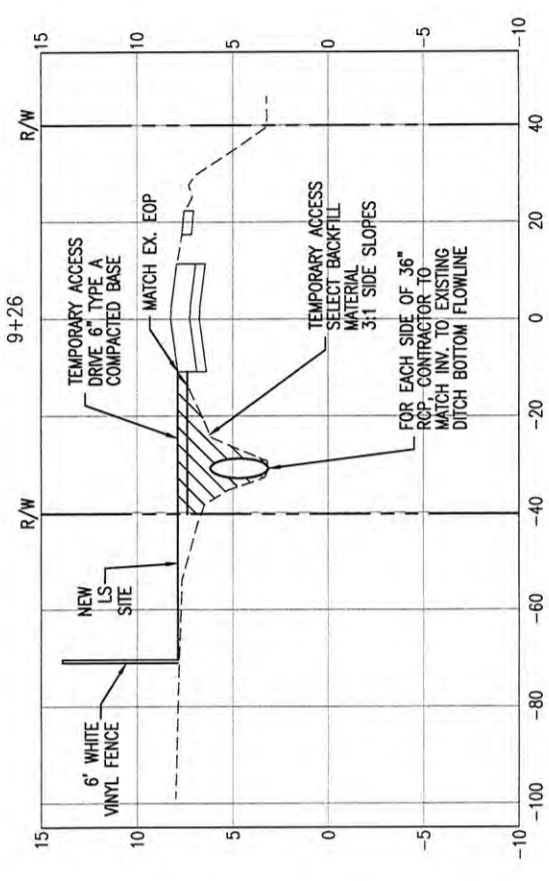
LIFT STATION
SITE DETAILS

PROJECT NO:	27656.01
DESIGNED BY:	JCP
DRAWN BY:	RCG
CHK'D BY:	BAM
PROJ. MGR:	JCP
DATE:	MARCH 2021

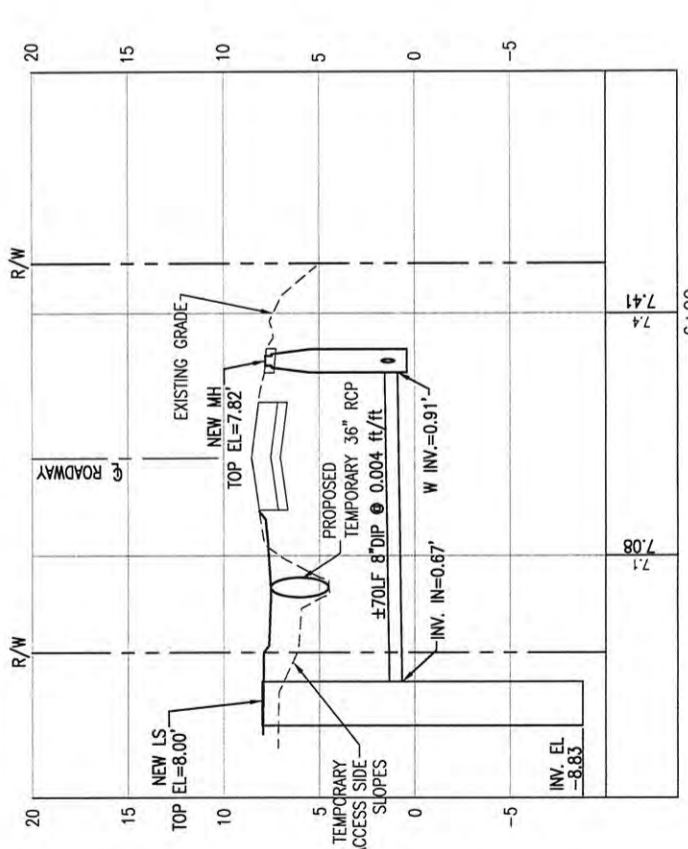
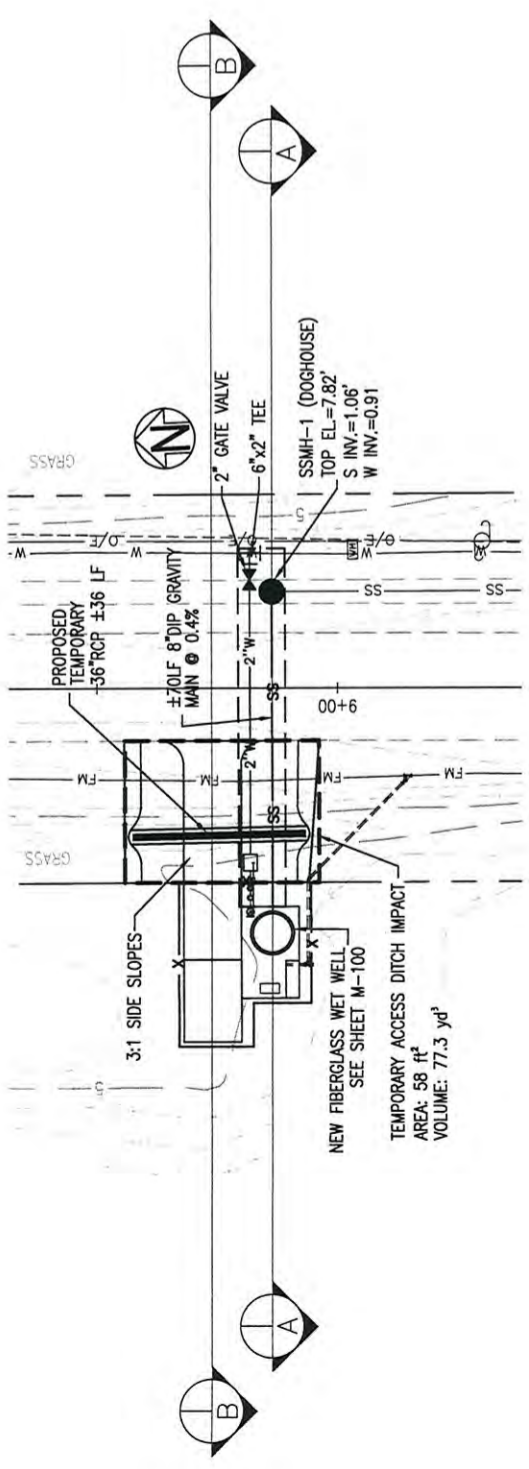
S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

JAMES ERIC ANDERSON, P.E.
FL Reg. Engineer #67494

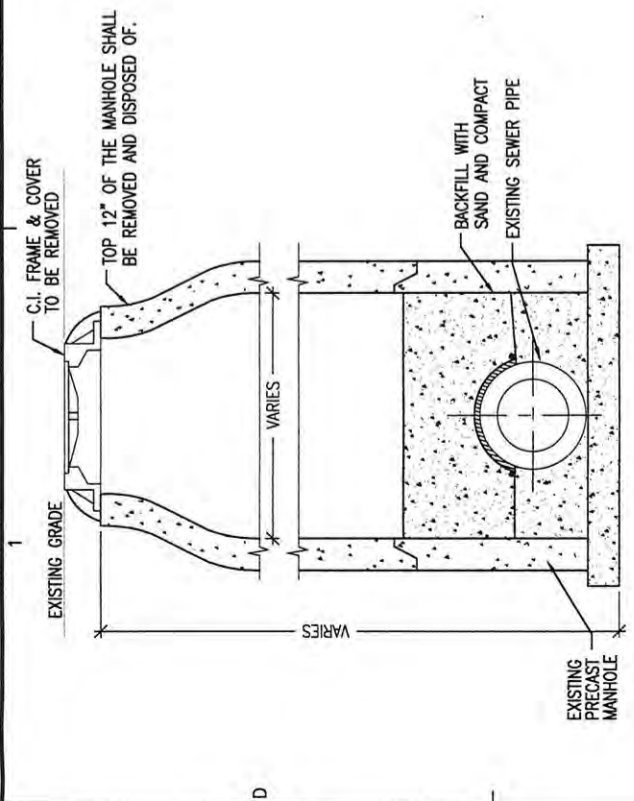
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Innovative Infrastructure Solutions
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B-B CROSS SECTION
SCALE: 1" = 20' H 0 10' 20' 40'
SCALE: 1" = 5' V 0 5' 10'

