Master Lift Station No. 4 (MLS4) Comminutor

Invitation for Bids # PSUT-24-05

General Information		
Project Cost Estimate	$260,200	See Section 1.4
Project Timeline	Six (6) months from NTP with an estimated start timeline of August 2024	See Section 1.4
Evaluation of Proposals	Staff	See Section 1.7
Non-Mandatory Pre-Bid Meeting	10:00 a.m. on May 14, 2024, at the site location, Master Lift Station No. 4 (MLS4), located opposite to Palm Cove Elementary School, at the intersection between Washington St and SW 114 Ave	See Section 1.8
Question Due Date	May 20, 2024	See Section 1.8
Proposals will be accepted until	2:00 p.m. on June 4, 2024	See Section 1.8
Proposal Security / Bid Bond	☐ Not required. ✓ Required only for bidders that have a total cumulative base proposal amount that exceeds $200,000. Proposal Security shall be in the amount of 5% of the total cumulative base amount proposed. ☐ Required for every bidder, regardless of proposal amount. Proposal Security shall be in the amount of 5% of the total cumulative base amount proposed. ☐ Required for every bidder, regardless of proposal amount. Proposal Security shall be in the amount of $10,000 or 5% of the total cumulative base amount proposed, whichever is less.	See Section 4.1
100% Payment and Performance Bonds	☐ Not required. ☐ Required, regardless of the awarded contract amount. ✓ Required in the event that the awarded contract exceeds $200,000.	See Section 4.2
Grant or Federal Funding Information	Not Applicable	Not Applicable

THE CITY OF PEMBROKE PINES
PROCUREMENT DEPARTMENT
8300 SOUTH PALM DRIVE
PEMBROKE PINES, FLORIDA 33025
(954) 518-9020

Table of Contents

SECTION 1 - INSTRUCTIONS

1.1 NOTICE

Notice is hereby given that the City Commission of the City of Pembroke Pines is seeking sealed proposals for:

IFB # PSUT-24-05
Master Lift Station No. 4 (MLS4) Comminutor

Solicitations may be obtained from the City of Pembroke Pines website at http://www.ppines.com/index.aspx?NID=667 and on the https://ppines.bonfirehub.com/ website.

If you have any problems downloading the solicitation, please contact the Bonfire Support at Support@GoBonfire.com.

If additional information help is needed with downloading the solicitation package please contact the Procurement Department at (954) 518-9020 or by email at purchasing@ppines.com. The Procurement Department hours are between 7:00 a.m. - 6:00 p.m. on Monday through Thursday and is located at 8300 South Palm Drive, Pembroke Pines, Florida 33025.

The City requires all questions relating to the solicitation be entered through the "Messages" section for the specific project on the https://ppines.bonfirehub.com/ website. Under the "Messages" section, vendors will find the "Opportunity Q&A" tab in which they can ask their specific question(s). Responses to the questions will be provided online at https://ppines.bonfirehub.com. Such request must be received by the "Question Due Date" stated in the solicitation. The issuance of a response via Bonfire is considered an Addendum and shall be the only official method whereby such an interpretation or clarification will be made.

Proposals will be accepted until 2:00 p.m., Tuesday, June 4, 2024. Proposals must be **submitted electronically at https://ppines.bonfirehub.com/**. The sealed electronic proposals will be publicly opened at 2:30 p.m. by the City Clerk's Office, in the City Hall Administration Building, 4th Floor Conference Room located at 601 City Center Way, Pembroke Pines, Florida, 33025.

1.1.1 VIRTUAL BID OPENING

The bid opening for this project will be held in the **City Clerk's Office Conference Room** located on the 4th Floor in the Charles F. Dodge City Center/City Hall Administration Building at 601 City Center Way, Pembroke Pines, Florida, 33025 at **2:30 PM on the bid due date.**

In light of public health concerns and to ensure accessibility for all, the City encourages interested parties, vendors, and the public to participate virtually via live streaming instead of attending the meeting in person. To virtually attend the bid opening, please use the Cisco Webex Meetings platform.

Virtual Meeting Details:

- WebEx Meeting Link: https://ppines.webex.com/meet/purchasing
- Cisco Webex Meeting Number: 717 019 586
- Join by Phone Number: +1-408-418-9388

The public may download the **Cisco Webex Meetings app** from https://www.webex.com/downloads.html/

To ensure an efficient meeting process, participants are requested to mute their audio and camera during the meeting. While the public is welcome to attend the virtual bid opening, **please note that active participation and commenting will not be allowed during the proceedings.**

For further information about the bid opening or assistance in accessing the virtual meeting, please contact:

Danny Benedit, Procurement Department
City of Pembroke Pines
8300 South Palm Drive,
Pembroke Pines, FL 33025
954-518-9022 or 954-518-9020
purchasing@ppines.com

1.2 PURPOSE

The City of Pembroke Pines is seeking proposals from qualified firms, hereinafter referred to as the Contractor, to furnish all labor, materials, equipment, services and incidentals for the Master Lift Station No. 4 (MLS4) Comminutor project, in accordance with the terms, conditions, and specifications contained in this solicitation.

The project requires electrical and structural modifications, such as access hatches, control panels, and the installation of an adjustable gantry crane for maintenance. The project also requires temporary facilities to continue operations.

1.3 SCOPE OF WORK

Below is a general list of the services required for the construction. It is not intended to be complete. Refer to Attachment J – "Technical Specifications" and drawings for all requirements, in conjunction to the requirements outlined in this bid package.

The project involves the following generalized descriptions of work:

1. Mobilization and Demobilization
2. Comminutor
3. Structural modifications
4. Temporary facilities
5. Startup and Testing

The City indicates a preference for the brand, Muffin Monster, in Attachment J – "Technical Specifications.

Contractors are allowed to submit pricing for alternative brands. Any proposed alternative must meet the grade or quality of the established preferred brand. Proposers shall indicate on their proposal if they are submitting pricing for a brand other than the preferred Muffin Monster, and clearly state the proposed substitution and deviation. It is the vendor's responsibility to provide any necessary documentation and samples within their bid submittal to prove that the product is equal to that specified. See Section 1.5.1(3) for more information on submitting an alternative product.

1.4 PROJECT COST ESTIMATE & TIMELINE

Staff estimates this project to cost approximately $260,200, which does not include permit costs.

Please note that the City will waive all City related permit, license, impact or inspection fees (including the Building Department and Engineering Department Permit Fees) related to this project. Any related State or County fees, for the aforementioned permits, will be paid by the City.

In addition, the City shall cover the cost for any other permit fees related to external entities through the City's Owner's Contingency for this project**, therefore proposers should not include permit costs in their total proposal price.**

The work shall be completed within six (6) months from issuance of CITY's Notice to Proceed, with an estimated start date of August 2024.

In addition, please note the city's average time for a contractor to apply for and receive an approved permit is 30 days; delays in this timeline caused by the contractor's failure to actively monitor the permit process and submit all required documentation in a timely manner, will count against the project's contractual completion period.

1.4.1 PERMIT, LICENSE, IMPACT OR INSPECTION FEES

With the exception of the City related permit, license, impact or inspection fees (including the Building Department and Engineering Department Permit Fees), which will be waived for this project, the City does not anticipate any additional permit, license, impact or inspection fees for this project.

The City shall determine the amount of the Owner's Contingency at time of award. The Owner's Contingency may be based on a specified percent of the proposed project amount and shall be established for the specific project being performed under the contract. This dollar amount shall be shown on the specific project purchase order as a distinct item from the vendor's overall offer to determine the total potential dollar value of the contract. Any Owner's Contingency funds that have not been utilized at the end of the project will remain with the City, if the permit fees exceed the Owner's Contingency indicated, the City will reimburse the contractor the actual amount of the permit fees required for project completion.

1.5 PROPOSAL REQUIREMENTS

The https://ppines.bonfirehub.com website allows for vendors to complete, scan and upload their documents as part of the proposer's submittal on the website.

Prospective proposers interested in responding to this solicitation are requested to provide all of the information listed in this section. Submittals that do not respond completely to all of requirements specified herein may be considered non-responsive and eliminated from the process. Brevity and clarity are encouraged.

The Bonfire system utilizes "Questionnaires" to request the following information from prospective proposers.

1.5.1 Pricing Sheet / Bid Tables

1. **Bid Table:** The vendor must provide their pricing through the designated lines items listed on the Excel Sheet that is available for download on the Bonfire website under the **"Pricing Sheet / Bid Table"** section. Please follow the instructions given in this package and on the Excel Sheet to complete and upload the information back onto the Bonfire website.

2. **Responses:** This tab of the Bid Table includes a **"Vendor Notes"** column for any additional comments regarding the requested line item(s). A comment is required in the **"Vendor Notes"** column. If the vendor does not need to submit any comments, please enter N/A or similar.

    a. Below is a sample of the "**Primary Responses"** tab of the Bid Table:

Primary Responses

Success: All data is valid!

						Numeric	Text	
Status	Bid/No Bid Decision	#	Item	Unit of Measurement	Quantity	Unit Price	Vendor Notes	Total Cost
Success: All values provided	Bid	#0-1	Mobilization and Demobilization	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	Bid	#0-2	Comminutor	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	Bid	#0-3	Structural Modifications	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	Bid	#0-4	Temporary Facilities	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	Bid	#0-5	Startup and Testing	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	Bid	#0-6	Cost for Payment and Performance Bond	Lump Sum	1	$ 0.00	N/A	$ 0.00
Basket Total								$ 0.00
Grand Total								$ 0.00

Instructions | Primary Responses | Additional Responses

3. **Additional Responses:** This tab of the Bid Table allows for bidders to submit alternative options. Substitutions of brands or products must be submitted as an alternative for the City's review and approval.

a. To submit an alternative, the vendor must copy the information for the corresponding line item from the **"#"** column in the **"Primary Responses"** tab and paste it into the **"Additional Reponses"** tab to identify which item they are providing an alternative option for.

b. Vendors are required to identify the substitution of brands or products in the **"Vendor Notes"** column.

c. For additional information on uploading supporting documentation for the proposed alternative(s), please refer to **Section 1.5.4(3)**.

d. Below is a sample of the **"Additional Responses"** tab of the Bid Table:

Additional Responses

Success: All data is valid!

					Numeric	Text	
Status	#	Item	Unit of Measurement	Quantity	Unit Price	Vendor Notes	Total Cost
Success: All values provided	#0-1	**Mobilization and Demobilization**	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	#0-2	**Comminutor**	Lump Sum	1	$ 0.00	Alternate Brand Name	$ 0.00
Success: All values provided	#0-3	**Structural Modifications**	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	#0-4	**Temporary Facilities**	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	#0-5	**Startup and Testing**	Lump Sum	1	$ 0.00	N/A	$ 0.00
Success: All values provided	#0-6	**Cost for Payment and Performance Bond**	Lump Sum	1	$ 0.00	N/A	$ 0.00
-							-
-							-

Instructions | Primary Responses | Additional Responses

1.5.2 Questionnaires

1. Contact Information Form

2. Proposer's Background Information

3. Vendor Registration Checklist

4. **References Form:** Provide specific examples of similar contracts delivered by the proposed team members. Provide details on related projects (preferably where the team was the same). A minimum of 3 references should be from the last five years and should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. As part of the proposal evaluation process, the City may conduct an investigation of references, including a record check or consumer affairs complaints. Proposers' submission of a proposal constitutes acknowledgment of the process and consent to investigate. The City is the sole judge in determining Proposers qualifications. In this section you will have the ability to enter information for 5 different references including the Reference Contact Information and the specific Project Information.

In addition, **do not provide City of Pembroke Pines projects as any of your references and do not utilize any current City of Pembroke Pines employees as reference contacts.**

A) References Contact Information
   a. Name of Firm, City, County or Agency
   b. Address
   c. Contact Name
   d. Contact Title
   e. Contact E-mail Address
   f. Contact Telephone #

B) Project Information
   a. Name of Contractor Performing the work
   b. Name and location of the project
   c. Nature of the firm's responsibility on the project
   d. Project duration
   e. Completion (Anticipated) Date
   f. Size of project
   g. Cost of project
   h. Work for which staff was responsible

1.5.3 Other Completed Documents

1. Attachment A: Non-Collusive Affidavit

2. Proposal Security (Bid Bond Form or Cashier's Check)

   a. Each Proposal should be accompanied by a certified or cashier's check or by a Bid Bond made payable to the City of Pembroke Pines on an approved form, duly executed by the Proposer as principal and having as surety thereon a surety company acceptable to CITY and authorized to write such Bond under the laws of the State of Florida, in an amount not less than five percent (5%) of the amount of the base Proposal price.

   b. Contingency is not to be counted in the total amount the proposal security is based on.

   c. Proposers must submit a scanned copy of their bid security (bid bond form or cashier's check) with their bid submittal through Bonfire.

   d. Proposers should also submit their original bid security (bid bond form or cashier's check) at time of the bid due date, or they may be deemed as non-responsive.

   e. The original Bid Bond or Cashier's Check should be in a sealed envelope, plainly marked "**BID SECURITY - IFB # PSUT-24-05 "Master Lift Station No. 4 (MLS4) Comminutor"** and sent to the City of Pembroke

Pines, City Clerk's Office, 4th Floor, 601 City Center Way, Pembroke Pines, Florida, 33025.

f. Please see SECTION 4 - SPECIAL TERMS & CONDITIONS of this document for additional information.