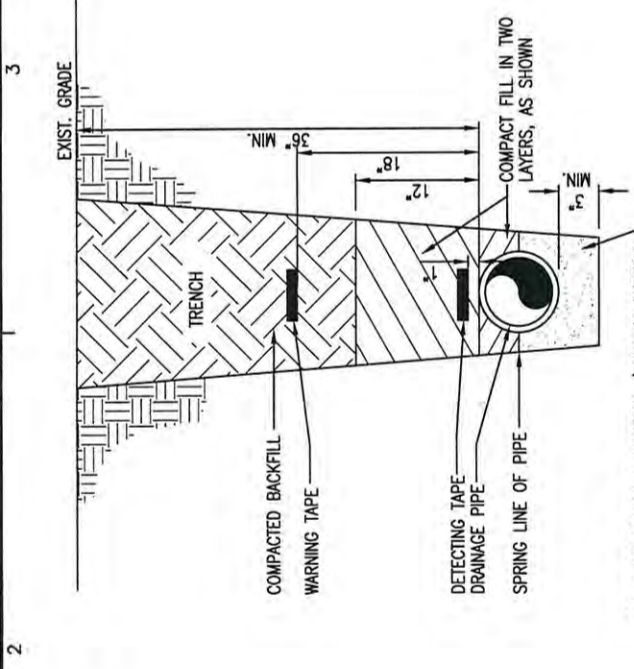


A-A CROSS SECTION
SCALE: 1" = 20' H 0 10' 20' 40'
SCALE: 1" = 5' V 0 5' 10'



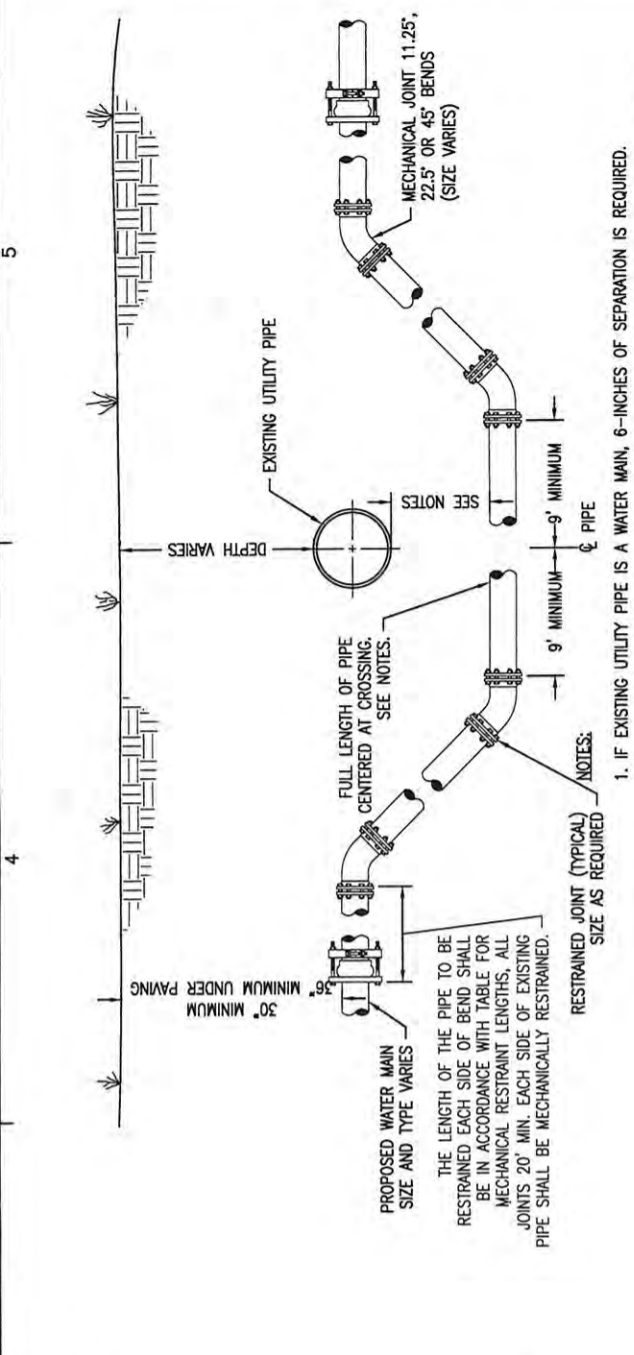
C1 NOT TO SCALE
DETAIL ON ABANDONMENT OF EXISTING MANHOLE ON EXISTING SEWER (NOT TO REMAIN IN SERVICE)

NOTE:
 1. EXISTING STRUCTURE WALLS THAT REMAIN SHALL BE PORTED TO ALLOW INFILTRATION OF NATURAL GROUNDWATER BY CREATING OPENINGS AT THE STRUCTURE BOTTOM AND PERIMETER. THE OPENINGS SHALL BE AT LEAST 12" DIAMETER IN SIZE AND SPACED AT NOT GREATER THAN 10' CENTERS ALONG THE STRUCTURE PERIMETER.



C2 NOT TO SCALE
TYPICAL PIPE BEDDING

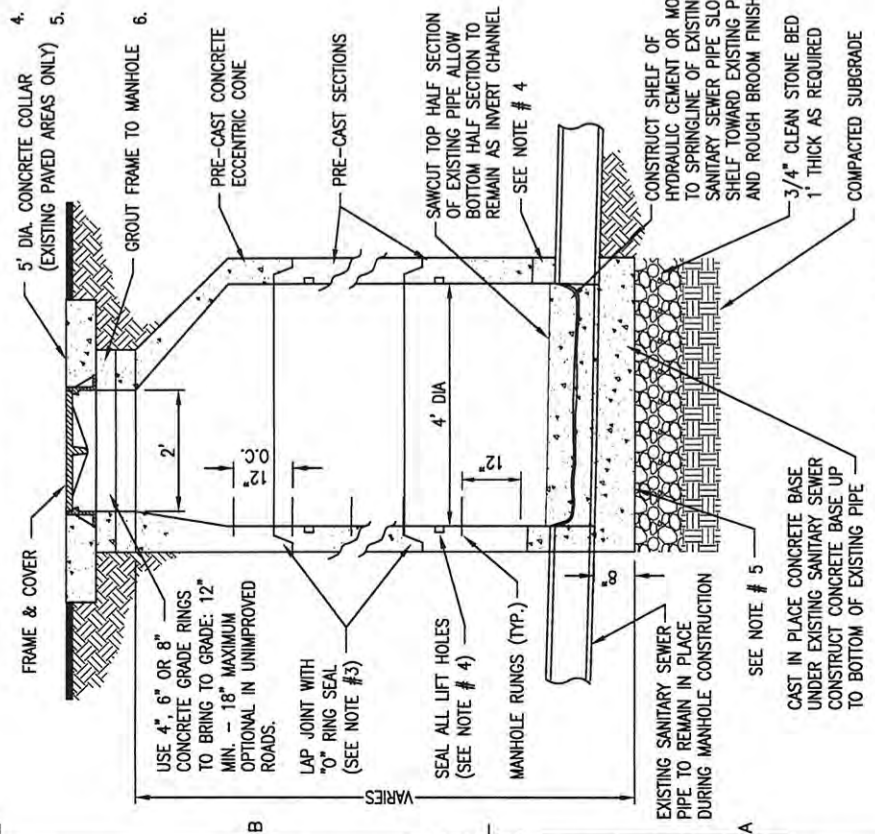
- NOTES FOR A1, THIS SHEET:
- MANHOLE SHALL CONFORM TO SPECIFICATIONS WITH 4000 P.S.I. CONCRETE.
 - DIAMETER OF OPENING FOR PIPE SHALL BE 1" LARGER DIAMETER THAN BELL OF THE PIPE BEING USED.
 - JOINTING COMPOUND SHALL BE RAMP NECK, TYPE 1, ROPE, FORM PLASTIC GASKET OR EQUAL.
 - ALL PATCHING TO BE DONE WITH HYDRAULIC CEMENT, NO MORTAR REPAIRS PERMITTED.
 - CAST IN PLACE CONCRETE TO BE 2500 P.S.I., REINFORCING STEEL TO BE A.S.T.M. A615 GRADE 60. CAST IN PLACE BASE SECTION TO BE CONSTRUCTED ON 12-INCH LAYER OF 3/4" CLEAN STONE MATERIAL. PRE-CAST SECTIONS MAY BE INSTALLED AFTER CONCRETE BASE HAS ATTAINED 75% OF DESIGN STRENGTH.
 - INTERIOR AND EXTERIOR OF MANHOLE TO HAVE 2 COATS OF SHOP APPLIED PROTECTIVE HIGH MIL EPOXY COATING. FIELD APPLY 2 COATS OF THE EPOXY COATING TO ALL EXPOSED MORTAR OR CEMENT AND DAMAGED SHOP AREAS AFTER MANHOLE INSTALLATION AND PRIOR TO BACKFILLING.



C4 NOT TO SCALE
ADJUSTMENT UNDER EXISTING UTILITIES

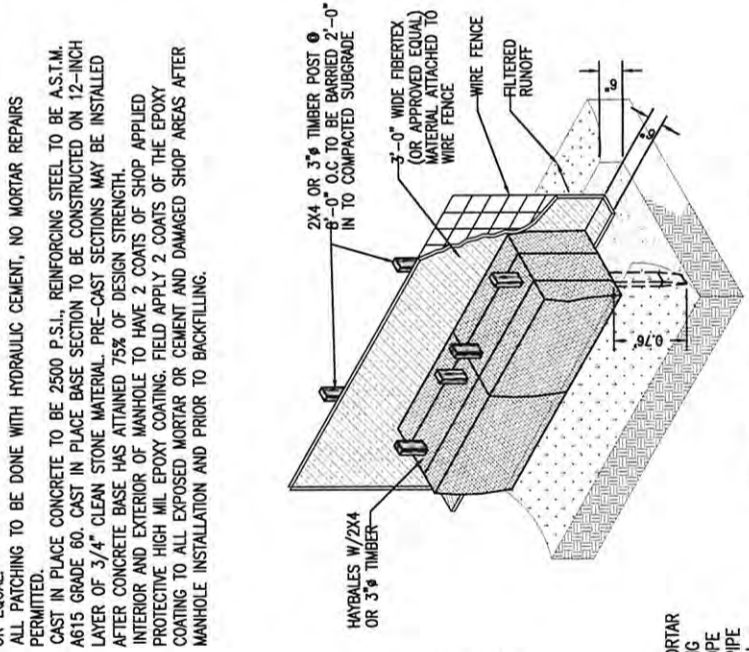
- NOTES:
- IF EXISTING UTILITY PIPE IS A WATER MAIN, 6-INCHES OF SEPARATION IS REQUIRED.
 - IF EXISTING UTILITY PIPE IS A FORCE MAIN, SANITARY SEWER, RECLAIMED WATER MAIN OR STORM SEWER, 18 INCHES OF SEPARATION IS REQUIRED. IF THIS IS IMPRACTICAL, AND EXISTING UTILITY MAIN IS C900, C905 OR D.I. PIPE, SEPARATION CAN BE REDUCED TO 6-INCHES. A FULL LENGTH OF PIPE SHALL BE CENTERED UNDER EXISTING UTILITY MAIN TO PROVIDE MAXIMUM JOINT SPACING FOR ALL CROSSINGS.
 - LOCATING WIRING REQUIRED.

BASKERVILLE-DONOVAN, INC.
 INNOVATIVE INFRASTRUCTURE SOLUTIONS
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 Pensacola - Panama City Beach - Tallahassee - Mobile
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 JAMES ERIC ANDERSON, P.E. #67494
 F.I. Reg. Engineer #67494



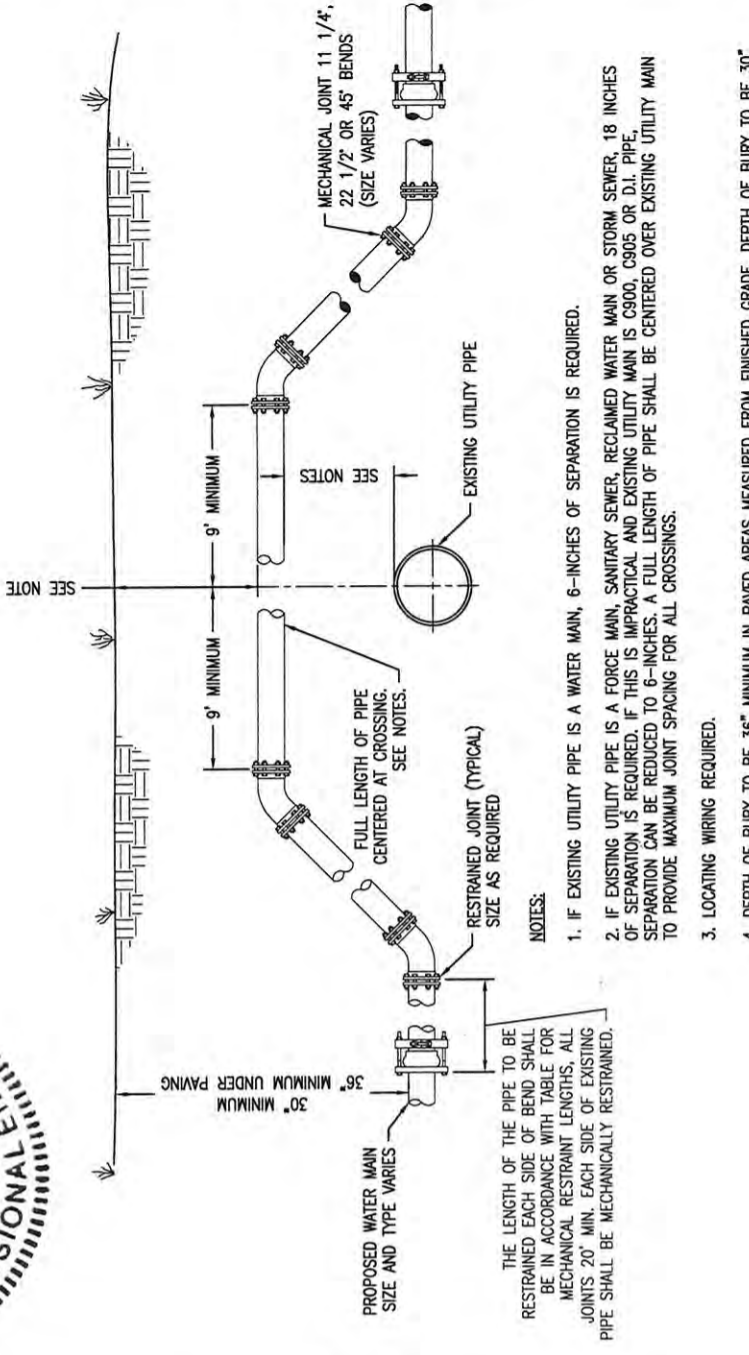
A1 NTS
DOGHOUSE MANHOLE

- SEE NOTE # 5
 CAST IN PLACE CONCRETE BASE UNDER EXISTING SANITARY SEWER PIPE TO REMAIN IN PLACE DURING MANHOLE CONSTRUCTION
- SEE NOTE # 4
 SAWCUT TOP HALF SECTION OF EXISTING PIPE ALLOW BOTTOM HALF SECTION TO REMAIN AS INVERT CHANNEL
- PRE-CAST SECTIONS
- PRE-CAST CONCRETE ECCENTRIC CONE
- GROUT FRAME TO MANHOLE
- 5" DIA. CONCRETE COLLAR (EXISTING PAVED AREAS ONLY)
- FRAME & COVER
- CONSTRUCT SHELF OF HYDRAULIC CEMENT OR MORTAR TO SPRINGLINE OF EXISTING SANITARY SEWER PIPE SLOPE SHELF TOWARD EXISTING PIPE AND ROUGH BROOM FINISH
- 3/4" CLEAN STONE BED 1' THICK AS REQUIRED
- COMPACTED SUBGRADE
- EXISTING SANITARY SEWER PIPE TO REMAIN IN PLACE DURING MANHOLE CONSTRUCTION
- MANHOLE RINGS (TYP.)
- SEAL ALL LIFT HOLES (SEE NOTE # 4)
- LAP JOINT WITH "O" RING SEAL (SEE NOTE # 3)
- USE 4" 6" OR 8" CONCRETE GRADE RINGS TO BRING TO GRADE: 12" MIN. - 18" MAXIMUM OPTIONAL IN UNIMPROVED ROADS.



A2 NTS
SILT FENCE DETAIL

NOTE: AT THE COMPLETION OF THE PROJECT AND AFTER SOIL STABILIZATION AND VEGETATIVE GROWTH HAVE BEEN ASSURED, THE SILT FENCE MUST BE COMPLETELY REMOVED AND THE EMBEDMENT TRENCH RESTORED TO A NATURAL CONDITION.