1.5.4 Optional Documentation

1. Trade Secrets:

a. The Proposer's response to this solicitation is a public record pursuant to Florida law, which is subject to disclosure by the City under the State of Florida Public Records Law, Florida Statutes Chapter 119.07 ("Public Records Law"). The City shall permit public access to all documents, papers, letters or other material submitted in connection with this solicitation and the Contract to be executed for this solicitation, subject to the provisions of Chapter 119.07 of the Florida Statutes.

b. Any language contained in the Proposer's response to the solicitation purporting to require confidentiality of any portion of the Proposer's response to the solicitation, except to the extent that certain information is in the City's opinion a Trade Secret pursuant to Florida law, shall be void. If a Proposer submits any documents or other information to the City which the Proposer claims is Trade Secret information and exempt from Florida Statutes Chapter 119.07 ("Public Records Laws"), the Proposer shall clearly designate that it is a Trade Secret and that it is asserting that the document or information is exempt. The Proposer must specifically identify the exemption being claimed under Florida Statutes 119.07. The City shall be the final arbiter of whether any information contained in the Proposer's response to the solicitation constitutes a Trade Secret.

c. EXCEPT FOR CLEARLY MARKED PORTIONS THAT ARE BONA FIDE TRADE SECRETS PURSUANT TO FLORIDA LAW, DO NOT MARK YOUR RESPONSE TO THE SOLICITATION AS PROPRIETARY OR CONFIDENTIAL. DO NOT MARK YOUR RESPONSE TO THE SOLICITATION OR ANY PART THEREOF AS COPYRIGHTED. ALL DOCUMENTS THAT THE FIRM PURPORTS TO BE CONFIDENTIAL, PROPRIETARY OR A TRADE SECRET SHALL BE UPLOADED TO THE BONFIRE WEBSITE AS A SEPARATE ATTACHMENT, IN THIS SECTION, CLEARLY IDENTIFYING THE EXEMPTION BEING CLAIMED UNDER FLORIDA STATUTES 119.07.

d. The city's determination of whether an exemption applies shall be final, and the proposer agrees to defend, indemnify, and hold harmless the city and the city's officers, employees, and agent, against any loss or damages

incurred by any person or entity as a result of the city's treatment of records as public records.

2. Financial Statements:

a. The City is **not** requesting the vendor to submit any financial statements for this project and prefers if the vendor does not submit financial statements. In addition, if the City needs a copy of the vendor's financial statements, the City can contact the vendor after the bid due date to request those documents. However, if the vendor does submit the financial statements, they should be uploaded in this section.

b. Any claim of confidentiality on financial statements must be asserted at the time of submittal. The firm must identify the specific statute that authorizes the exemption from the Public Records Law. Please note that the financial statement exemption provided for in Section 119.071(1)c, Florida Statutes only applies to submittals in response to a solicitation for a "public works" project.

3. Alternatives:

a. If you are submitting an alternative product, please upload any related information in this section (such as specification sheets, etc.).

b. In addition, pursuant to **Section 3.7 "Brand Names,"** if and wherever in the specifications a brand name, make, name of manufacturer, trade name, or vendor catalog number is mentioned, it is for the purpose of establishing a grade or quality of material only. Since the City does not wish to rule out other competition and equal brands or makes, the phrase "OR EQUAL" is added. However, if a product other than that specified is bid, Proposers shall indicate on their proposal and clearly state the proposed substitution and deviation. It is the vendor's responsibility to provide any necessary documentation and samples within their bid submittal to prove that the product is equal to that specified. Such samples are to be furnished before the date of bid opening, unless otherwise specified. Additional evidence in the form of documentation and samples may be requested if the proposed brand is other than that specified. The City retains the right to determine if the proposed brand shall be considered as an approved equivalent or not.

4. Additional Information:

a. Please provide any additional information that you deem necessary to complete your proposal in this section, if it has not been requested in another section.

1.6 VENDOR REGISTRATION DOCUMENTS

The **https://ppines.bonfirehub.com/** website will allow vendors to update their information and documents on an as-needed basis. This process is intended to make the bidding process easier for vendors that bid on multiple City projects. This process will allow vendors to complete and submit the following standard forms and documents at any time prior to bidding on a project. In addition, the vendors will be able to utilize these same forms without the need to re-fill and re-submit the forms each time they bid on a City project. In the event that the City does not have one of the forms or documents listed below for your company, the City may reach out to your company after the bid has closed to obtain the document(s).

Furthermore, please make sure to update this information on an as-needed basis so that all pertinent information is accurate, such as local business tax receipts, and any other relevant information.

The following documents can be completed prior to the bidding process through the **https://ppines.bonfirehub.com/** website and do not need to be attached to your submittal as the Bonfire website will automatically include it.

1.6.1 Vendor Information Form

1.6.2 Form W-9 (Rev. October 2018)

a. Previously dated versions of this form will delay the processing of any payments to the selected vendor.

1.6.3 Company Profile Form

1.6.4 Sworn Statement on Public Entity Crimes Form

1.6.5 Equal Benefits Certification Form

1.6.6 Vendor Drug-Free Workplace Certification Form

1.6.7 Scrutinized Company Certification

1.6.8 E-Verify System Certification Statement

a. Effective January 1, 2021, pursuant to Section 448.095. Florida Statues, the City may not enter into a contract with a vendor/contractor/subcontractor unless that vendor/contractor/subcontractor is registered with and uses the E-Verify system administered by the U.S. Department of Homeland Security ("DHS").

b. Contractor shall also require all subcontractors to provide an affidavit attesting that the subcontractor does not employ, contract with, or subcontract with, an

unauthorized alien. The Contractor shall maintain a copy of such affidavit for the duration of the contract.

1.6.9 Veteran Owned Small Business Preference Certification

a. If claiming Veteran Owned Small Business Preference Certification, business must attach the "Determination Letter" from the United States Department of Veteran Affairs Center for Verification and Evaluation notifying the business that they have been approved as a Veteran Owned Small Business (VOSB).
b. The Veteran Owned Small Business Preference Certification form must be completed by/for the proposer; the proposer **WILL NOT** qualify for Veteran Owned Small Business Preference based on their sub-contractors' qualifications.

1.6.10 Local Business Tax Receipts

1.6.11 Local Vendor Preference Certification

1.7 EVALUATION OF PROPOSALS & PROCESS OF SELECTION

A. Staff will evaluate all responsive proposals received from proposers who meet or exceed the bid requirements contained in the solicitation. Evaluations shall be based upon the information contained in the proposals as submitted.

B. Staff will make a recommendation to the City Commission for award of contract.

1.8 TENTATIVE SCHEDULE OF EVENTS

Event	Time &/or Date
Issuance of Solicitation (Posting Date)	**May 7, 2024**
Non-Mandatory Pre-Bid Meeting	**10:00 a.m. on May 14, 2024**
Question Due Date	**May 20, 2024**
Anticipated Date of Issuance for the Addenda with Questions and Answers	**May 23, 2024**
Proposals will be accepted until	**2:00 p.m. on June 4, 2024**
Proposals will be opened at	**2:30 p.m. on June 4, 2024**
Evaluation of Proposals by Staff	**June 4, 2024 – July 29, 2024**
Recommendation of Contractor to City Commission award	**August 7, 2024**
Issuance of Notice to Proceed	**August 2024**
Project Commencement	**Not later than 10 days after NTP**
Project Completion	**Six (6) months after NTP**

1.8.1 NON-MANDATORY PRE-BID MEETING / SITE VISIT

There will be a non-mandatory scheduled pre-bid meeting on **May 14, 2024 at 10:00 a.m.** Meeting location will be at the site location, Master Lift Station No. 4 (MLS4), located opposite to Palm Cove Elementary School, at the intersection between Washington St and SW 114 Ave.

In the event that a contractor cannot attend the scheduled pre-bid meeting, or if a contractor would like a follow up visit to the site, they may request a site visit by contacting Irene Munarriz at 954-518-9061. We urge all contractors to attend the scheduled meeting, as a separate or follow-up meeting may not be afforded to the requester due to scheduling and availability of staff to assist with any additional meetings. In addition, if making a request for a separate or follow-up meeting, contractors are urged to make these requests as early as possible.

Contractors may be required to sign in at any of the meetings to show proof of attendance. It is the vendor's responsibility to make sure that they sign in at the meeting.

1.9 SUBMISSION REQUIREMENTS

Bids/proposals **must be submitted electronically** at **https://ppines.bonfirehub.com/ on or before 2:00 p.m. on June 4, 2024.**

Please note vendors should be registered on Bonfire under the name of the organization that they are operating as and it should match the organization name on the documents that they are submitting and utilizing when responding to the solicitation.

In addition, the vendor must complete any questionnaires on the **https://ppines.bonfirehub.com/** website and provide any additional information requested throughout this solicitation. Any additional information requested in the solicitation should be scanned and uploaded.

The City recommends for proposers to submit their proposals as soon as they are ready to do so. Please allow ample time to submit your proposals on the **https://ppines.bonfirehub.com/** website. Proposals may be modified or withdrawn prior to the deadline for submitting Proposals. Bonfire Support is happy to help you with submitting your proposal and to ensure that you are submitting your proposals correctly, but we ask that you contact Support@GoBonfire.com with ample time before the bid closing date and time.

PLEASE DO NOT SUBMIT ANY PROPOSALS VIA MAIL, E-MAIL OR FAX.

However, please note that any required Bid Bond or Cashier's Check should be in a sealed envelope, plainly marked "**BID SECURITY - IFB # PSUT-24-05 "Master Lift Station No. 4 (MLS4) Comminutor"** and sent to the City of Pembroke Pines, City Clerk's Office, 4th Floor, 601 City Center Way, Pembroke Pines, Florida, 33025.

Attachment E

MASTER LIFT STATION

OPENING EXISTING SLAB

11390 SW 9 STREET,
PEMBROKE PINES, FL

STRUCTURAL CALCULATIONS

CONCRETE SLAB ANALYZE

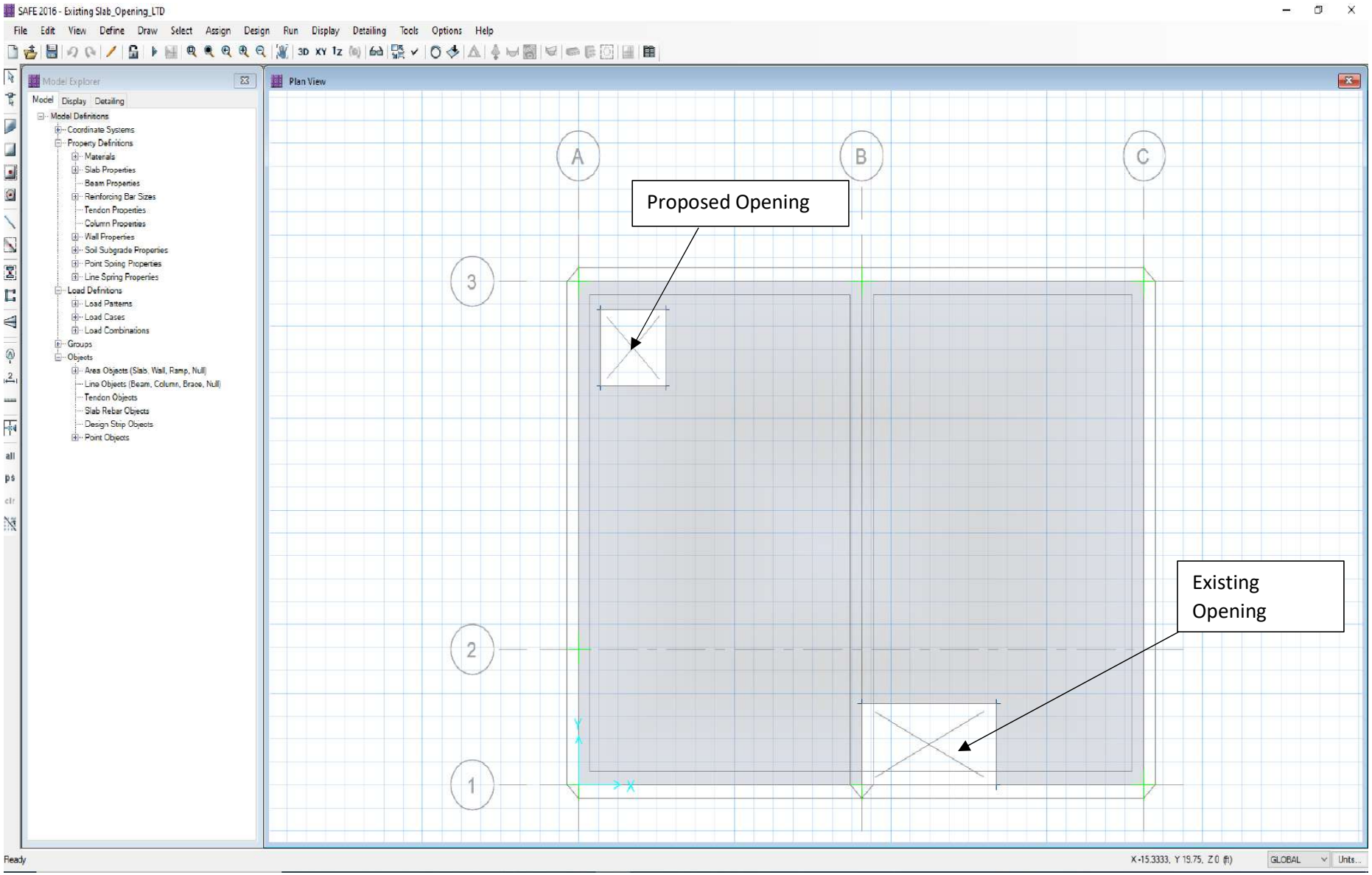
Job. No. H130010
October 19, 2022

Youssef H. Hachem, Ph.D., P.E.
P.E. License No. 43302
12151 SW 128 Ct., Suite 104
Miami, Florida 33186
(305) 969-YHCE
yh@yhengineering.com