A4 NOT TO SCALE
ADJUSTMENT OVER EXISTING UTILITIES

- NOTES:
- IF EXISTING UTILITY PIPE IS A WATER MAIN, 6-INCHES OF SEPARATION IS REQUIRED.
 - IF EXISTING UTILITY PIPE IS A FORCE MAIN, SANITARY SEWER, RECLAIMED WATER MAIN OR STORM SEWER, 18 INCHES OF SEPARATION IS REQUIRED. IF THIS IS IMPRACTICAL, AND EXISTING UTILITY MAIN IS C900, C905 OR D.I. PIPE, SEPARATION CAN BE REDUCED TO 6-INCHES. A FULL LENGTH OF PIPE SHALL BE CENTERED OVER EXISTING UTILITY MAIN TO PROVIDE MAXIMUM JOINT SPACING FOR ALL CROSSINGS.
 - LOCATING WIRING REQUIRED.
 - DEPTH OF BURY TO BE 36" MINIMUM IN PAVED AREAS MEASURED FROM FINISHED GRADE. DEPTH OF BURY TO BE 30" MINIMUM IN UNPAVED AREAS.

PROJECT NO. 27556.01	DESIGNED BY: JCP	DATE: MARCH 2021
DRWN BY: RGG	PROJ. MGR: JCP	NOT RELEASED FOR CONSTRUCTION BY DATE
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S. BERTHE AVENUE LIFT STATION AND SEWER REHABILITATION

DETAILS

C-900

PROPOSED
PUMP STATION
SITE PLAN

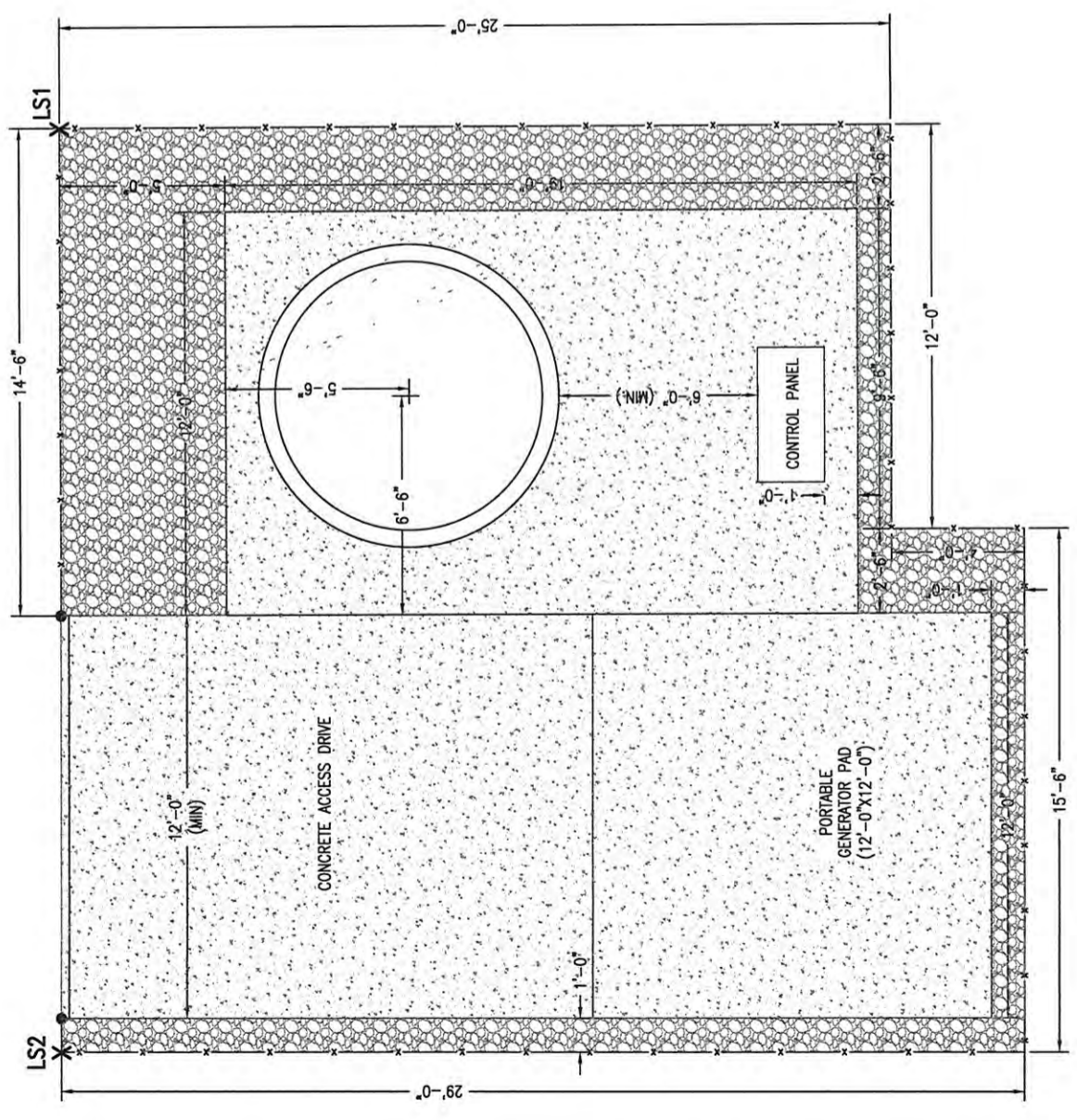
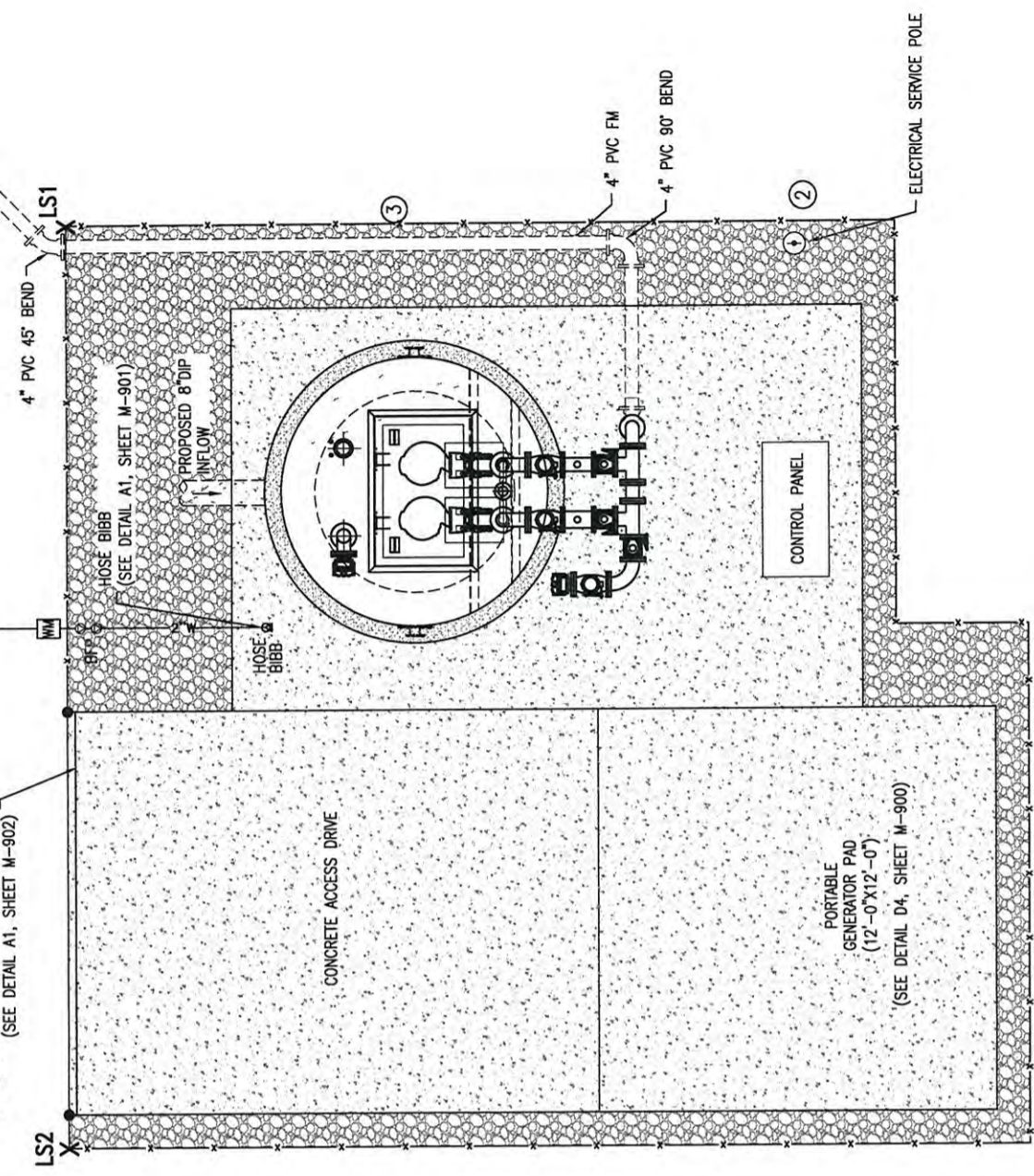
PROJECT NO.	27656.01
DESIGNED BY:	TLL
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CHK'D BY:	JCP
PROJ. MGR:	JCP
DATE:	MARCH 2021
NOT RELEASED FOR CONSTRUCTION BY	DATE
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DATE	
APPR.	