www.yhengineering.com

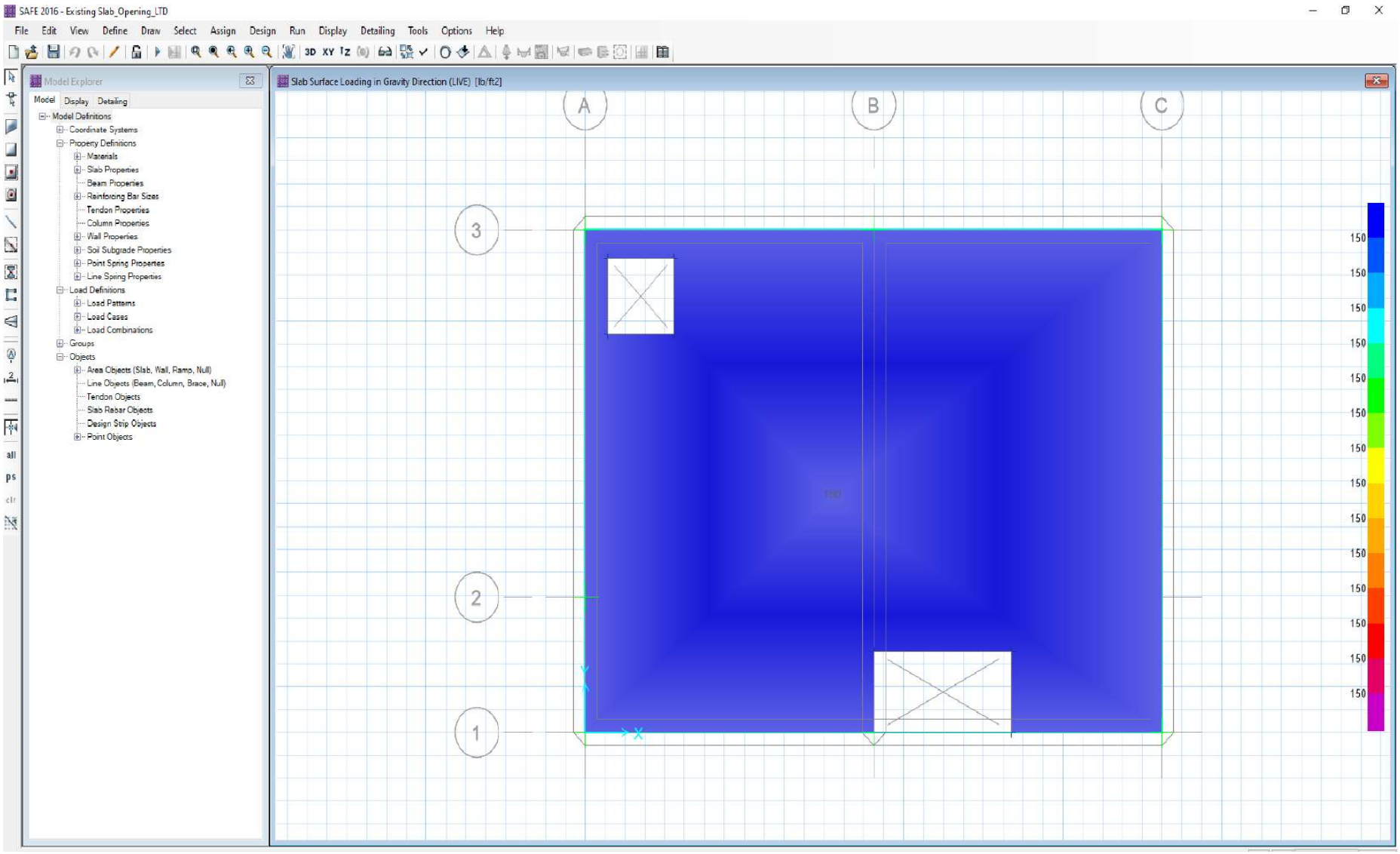
10 Pages

Attachment E



Layout of the existing slab 10 in thickness showing proposed opening in left conner top area.

Attachment E



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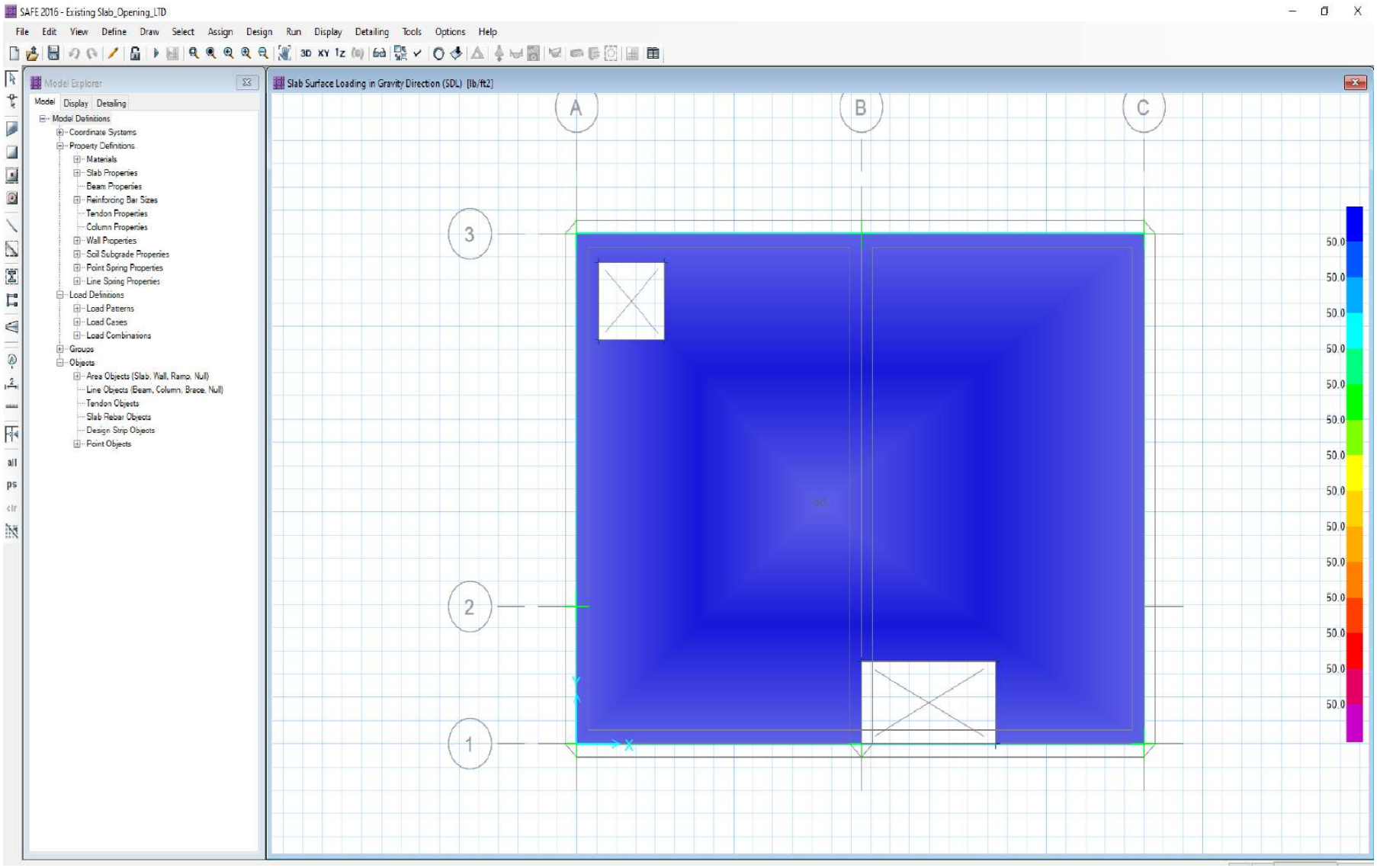
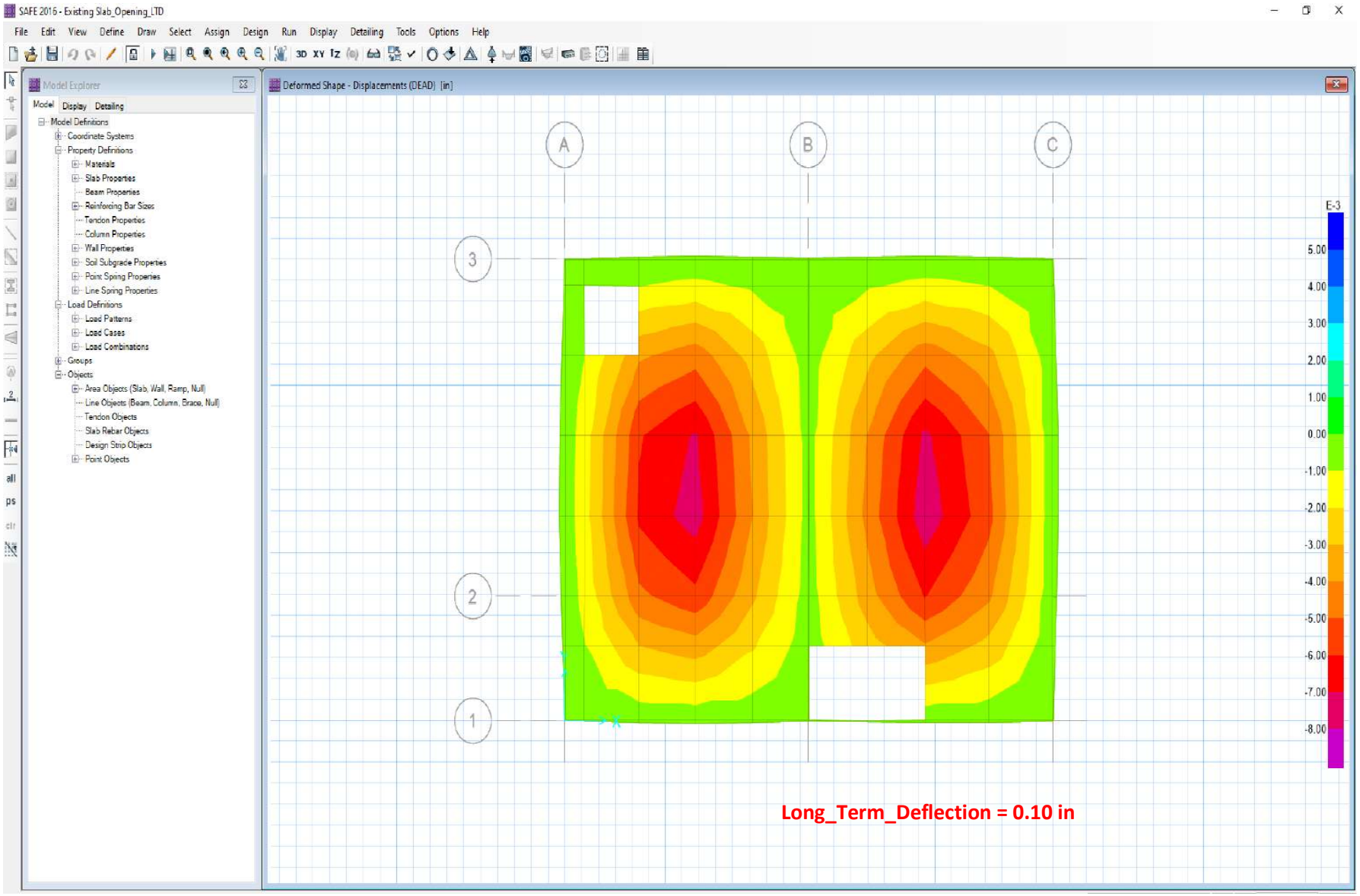
Attachment E