S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

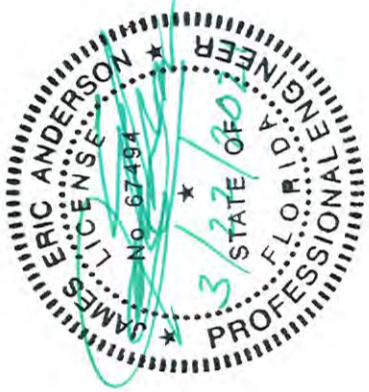
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Panama City Beach - Tallahassee - Mobile
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A4 LIFT STATION SITE PLAN
SCALE: 3/8" = 1'-0" 0 1' 2' 4'

A1 LIFT STATION SITE DIMENSION PLAN
SCALE: 3/8" = 1'-0" 0 1' 2' 4'



- CONSTRUCTION KEY NOTES:
- 4" OF GRANITE #57 STONE PLACED ON MIRAFI 140-N GEOTEXTILE FABRIC OR APPROVED EQUAL.
 - CONTRACTOR TO FIELD LOCATE THE ELECTRICAL SERVICE POLE WITH ENGINEER AND ELECTRICAL UTILITY COMPANY.
 - CONTRACTOR TO SEED AND MULCH ALL UNPAVED AREA OUTSIDE OF FENCE.
 - CONTRACTOR TO COORDINATE WITH THE CITY OF CALLAWAY WHEN CONNECTING 4" PVC FM TO THE EXISTING 4" FM.



PROPOSED
PUMP STATION
EQUIPMENT & PIPING
PLAN AND SECTIONS

PROJECT NO:	27656.01
DESIGNED BY:	TLL
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CHK'D BY:	JCP
PROJ. MGR:	JCP
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NOT RELEASED FOR CONSTRUCTION BY DATE	

S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

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- GENERAL NOTES:**
- PUMP STATION CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF CALLAWAY STANDARD SPECIFICATIONS AND DETAILS UNLESS NOTED OTHERWISE.
 - NOZZLES PROJECT MINIMUM 2" INTO TANK.
 - TANK TO BE WATER FILLED (HYDRO TESTED) FOR A 24 HOUR PERIOD AFTER THE TANK IS INSTALLED.
 - PROPER VENTING MUST BE UTILIZED. IF VENT SCREENS ARE PRESENT THEY SHOULD BE KEPT CLEAN DAILY.
 - DO NOT ENTER TANK UNLESS FEDERAL AND STATE O.S.H.A. TANK ENTRY PROCEDURES HAVE BEEN FOLLOWED.
 - IT SHALL BE THE PUMP SUPPLIER'S RESPONSIBILITY TO CONFIRM THE ADEQUACY OF THE SPECIFIED MINIMUM HATCH SIZE TO ENABLE THE PUMP(S) TO BE EASILY REMOVED FROM THE WET WELL THROUGH THE HATCH WITHOUT DISASSEMBLY WITH A MINIMUM 4" CLEAR. UPSIZE HATCHES AS NEEDED.
 - EACH HATCH FRAME GRATE DRAIN SHALL BE PIPED TO DRAIN TO THE SOUTH. DRAIN PIPING SHALL BE PVC EMBEDDED IN THE STATION TOP.
 - A FIBERGLASS WETWELL SUBMITTAL SHALL BE SUBMITTED BY THE CONTRACTOR. CONTRACTOR SHALL SUBMIT A SUBMITTAL FOR ALL PIPING, VALVES AND APPURTENANCES ASSOCIATED WITH THE PUMP STATION.
 - PRESSURE GAUGE SHALL HAVE STAINLESS STEEL TAP & ISOLATION BALL VALVE.
 - ANY PENETRATIONS IN WET WELL FOR PIPING, ELECTRICAL, ETC. SHALL BE SEALED & SLEEVED. ALL VISIBLE PENETRATION SHALL BE SEALED WITH LINKSEAL. ALL BELOW GRADE SHALL BE SEALED WITH AN FRP SLEEVE WITH KOR-N-SEAL.
 - PIPING WITHIN THE WET WELL SHALL BE FLANGED DR11 HDPE. ALL NUTS, BOLTS & ACCESSORIES WITHIN THE WET WELL SHALL BE 316 STAINLESS STEEL. PIPE AND FITTINGS OUTSIDE OF THE WET WELL AND ABOVE GROUND SHALL BE 316 STAINLESS STEEL (FLANGED, SCHEDULE 10). ALL WELD-ON FLANGES SHALL BE 125# RF SOCKET-WELD FLANGE OR RF WELD NECK FLANGE (TYPE). ALL BOLTS, WASHERS AND NUTS SHALL BE 316 STAINLESS STEEL AND SHALL BE COATED WITH "NEVER SEIZE" TYPE COATING.
 - PLUG VALVES SHALL HAVE AN ALLOWABLE FLOW CAPACITY EQUAL TO 100% OF THE ADJACENT PIPE AREA, AND SHALL ALLOW "PIGGING".
 - THRUST BLOCKS TO BE PLACED AT ALL BENDS BELOW GRADE. SEE M-902, DETAIL C1.

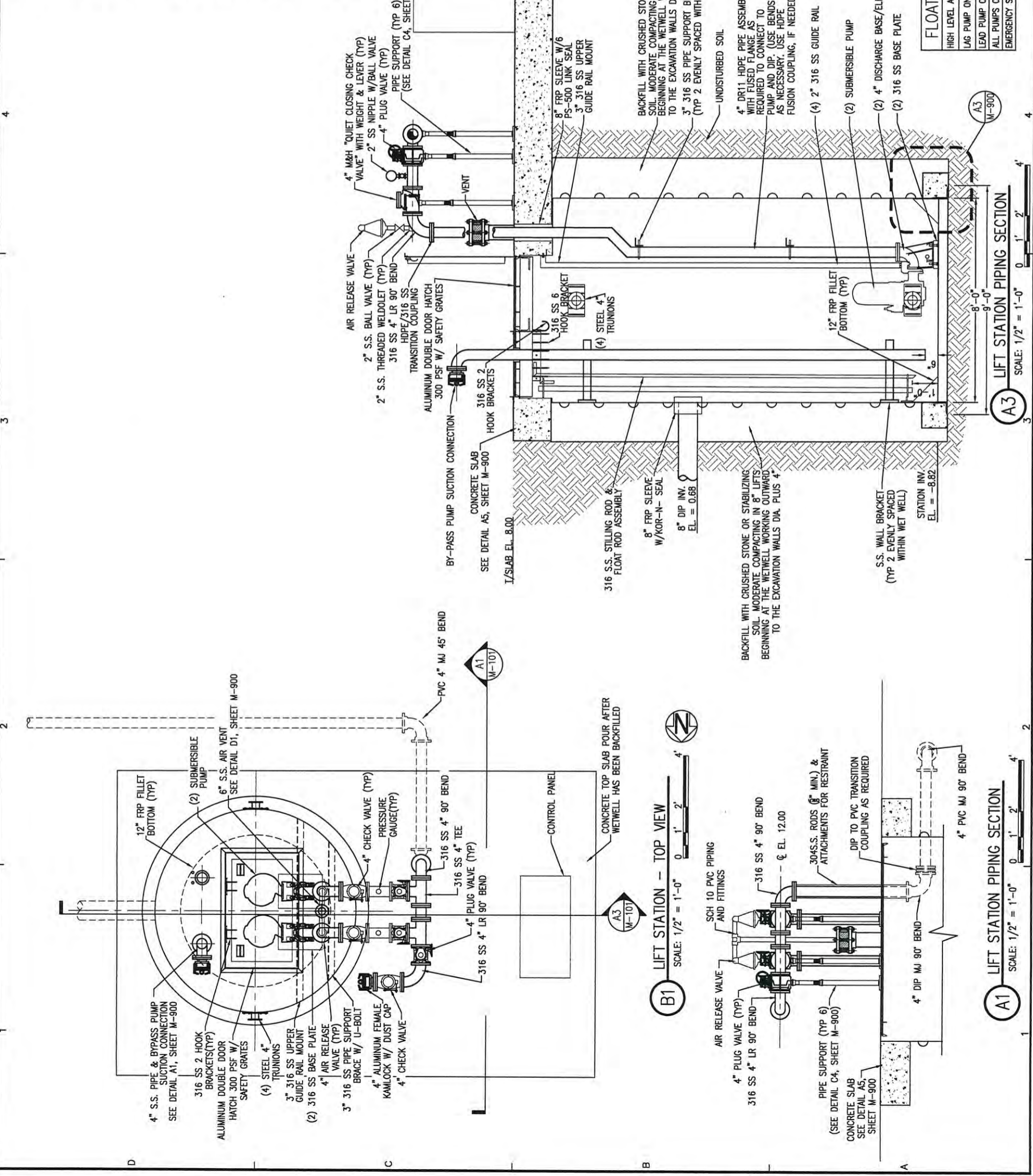
PUMP

TYPE PUMP	SUBMERSIBLE
HIGH CONDITION (GPM - TDH)	113 GPM @ 109' TDH
LOW CONDITION (GPM - TDH)	113 GPM @ 40' TDH
DISCHARGE PIPE SIZE	4"
HP. - RATED RPM	20
VOLT/PHASE	230V / 3 PHASE

A5 PROPOSED PUMP DATA

FLOAT ELEVATIONS

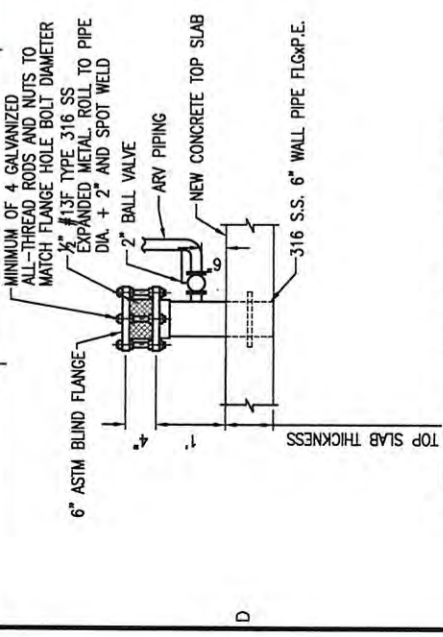
HIGH LEVEL ALARM	EL. -1.67
LAG PUMP ON	EL. -2.67
LEAD PUMP ON	EL. -3.67
ALL PUMPS OFF	EL. -5.67
EMERGENCY SHUT-OFF	EL. -6.67



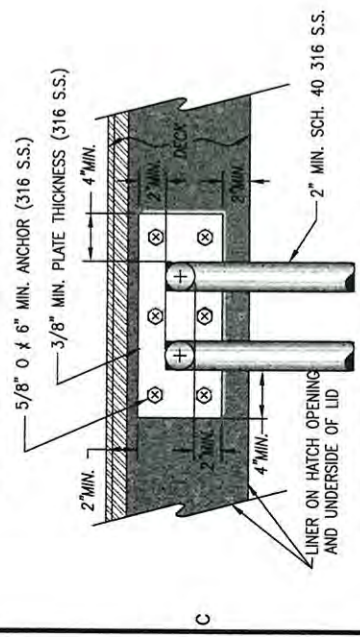
A3 LIFT STATION PIPING SECTION
SCALE: 1/2" = 1'-0"

B1 LIFT STATION - TOP VIEW
SCALE: 1/2" = 1'-0"

A1 LIFT STATION PIPING SECTION
SCALE: 1/2" = 1'-0"

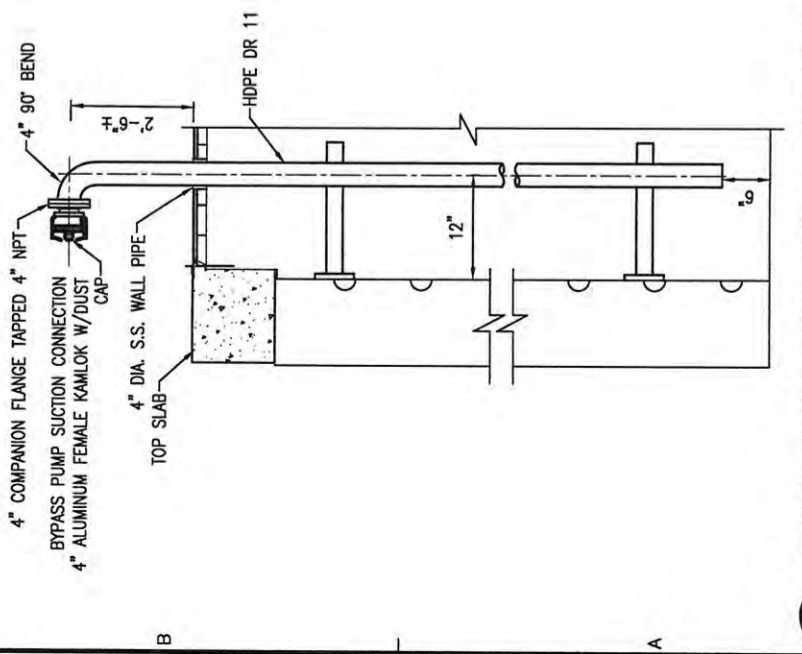


D1 TYPICAL VENT PIPE DETAIL
NOT TO SCALE

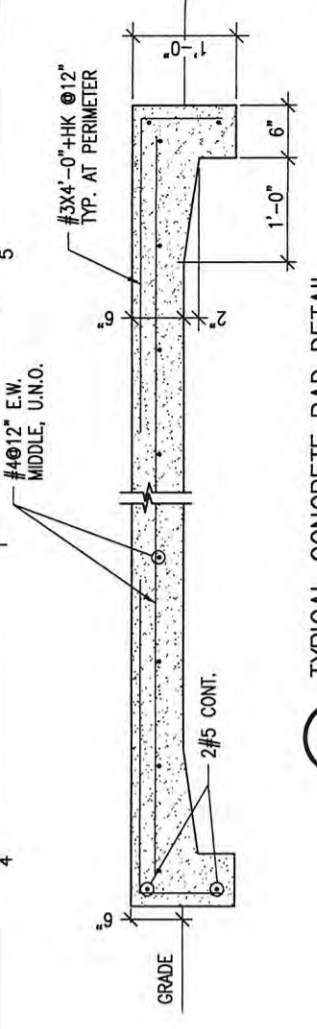


— REQUIRE SUBMITTAL FOR "STYLE" OF RAIL ATTACHMENT.
— PUMP RAILS TO BE WELDED TO PLATE IN A MANNER ACCEPTABLE TO THE CITY OF CALLAWAY.

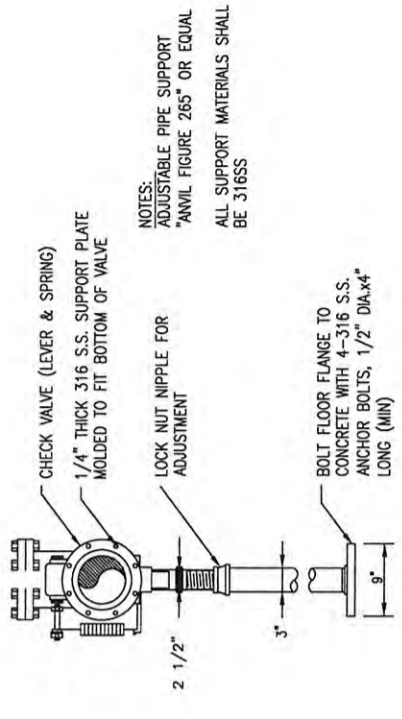
B1 GUIDE RAIL
SCALE: N.T.S.