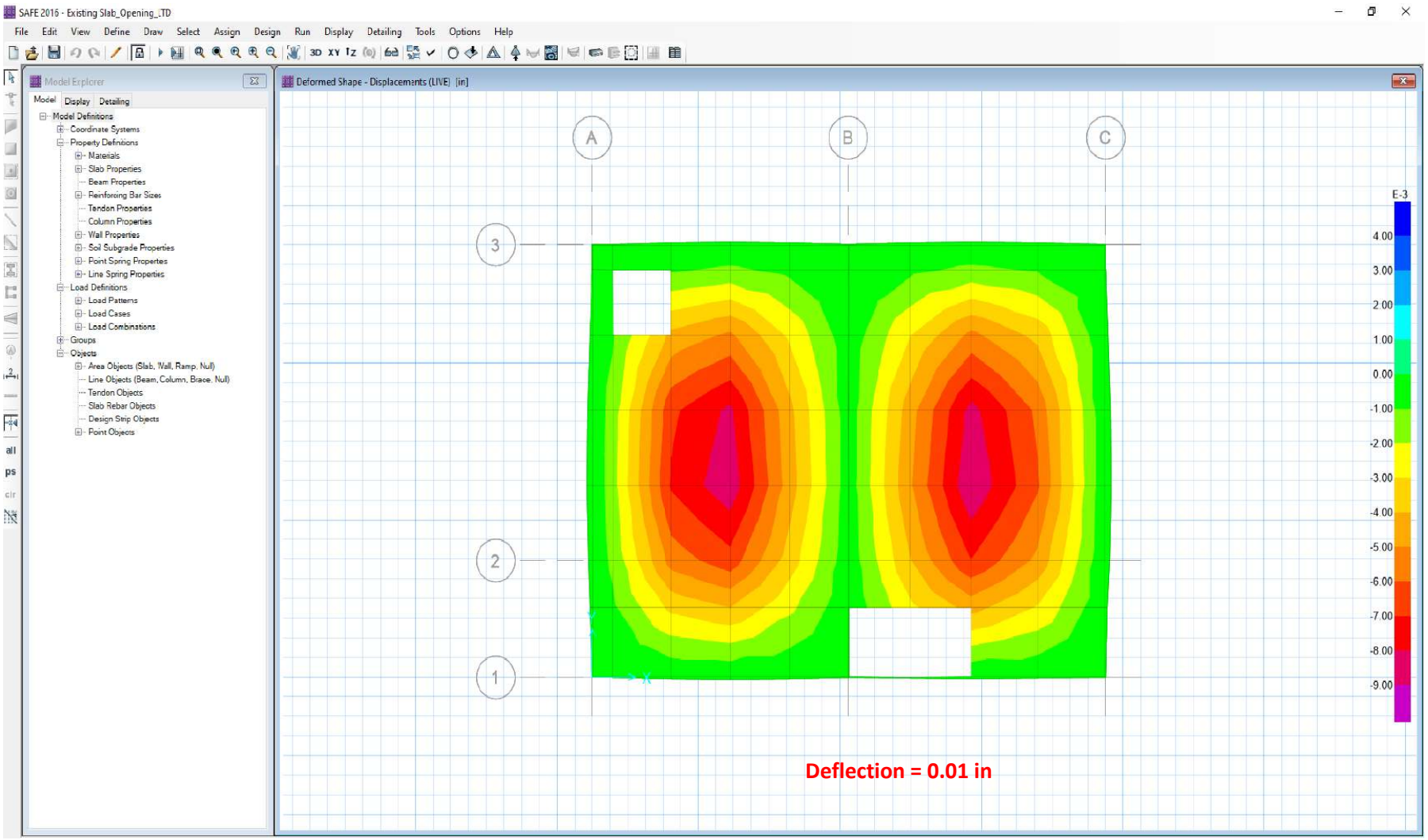


Dead Load = 50 psf

Long Term Deflection

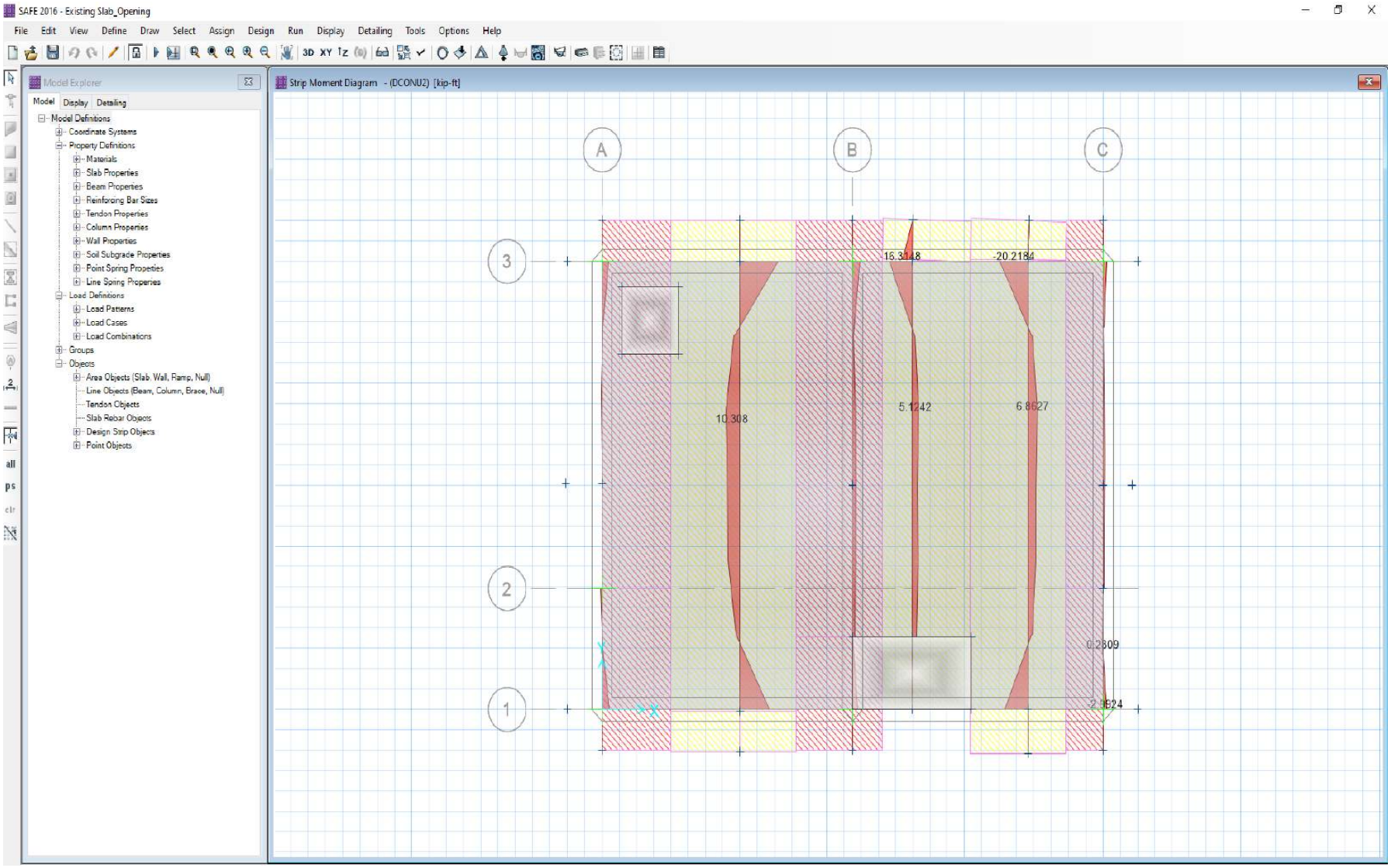


Short Term Deflection



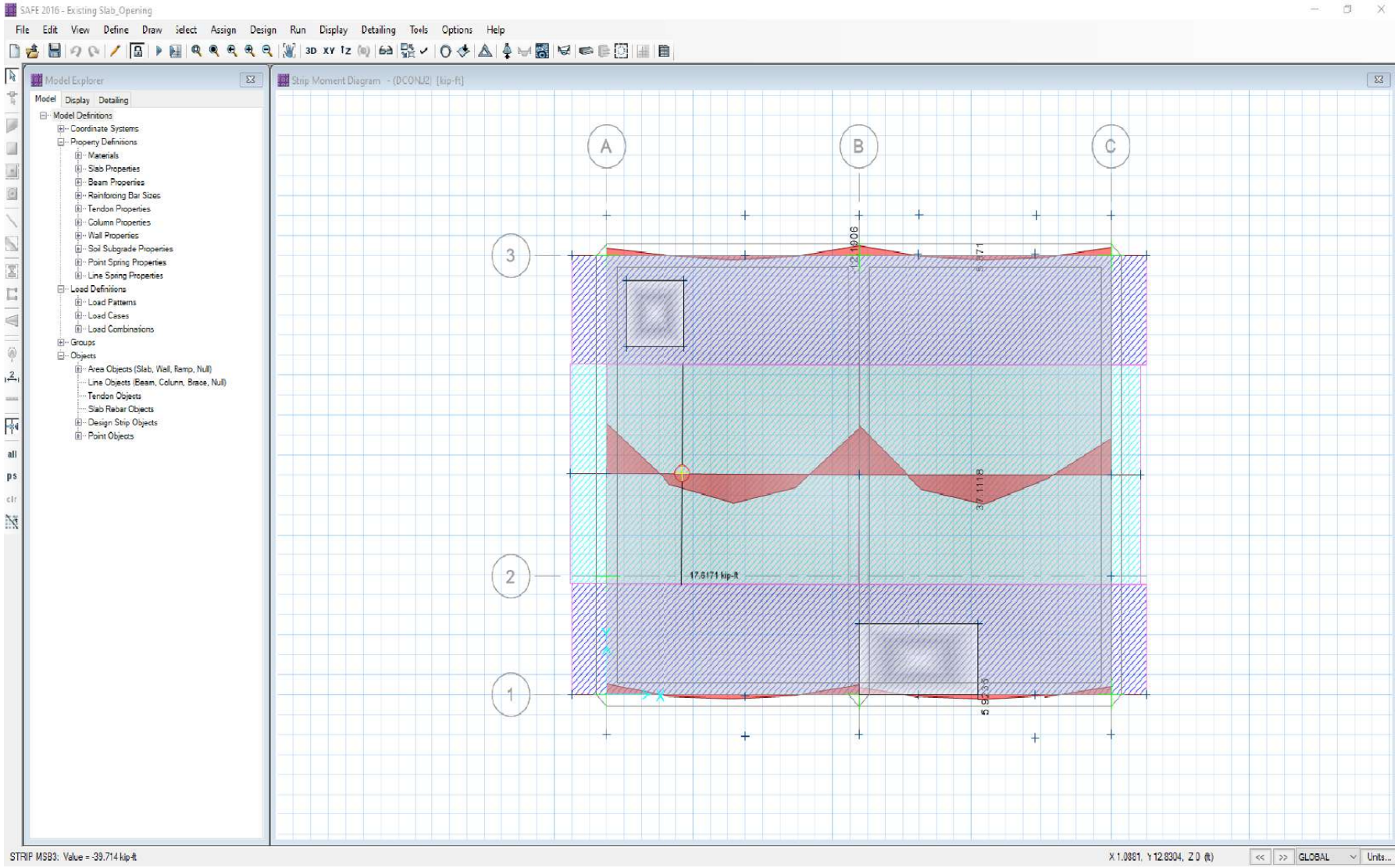
Attachment E

Moment Strip Layer A



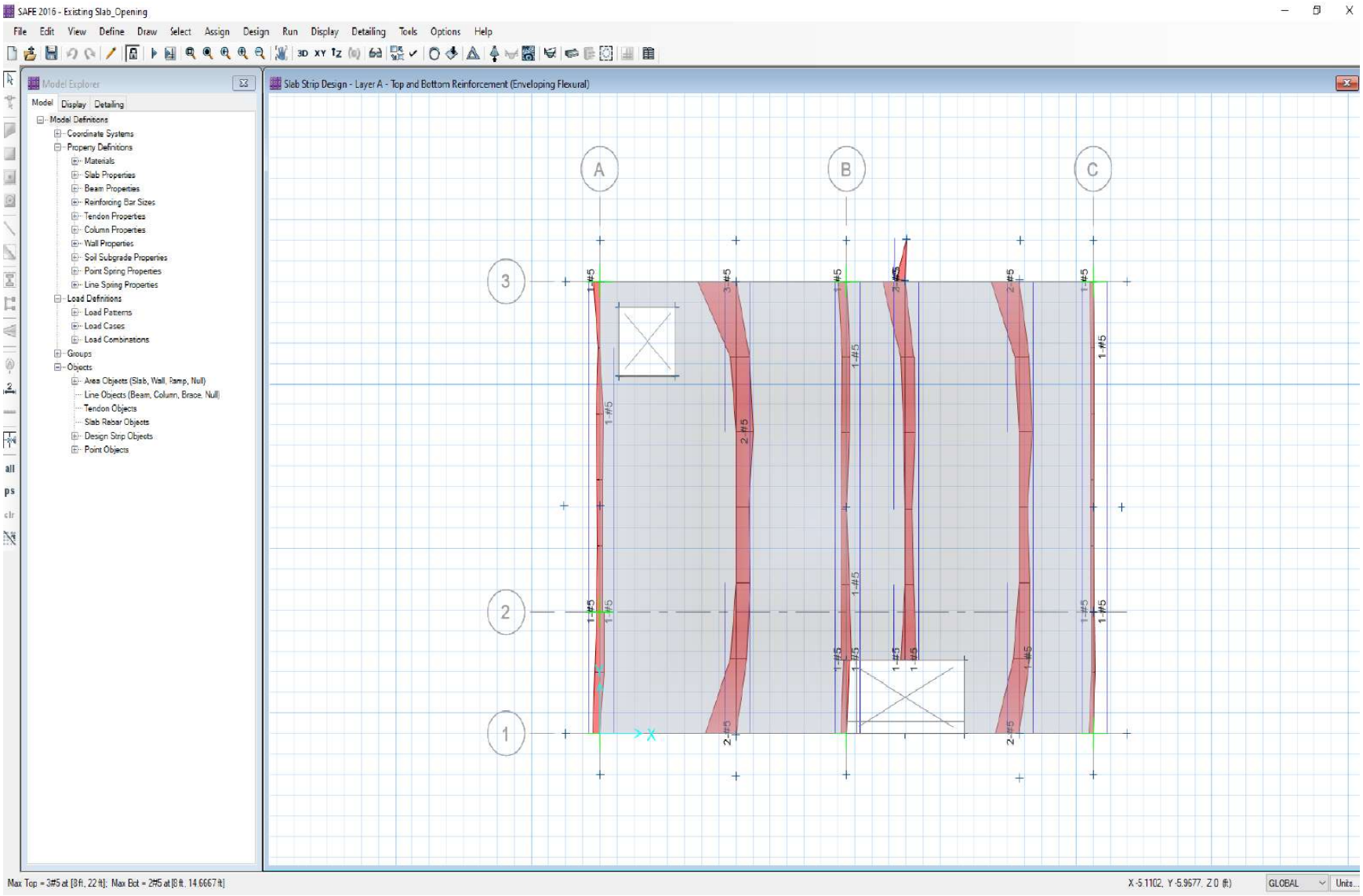
Attachment E

Strip Layer B



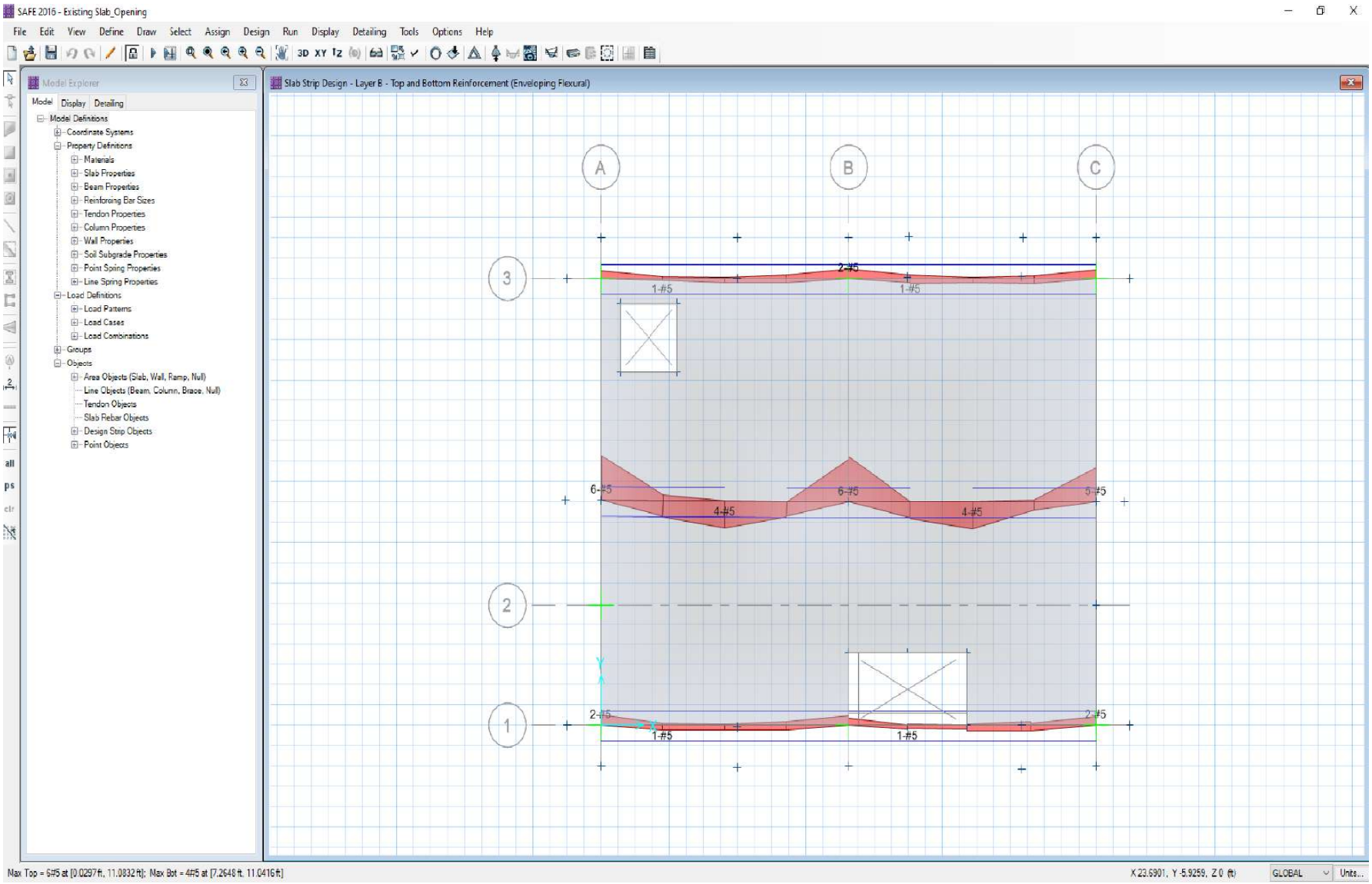
Attachment E

Reinforce Layer “A”



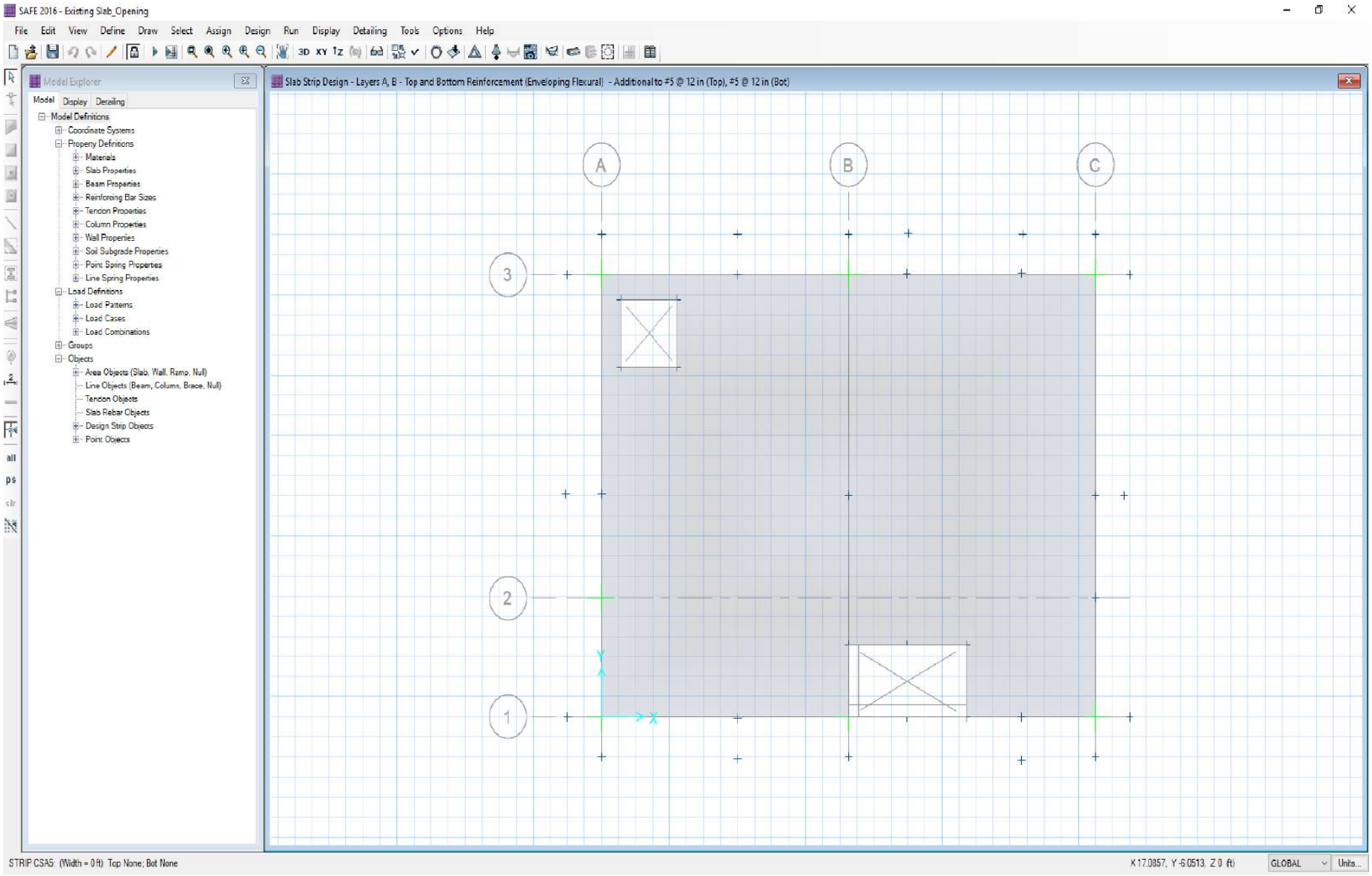
Attachment E

Reinforce Layer B

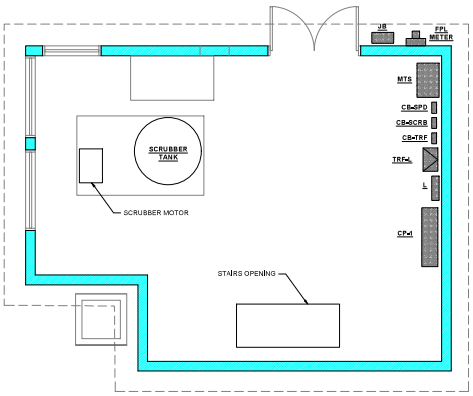


Attachment E

Using Rebar #5 @ 12” Each Way Top & Bottom (No additional reinforce required)

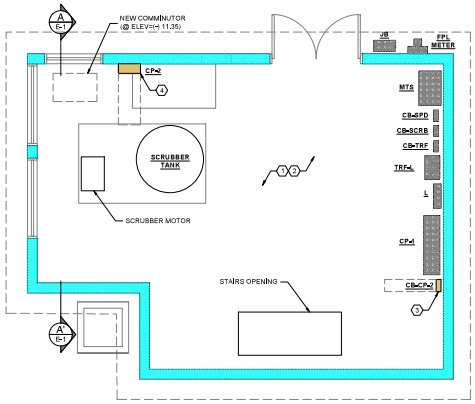


Attachment F



ELECTRICAL PLAN - FIRST FLOOR - EXISTING

SCALE: 1/4" = 1'-0"



ELECTRICAL PLAN - FIRST FLOOR - NEW

SCALE: 1/4" = 1'-0"

SCOPE OF WORK

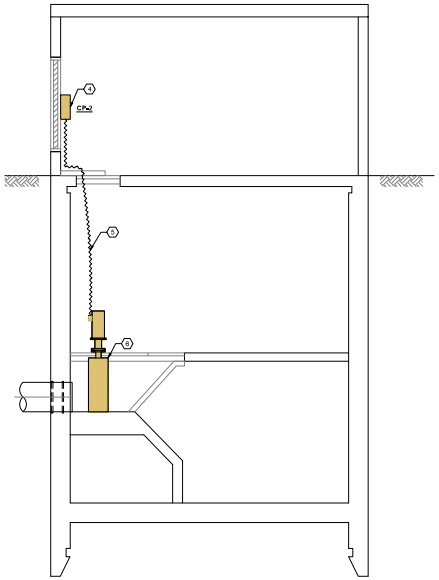
THE ELECTRICAL SCOPE OF WORK OF THIS PROJECT CONSISTS OF THE INSTALATION OF A NEW 5.0HP COMMINUTOR.

ELECTRICAL KEY NOTES