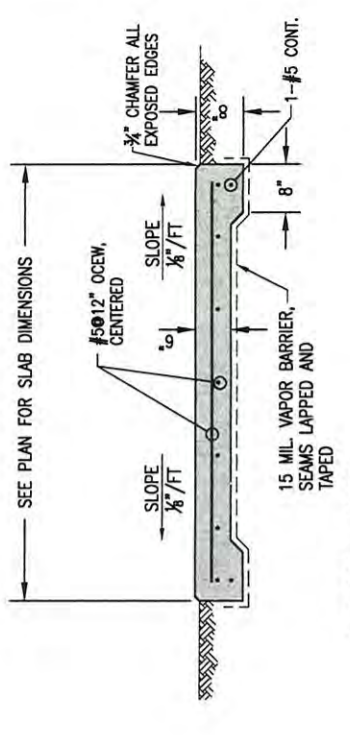
A1 TYPICAL BYPASS PUMP SUCTION CONNECTION DETAIL
SCALE: 1/2" = 1'-0" 0 1' 2' 4'



D4 TYPICAL CONCRETE PAD DETAIL
NOT TO SCALE



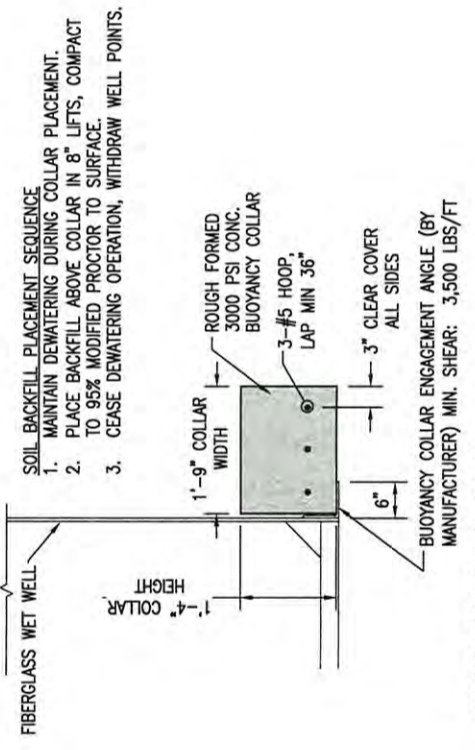
C4 ADJUSTABLE PIPE STAND DETAIL
SCALE: N.T.S.



GENERAL NOTES

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS = 3000 PSI, THE BATCH MIX DESIGN SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER.
2. REINFORCING SHALL BE GRADE 60, SUBMIT REINFORCING SHOP DRAWINGS FOR APPROVAL.
3. WET CURE ALL CAST CONCRETE FOR A MINIMUM OF 7 DAYS, PROVIDE MEDIUM BROOM FINISH TO ALL EXPOSED SURFACES, CHAMFER ALL CORNERS 3/4\".
4. SLAB CONSTRUCTION: COMPACT EXISTING EXPOSED SUBGRADE TO 95% MAXIMUM DRY DENSITY TO A DEPTH OF 12\" (MODIFIED PROCTOR). BACKFILL IN 6\" LIFTS TO BEARING ELEVATION WITH CLEAN SANDY SOIL SUITABLE TO THE OWNER'S TESTING LAB TO 95% MAXIMUM DRY DENSITY PER MODIFIED PROCTOR METHOD.

A5 TYPICAL CONCRETE SLAB DETAIL
SCALE: 1/2" = 1'-0" 0 1' 2' 4'



- WET WELL EXCAVATION COMPACTION
1. DEWATER TO 24\" BELOW WET WELL BASE.
 2. PLACE 24\" GRANITE BASED AGGREGATE. WRAP TOP, BOTTOM AND SIDES IN LAPPED GEOTEXTILE. COMPACT UNTIL GRAVEL LOCKS.

A3 PUMP STATION BUOYANCY COLLAR DETAIL
SCALE: 3/4" = 1'-0" 0 6" 1' 2'

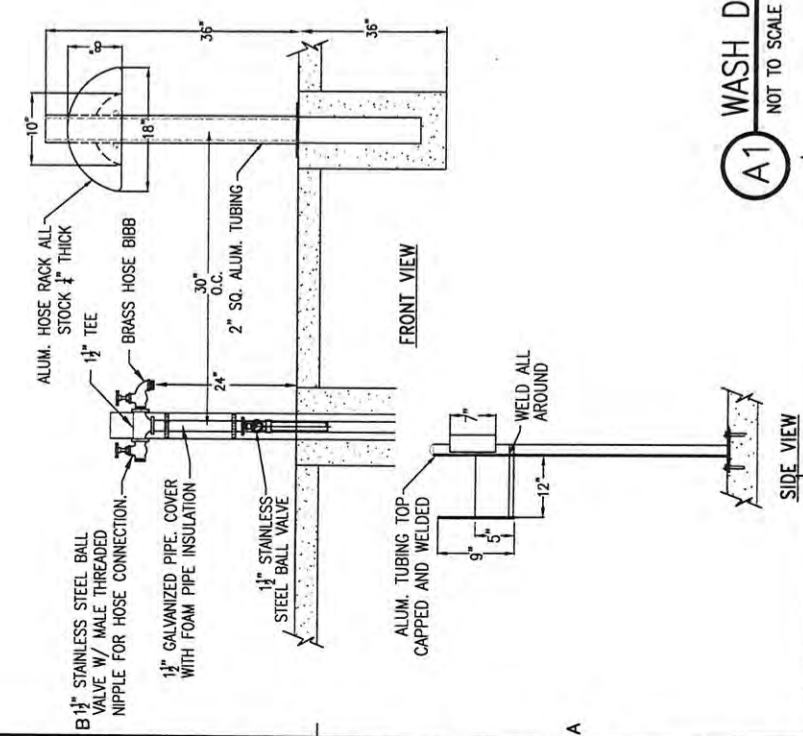
LIFT STATION
DETAILS

PROJECT NO:	27656.01
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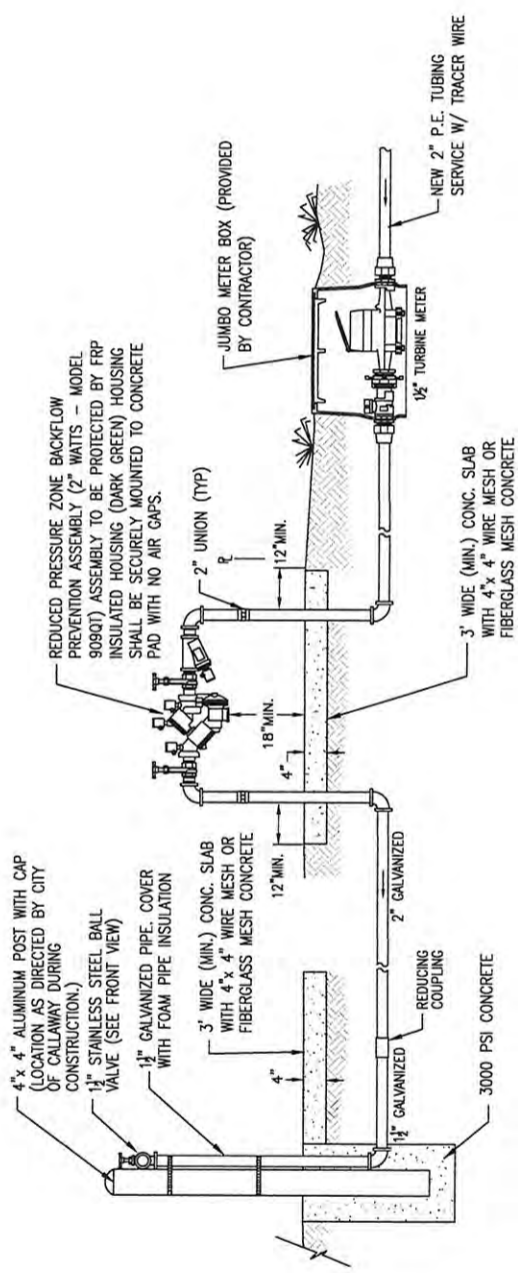
S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

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A1 WASH DOWN STATION AND METER DETAIL
NOT TO SCALE



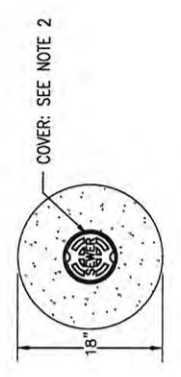
- NOTES:
1. LOCATE AS FIELD DIRECTED BY CITY OF CALLAWAY DURING CONSTRUCTION.
 2. CONTRACTOR SHALL PROVIDE 50' OF 1 1/2" RED RUBBER HOSE WITH THREADED FEMALE AND MALE ENDS.



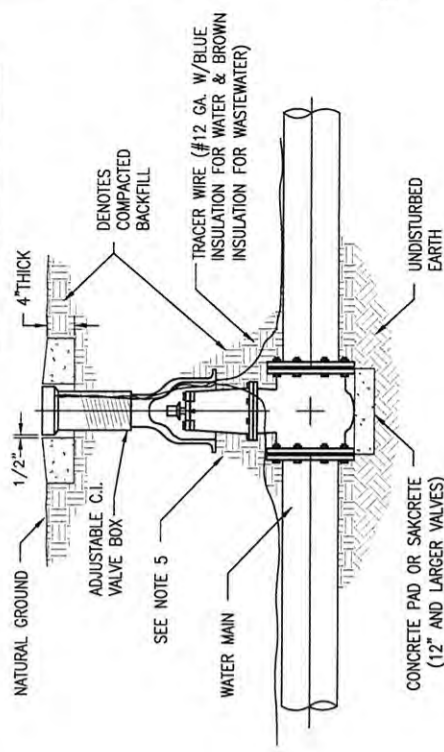
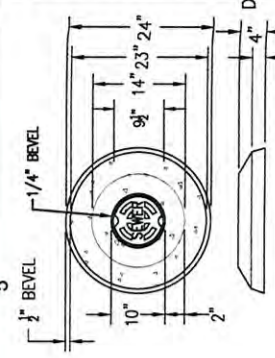
B4 VERTICAL PLUG VALVE & BOX INSTALLATION
NOT TO SCALE

- NOTES:
1. VALVE BOX AND BOOT SHALL BE CAST IRON.
 2. VALVE COVER SHALL BE MARKED "SEWER".
 3. VALVE BOX TOP SHALL BE FLUSH WITH FINISHED GRADE OR 1/2" ABOVE NATURAL GROUND LEVEL.
 4. PLUG VALVE SHALL BE RESILIENT SEAT WITH MECHANICAL JOINT ENDS OR APPROVED EQUAL.
 5. EARTH UNDER FLANGE OF VALVE BOX & COLLAR TO BE FIRM AND WELL TAMPED TO ENSURE AGAINST VALVE BOX SETTLING.

CAST-IN-PLACE COLLAR



24" PRE-CAST VALVE PAD



LIFT STATION
DETAILS

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S. BERTHE AVENUE
LIFT STATION AND
SEWER REHABILITATION

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STATE OF FLORIDA
3/23/20

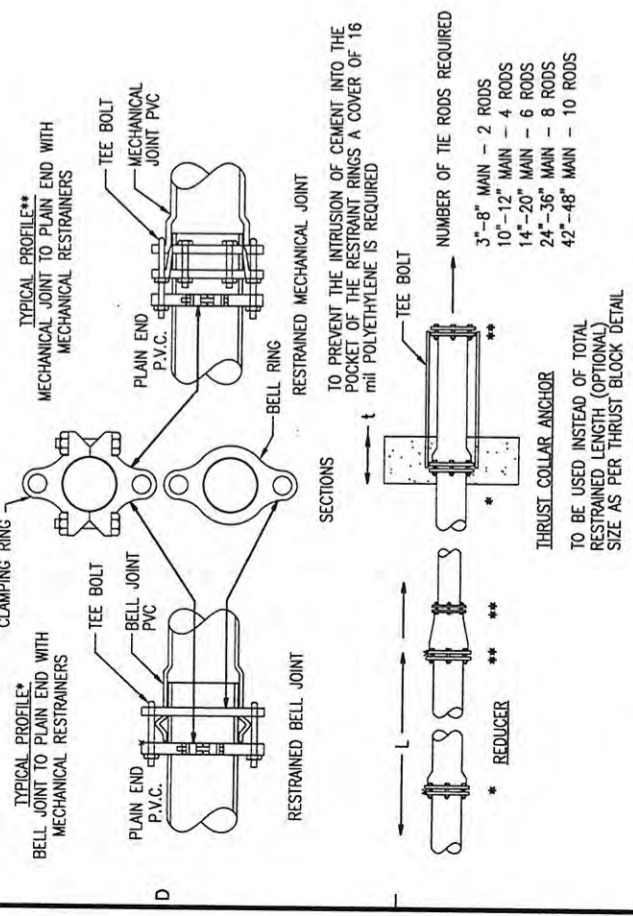
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PIPE JOINT RESTRAINT TABULATION

SHOWING DISTANCES IN FEET FROM THE FITTING TO BE RESTRAINED TO THE LAST RESTRAINING GLAND REQUIRED

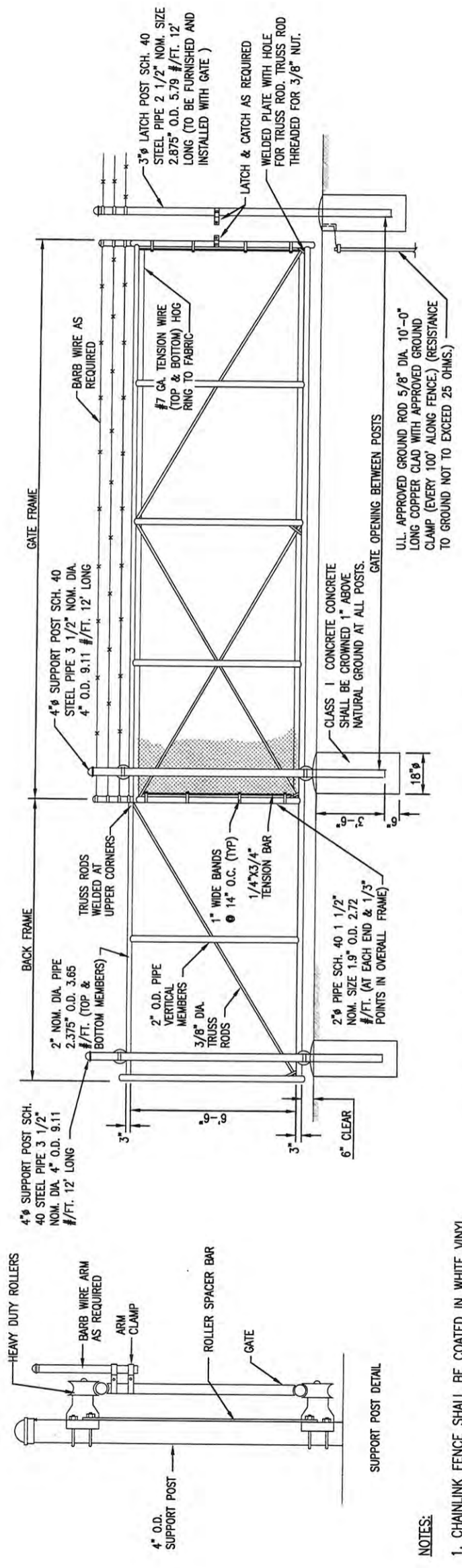
PIPE SIZE AND TYPE	HORIZONTAL BENDS					DEAD ENDS	EQUAL TEES SEE NOTE 3	TRANSITION TO HDPE SEE NOTE 4
	90°	45°	22.5°	11.25°	45°			
3" DI	18	8	4	2	33	33	1	33
4" DI	22	9	4	2	39	39	1	39
6" DI	31	13	6	3	55	55	1	55
8" DI	40	17	8	4	72	72	1	72
10" DI	48	20	9	5	86	86	1	86
12" DI	56	23	11	5	101	101	1	101
16" DI	70	29	14	7	129	129	1	129
20" DI	84	35	17	8	156	156	1	156
24" DI	96	40	19	9	181	181	1	181
4" PVC	28	12	6	3	62	62	1	62
6" PVC	39	16	8	4	87	87	1	87
8" PVC	50	21	10	5	114	114	1	114
10" PVC	60	25	12	6	136	136	1	136
12" PVC	70	29	14	7	160	160	1	160
16" PVC	88	36	17	9	205	205	1	205
20" PVC	105	43	21	10	247	247	1	247
24" PVC	120	50	24	12	287	287	1	287

NOTES: 1. TEST PRESSURE = 150 psi, SOIL GROUP = SM, TRENCH TYPE = 3 DEPTH = 2.5', SAFETY FACTOR = 2
2. RESTRAINED LENGTHS FOR VERTICAL OFFSETS, REDUCERS & UNEQUAL SIZE TEES MUST BE INDIVIDUALLY CALCULATED.
3. WITH EQUAL TEES, THE DISTANCES SHOWN ARE WITH A RUN LENGTH OF 40' AS AN EXAMPLE ONLY. FOR OTHER LENGTHS AND FOR UNEQUAL TEES, INDIVIDUAL CALCULATIONS MUST BE MADE.
4. HOPE PIPE TO BE TERMINATED WITH A FUSED FLANGE. TRANSITION WITH FLANGE BY MJ FITTING AND PROVIDE RESTRAINED JOINTS ON PVC OR DI AS NOTED IN TABLE.



C1 PIPE RESTRAINT JOINT DETAILS
NOT TO SCALE

C2 PIPE RESTRAINT JOINT DETAIL
NOT TO SCALE



A1 CHAIN LINK FENCE DETAIL WITH 12' ROLLING GATE
NOT TO SCALE

NOTES:
1. CHAINLINK FENCE SHALL BE COATED IN WHITE VINYL. CONTRACTOR TO INSTALL WHITE PRIVACY SLATS WITH THE CHAINLINK FENCE.