1. ALL WORK SHALL BE COORDINATED WITH CITY OF PEMBOKE PINES PROJECT MANAGER.
2. THESE DRAWINGS ARE DIAGRAMMATICAL IN NATURE AND REPRESENT EXISTING CONDITIONS BASED ON AVAILABLE DRAWINGS AND SITE OBSERVATIONS. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF ALL ACTUAL CONDITIONS, FOR EXACT LOCATIONS AND SIZES OF PIPING, CONDUIT, WIRES, EQUIPMENT, ETC.
3. NEW MAIN CIRCUIT BREAKER.
4. NEW COMMINUTOR CONTROL PANEL. CONTROL PANEL PROVIDED BY COMMINUTOR MANUFACTURER, ELECTRICAL CONTRACTOR SHALL COORDINATE WITH CITY OF PEMBOKE PINES PROJECT MANAGER.
5. ELECTRICAL POWERCORD - 6#12 AWG - TYPE SOOW - EPDM INSULATION - CPE JACKET. POWERCORD PROVIDED BY COMMINUTOR MANUFACTURER. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH CITY OF PEMBOKE PINES PROJECT MANAGER.
6. NEW COMMINUTOR WITH 5.0HP XPHV IMMERSIBLE MOTOR. COMMINUTOR TO BE PROVIDED BY CITY OF PEMBOKE PINES. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH CITY OF PEMBOKE PINES PROJECT MANAGER.

ELECTRICAL SYMBOLS LEGEND

	ELECTRICAL PANEL
JB	JUNCTION BOX
5.0	MOTOR CONNECTION, NUMBER DENOTES HORSEPOWER

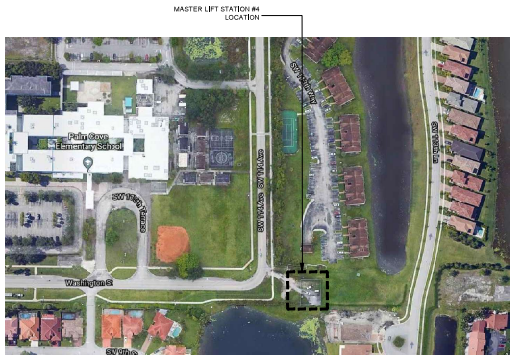


SECTION A-A'

SCALE: N.T.S

ELECTRICAL NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE FLORIDA BUILDING CODE 2020, NFPA NATIONAL FIRE PROTECTION AGENCY, NFPA 72 2016, NFPA 101 2018 AND NATIONAL ELECTRICAL CODE NEC 2017.
2. THE CONTRACTOR SHALL VERIFY ALL EQUIPMENT AND MOTOR LOADS BEFORE INSTALLING WIRING.
3. CONTRACTOR SHALL GUARANTEE THE ENTIRE ELECTRICAL WORK, INCLUDING PARTS AND LABOR, FOR A PERIOD OF ONE (1) YEAR AFTER FINAL WRITTEN ACCEPTANCE BY OWNER.
4. THE CONTRACTOR SHALL TAKE PERMITS, PROCURE CERTIFICATES AND PAY ALL FEES CONNECTED THEREWITH.
5. THE CONTRACTOR SHALL MAKE FIELD VISITS PRIOR TO BID AND BECOME FAMILIAR WITH THE SCOPE OF WORK INVOLVED IN THIS JOB. SUPLEMENTALS WILL NOT BE CONSIDERED / ACCEPTED FOR FAILURE ON THE CONTRACTOR'S PART TO COMPLY WITH THIS REQUIREMENT.
6. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH OTHER TRADES AS WELL PROVIDING TEMPORARY POWER AT PROJECT SITE FOR ALL TRADES.
7. ALL MATERIALS SHALL BE NEW, OF TYPES AND MAKES CALLED FOR, OR APPROVED EQUAL.
8. ALL ELECTRICAL CIRCUITS SHALL BE IDENTIFIED AND LABELED IN THE ELECTRICAL PANEL.
9. DRAWINGS ARE DIAGRAMMATIC AND INTENDED TO SHOW APPROXIMATE LOCATIONS AND ARRANGEMENTS ONLY. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH INTERIOR DESIGNER AND/OR ARCHITECT FOR EXACT LOCATION AND HEIGHT OF ELECTRICAL OUTLETS.
10. GROUNDING SHALL COMPLY WITH THE NEC ART 250.
11. FLEXIBLE CONDUIT SHALL BE USED FOR CONNECTIONS TO VIBRATING EQUIPMENT, TRANSFORMERS, AND RECESSED LIGHT FIXTURES
12. PROVIDE ENGRAVED PLASTIC LABELS FOR ALL NEW ELECTRICAL PANELS, CONTROLLERS, DISCONNECT SWITCHES, AND TIME SWITCHES.
13. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND EXISTING CONDITIONS, THE DISCREPANCY SHALL BE REPORTED TO OWNER'S REPRESENTATIVE FOR EXPEDITING AND RESOLUTION.
14. CONTRACTOR TO ASSURE THAT PROPER CLEARANCE (AS PER MANUFACTURER RECOMMENDATIONS) IS PROVIDED AROUND ALL NEW EQUIPMENT FOR SERVICING AND REPLACEMENT PURPOSES.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED OF HIS WORK.
16. ALL WIRING INSTALLATION SHALL BE MADE AS REQUIRED BY NEC Art. 300.
17. ELECTRICAL CONTRACTOR MUST USE EXISTING PANELS, WIRING, OUTLETS, RECEPTACLES, FIXTURES AND SWITCHES WHEN FEASABLE.
18. DISCONNECT SWITCHES SHALL BE H.P. RATED, QUICK-MAKE/QUICK-BREAK ENCLOSURES AS REQUIRED BY EXPOSURE.
19. ONCE CONSTRUCTION IS COMPLETED, AS-BUILTS DRAWINGS SHALL BE PROVIDED TO OWNER'S REPRESENTATIVE DULY SIGNED BY ELECTRICAL CONTRACTOR.



SITE PLAN

N.T.S

INGEMEL S.A.
ENGINEERING COMPANY
State of Florida CA No. 9113
20871 Johnson Street, Suite 115
Phone: (954) 218-2264 Fax: (954) 450-7216
Pembroke Pines, Florida 33029

The City Of PEMBROKE PINES

LEGENDS:

- EXISTING ELECTRICAL EQUIPMENT
- NEW ELECTRICAL EQUIPMENT
- CB — CIRCUIT BREAKER
- MTS — MANUAL TRANSFER SWITCH
- TRF — TRANSFORMER

P.E. SEAL

TO THE BEST OF OUR KNOWLEDGE THE PLANS AND SPECIFICATIONS COMPLY WITH THE APPLICABLE MINIMUM BUILDING CODE

Digitally signed by Pedro Arias
Date: 2023.11.06 13:32:19 -05'00'

Pedro Arias, P.E.
Florida Registration, No. 63813

REV No.	DATE	DESCRIPTION
-	11-06-23	ISSUED FOR PERMIT

PROJECT:

MASTER LIFT STATION #4
NEW SEWAGE COMMINUTOR ADDITION

PROJECT ADDRESS:
SW 114 Ave - Washington St.
PEMBROKE PINES, FL, 33025

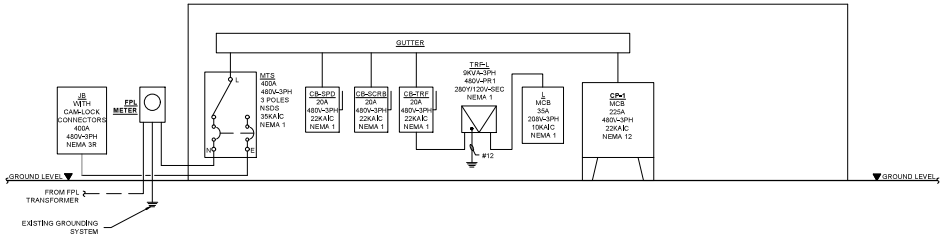
CONTENTS:
ELECTRICAL PLAN

SCALE: INDICATED	DATE: 10-26-21
DRAWN: GP	DWG FILE: 21-122-E1
APPROVED: PEDRO A.	PROJECT NO.: 21-122

SHEET No.
E - 1

SHEET:	OF:
1	2

Attachment G

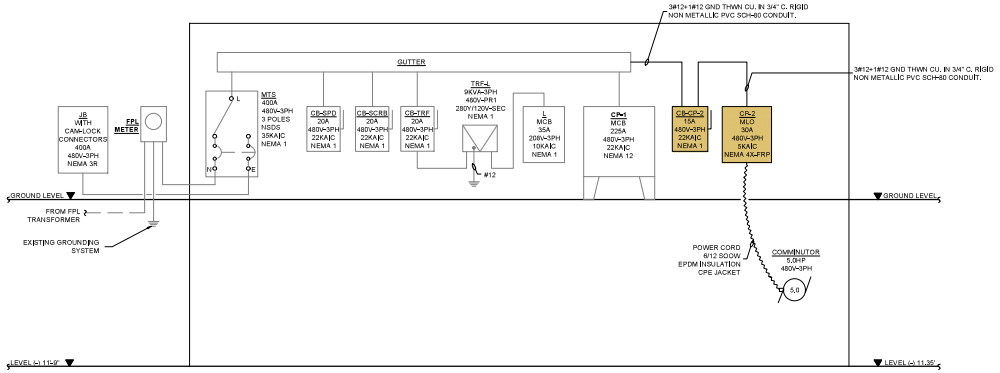


ELECTRICAL RISER - EXISTING

SCALE: N.T.S

GUTTEF - SERVICE LOAD CALCULATION (Existing)

DESCRIPTION	LOAD
CIRCUIT BREAKER CB-SPD	0 V.A.
CIRCUIT BREAKER CB-SCRB	3,080 V.A.
CIRCUIT BREAKER CB-TRF (TRF-L - PANEL L)	6,960 V.A.
CONTROL PANEL CP-1	162,045 V.A.
TOTAL LOAD:	171,945 V.A.
TOTAL LOAD @ 480V-3PH:	297 AMPS
DEMAND LOAD (LOAD @125%)	214,931 V.A.
DEMAND LOAD (LOAD @125%)	259 AMPS
EXISTING SERVICE @ 480V-3PH	400 AMPS

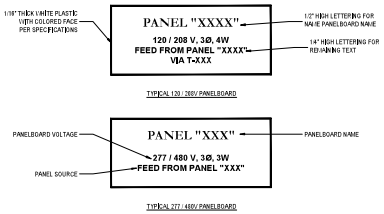


ELECTRICAL RISER - NEW

SCALE: N.T.S

GUTTER - SERVICE LOAD CALCULATION (Existing - Modified)

DESCRIPTION	LOAD
CIRCUIT BREAKER CB-SPD	0 V.A.
CIRCUIT BREAKER CB-SCRB	3,000 V.A.
CIRCUIT BREAKER CB-TRF (TRF-L - PANEL L)	6,900 V.A.
CONTROL PANEL CP-1	162,045 V.A.
CONTROL PANEL CP-2	7,500 V.A.
TOTAL LOAD:	179,445 V.A.
TOTAL LOAD @ 480V-3PH:	216 AMPS
DEMAND LOAD (LOAD @125%)	224,306 V.A.
DEMAND LOAD (LOAD @125%)	270 AMPS
EXISTING SERVICE @ 480V-3PH	400 AMPS



PLASTIC LABELS DETAIL

NOT TO SCALE

INGEMEL S.A.
ENGINEERING COMPANY
State of Florida CA No. 9113
20871 Johnson Street, Suite 115
Phone: (954) 218-2264 Fax: (954) 450-7216
Pembroke Pines, Florida 33029

The City Of PEMBROKE PINES

LEGENDS:

- EXISTING ELECTRICAL EQUIPMENT
- NEW ELECTRICAL EQUIPMENT
- JB JUNCTION BOX
- CB CIRCUIT BREAKER
- MTS MANUAL TRANSFER SWITCH
- TRF TRANSFORMER

P.E. SEAL

TO THE BEST OF OUR KNOWLEDGE THE PLANS AND SPECIFICATIONS COMPLY WITH THE APPLICABLE MINIMUM BUILDING CODE

Digitally signed by Pedro Arias
Date: 2023.11.06 13:31:45 -05'00'

Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.

Pedro Arias, P.E.
Florida Registration, No. 63813

REV No.	DATE	DESCRIPTION
-	11-06-23	ISSUED FOR PERMIT

PROJECT:

MASTER LIFT STATION #4
NEW SEWAGE COMMINUTOR ADDITION

PROJECT ADDRESS:
SW 114 Ave - Washington St.
PEMBROKE PINES, FL, 33025

CONTENTS:
ELECTRICAL PLAN

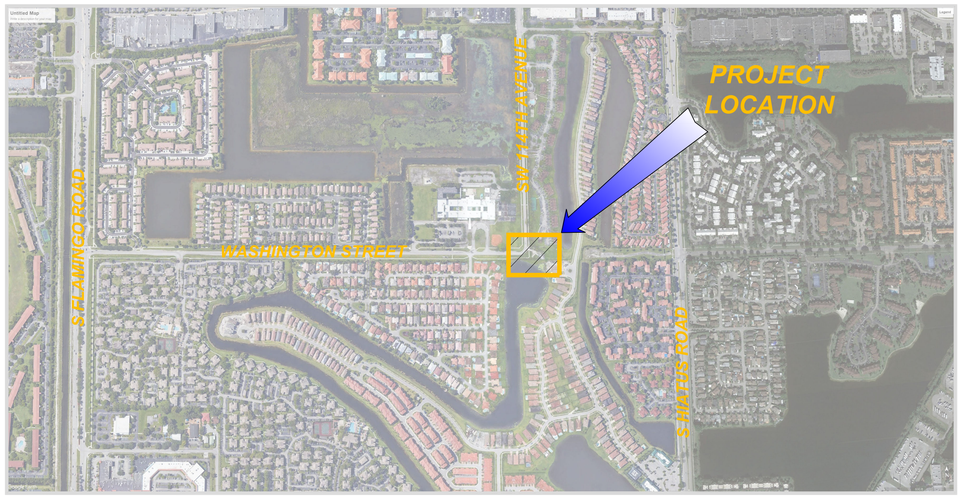
SCALE: INDICATED	DATE: 10-26-21
DRAWN: GP	DWG FILE: 21-122-E2
APPROVED: PEDRO A.	PROJECT NO.: 21-122

SHEET No.
E - 2

SHEET: 2 OF: 2

MASTER LIFT STATION NO.4 COMMINUTOR

11390 SW 9 STREET, PEMBROKE PINES, FL



LOCATION MAP

(N.T.S.)

DRAWING INDEX	
CITY	
G-1	COVER SHEET
M-1	PLAN VIEWS SHEET
M-2	ELEVATION - SECTIONS SHEET
M-3	DETAILS SHEET

REVISIONS			
NO.	DATE	BY	DESCRIPTION

CITY OF PEMBROKE PINES
UTILITIES DEPARTMENT

8300 SOUTH PALM DRIVE - PEMBROKE PINES, FL 33025 (954) 518-9040

PEMBROKE PINES COMMISSION

FRANK C. ORTIS	MAYOR
THOMAS GOOD, JR.	VICE MAYOR - DISTRICT 1
JAY D. SCHWARTZ	DISTRICT 2
IRIS A. SIPLE	DISTRICT 3
ANGELO CASTILLO	DISTRICT 4
CHARLES F. DODGE	CITY MANAGER

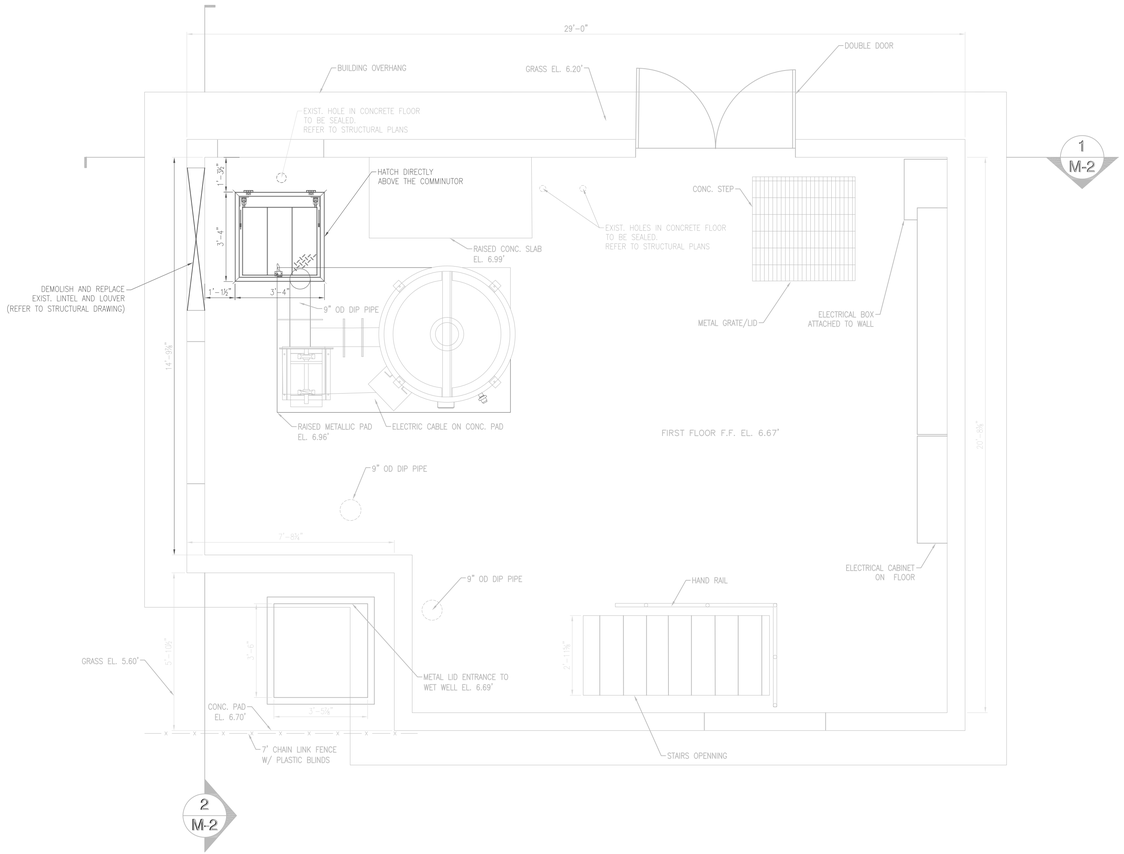
DATE: JULY, 2022

SHEET NAME: COVER SHEET

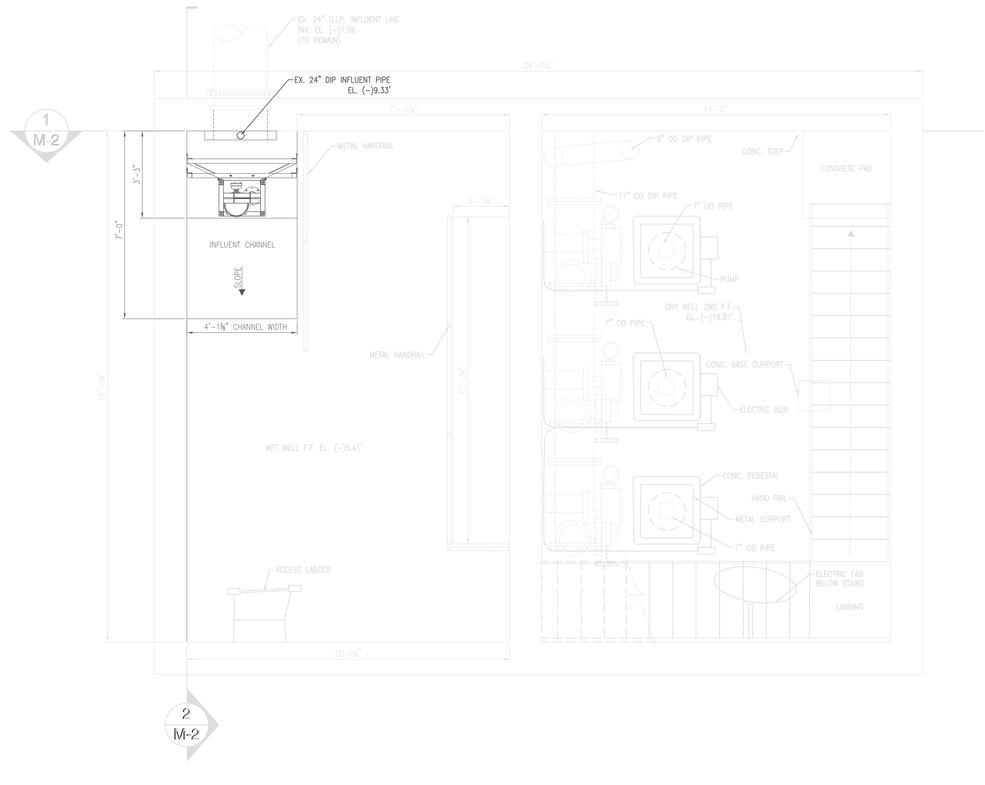
PROJECT TITLE: MASTER LIFT STATION No. 4 COMMINUTOR

BID PLANS

S:\Public Works\UTILITIES\UTILITY ENGINEERING\Lift and Pump Stations\4\Drawings\CADD\Master Lift Station No. 4 Rehabilitation - Zip\Cover Sheet.dwg



1 M-1 PLAN VIEW 1ST FLOOR
3/8" = 1'-0"



2 M-1 PLAN VIEW EL. -5.41
3/8" = 1'-0"

KEY NOTES:

1. CONTRACTOR SHALL DEMOLISH LINTEL AND LOUVER TO PROVIDE ACCESS AND INSTALL A NEW LINTEL AND LOUVER BASED ON THE EXISTING UNIT OR AN APPROVED EQUIVALENT.
2. PROVIDE SHOP DRAWINGS AND SPECIFICATIONS FOR OWNER APPROVAL.
3. THE CONTRACTOR NEEDS TO FIELD VERIFY THE EXISTING CONDITIONS AND PROPOSE A HATCH BASED ON THE DIMENSIONS OF THE PROPOSED HATCH AREA.
4. RAISED CONCRETE SLAB AREA NEAR THE HATCH NEEDS TO BE CUT PRIOR TO INSTALLATION OF HATCH.

DRAWN BY: M.U.M. | DESIGNED BY: A.J.G. | CHECKED BY: J.N.C. | DATE: 3/16/2022 | SCALE: 3/8" = 1'-0"

CITY OF PEMBROKE PINES
UTILITIES DEPARTMENT
8300 SOUTH PALM DRIVE
PEMBROKE PINES, FLORIDA 33025
TEL: (954) 518-9040

REVISIONS

NO.	DATE	BY	DESCRIPTION

PLAN VIEWS SHEET

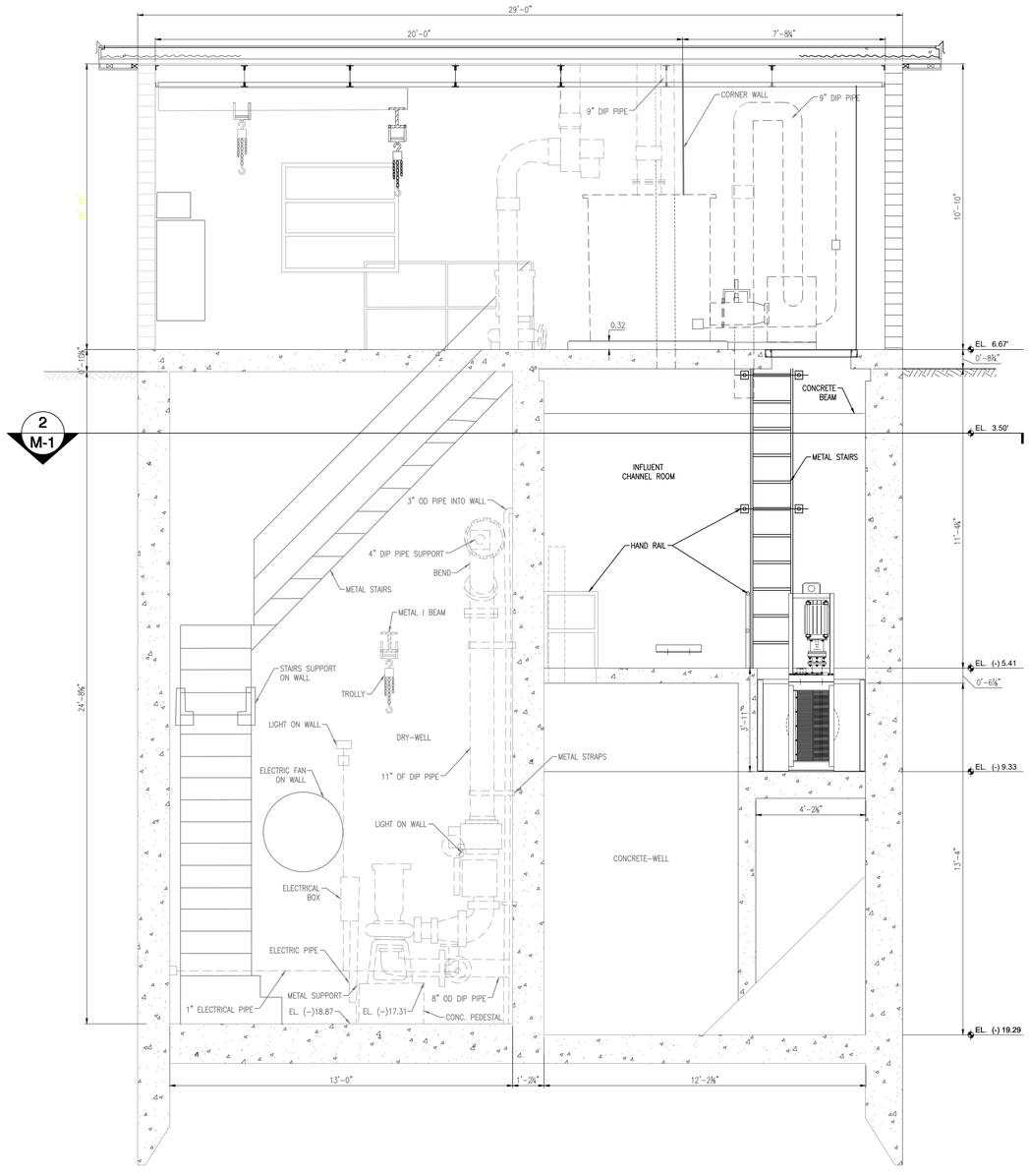
MASTER LIFT STATION NO.4 COMMINUTOR
11390 SW 9 STREET, PEMBROKE PINES, FL

SHEET NAME: M-1

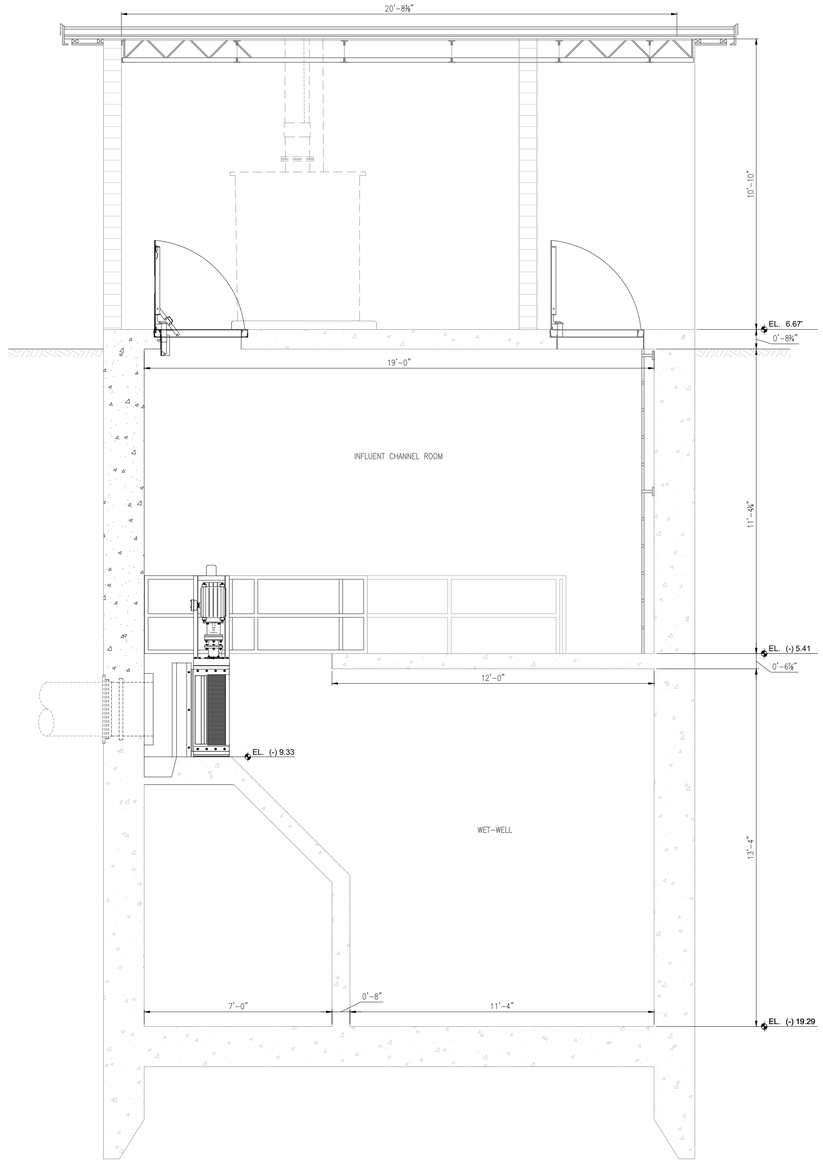
SHEET: 2 OF 4

CITY OF P.P. PLAN SUBMITTAL: BID PLANS

SUBMITTAL DATE: JULY 16, 2022



1 / M-2 SECTION VIEW 1-1
3/8" = 1'-0"



2 / M-2 SECTION VIEW 2-2
3/8" = 1'-0"

DRAWN BY: M.U.M.
DATE: 3/16/2022
DESIGNED BY: A.J.G.
SCALE: 3/8" = 1'-0"
CHECKED BY: J.N.C.

CITY OF PEMBROKE PINES
UTILITIES DEPARTMENT
8300 SOUTH PALM DRIVE
PEMBROKE PINES, FLORIDA 33025
TEL: (954) 518-9040

REVISIONS

NO.	DATE	BY	DESCRIPTION

ELEVATIONS - SECTIONS SHEET

MASTER LIFT STATION NO.4 COMMINUTOR
11390 SW 9 STREET, PEMBROKE PINES, FL

SHEET NAME: M-2

SHEET: 3 OF 4

CITY OF P.P. PLAN SUBMITTAL: BID PLANS

SUBMITTAL DATE: JULY 16, 2022

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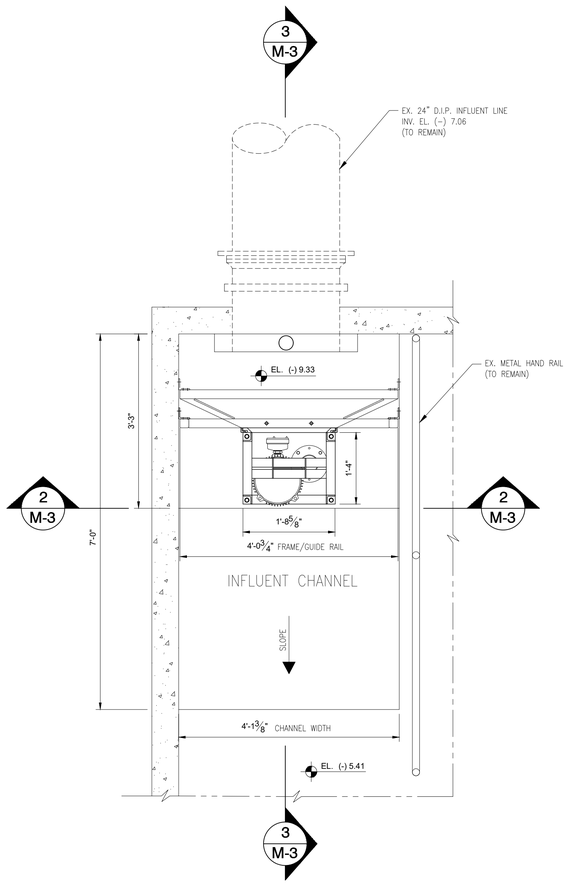
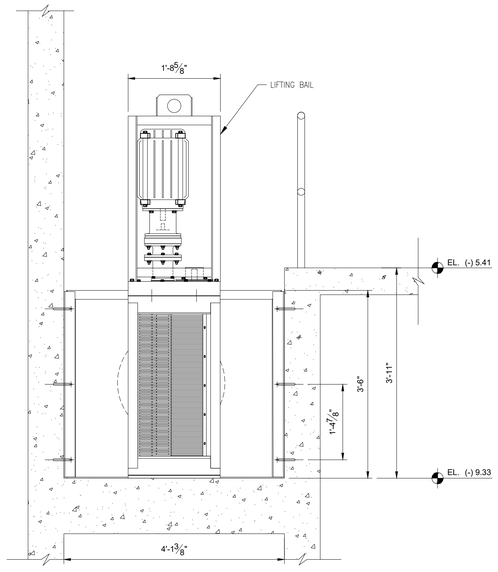
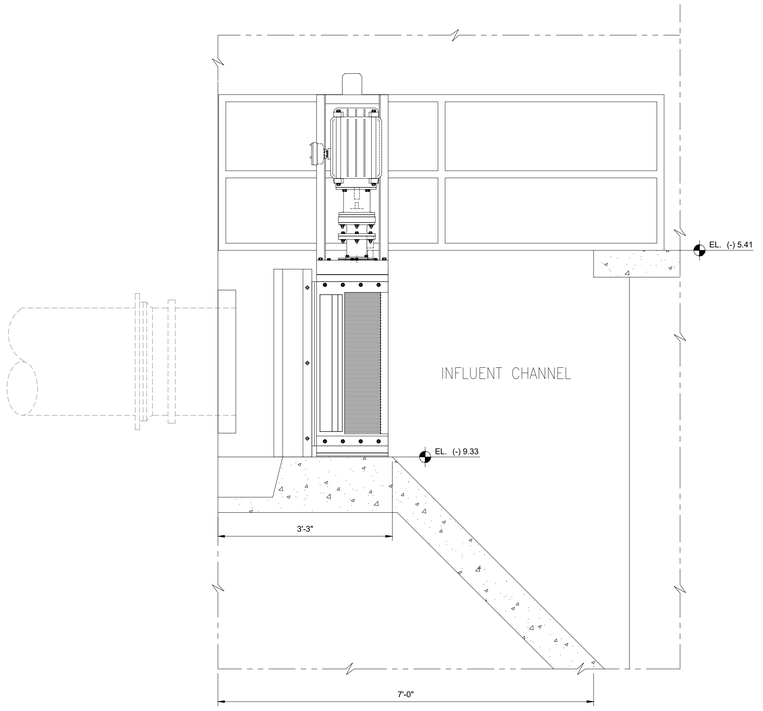


1 M-3 PLAN VIEW
3/4" = 1'-0"



2 M-3 SECTION
3/4" = 1'-0"



3 M-3 SECTION
3/4" = 1'-0"

NOTES UNLESS OTHERWISE SPECIFIED:

1. 18 ANCHOR BOLTS 1/2" (12MM) X 3 3/4" (95MM).
2. CONTRACTOR SHALL SEAL GAPS BETWEEN FRAME AND CHANNEL TO PREVENT ANY LARGE PARTICLES FROM PASSING.
3. CHANNEL WIDTH SHALL EXCEED FRAME WIDTH BY 1/4" MIN. SEE TAB BLOCK II FOR MORE DETAILS.
4. MAX GUIDE RAIL HEIGHT IS 16 FEET (4877MM). MULTIPLE GUIDE RAIL SECTIONS ARE REQUIRED FOR HEIGHTS GREATER THAN 16 FEET (4877MM).
5. DRAWING ILLUSTRATES A SINGLE GUIDE RAIL SECTION AND IS FOR ILLUSTRATION PURPOSES ONLY.
6. FRAME/GUIDE RAIL MODEL DESIGNATION 32 / 49" WIDTH
   CHANNEL MONSTER MODEL CMD 3210-XDS2.0 / IMMERSIBLE CUTTER MOTOR
7. FOR LIFTING RAIL REFER TO MANUFACTURE SHOP DRAWING NO. CMC3105-2010-S, REV A, SHEET 1 OF 3.

DRAWN BY:	DATE:
M.U.M.	3/16/2022
DESIGNED BY:	SCALE:
A.J.G.	3/4" = 1'-0"
CHECKED BY:	
J.N.C.	

CITY OF PEMBROKE PINES
UTILITIES DEPARTMENT
8300 SOUTH PALM DRIVE
PEMBROKE PINES, FLORIDA 33025
TEL: (954) 518-9040

REVISIONS

NO.	DATE	BY	DESCRIPTION

DETAILS SHEET

MASTER LIFT STATION NO.4 COMMINUTOR
11390 SW 9 STREET, PEMBROKE PINES, FL

SHEET NAME: M-3

SHEET: 4 OF 4

CITY OF P.P. PLAN SUBMITTAL: BID PLANS

SUBMITTAL DATE: JULY 16, 2022

Attachment I

GENERAL:

A. ALL MATERIALS AND CONSTRUCTION SHALL COMPLY WITH THE FLORIDA BUILDING CODE, 2020 7TH EDITION, HVHZ. ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDINGS, THE ACI 318-14 BUILDING CODE, AND ALL APPLICABLE FEDERAL, STATE AND LOCAL ORDINANCES.
B. THESE DRAWINGS AND SPECIFICATIONS COMPLY, TO THE BEST OF MY KNOWLEDGE WITH THE 2020 FLORIDA BUILDING CODE, 7TH EDITION, HVHZ .
C. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS OF EXISTING STRUCTURES AFFECTING NEW CONSTRUCTION BEFORE COMMENCING ANY WORK. ANY VARIATIONS IN ACTUAL FIELD CONDITIONS/DIMENSIONS FROM THOSE SHOWN IN THE CONTRACT DRAWINGS SHALL BE REPORTED TO THE ARCHITECT/ENGINEER FOR DETERMINING THE NEED OF REDESIGN PRIOR TO CONTRACTOR'S SUBMITTAL OF SHOP WORKING DRAWINGS FOR REVIEW.
D. THESE DRAWINGS SHALL BE WORKED TOGETHER WITH ARCHITECTURAL, AIR CONDITIONING, MECHANICAL AND ELECTRICAL DRAWINGS TO LOCATE DEPRESSED SLABS, SLOPES, DRAINS, OUTLETS, RECESSES, OPENINGS, REGLETS, BOLT SETTINGS, SLEEVES, ETC. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF ARCHITECT/ ENGINEER BEFORE PROCEEDING WITH THE WORK. ANY DISCREPANCIES, OMISSIONS OR VARIATIONS FOUND ON THE DRAWINGS OR IN THE SPECIFICATIONS DISCOVERED DURING THE BIDDING PHASE SHALL BE IMMEDIATELY COMMUNICATED TO ARCHITECT/ ENGINEER.
E. WHEN PERFORMING WORK BELOW GRADE, CARE SHALL BE TAKEN TO AVOID DAMAGING ANY EXISTING UTILITIES. ALL UNKNOWN UTILITIES DISCOVERED DURING CONSTRUCTION SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER. ANY DAMAGE TO THE EXISTING UTILITIES SHALL BE REPORTED TO ALL AFFECTED PARTIES, INCLUDING THE ARCHITECT/ENGINEER.
F. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR UPDATING HIS CONSTRUCTION DOCUMENTS WITH THE REVISED DRAWINGS AND SPECIFICATIONS, FIELD ORDERS, CHANGE ORDERS AND CLARIFICATION SKETCHES ISSUED DURING THE COURSE OF CONSTRUCTION.
G. TYPICAL DETAILS AND NOTES ON THESE DRAWINGS SHALL APPLY UNLESS SPECIFICALLY NOTED OTHERWISE. CONSTRUCTION DETAILS AND SECTIONS NOT COMPLETELY SHOWN OR NOTED SHALL BE SIMILAR TO DETAILS AND SECTIONS SHOWN OR NOTED FOR SIMILAR CONDITIONS.
H. THE GENERAL CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL EXCAVATION PROCEDURES INCLUDING LAGGING, SHORING, AND PROTECTION OF ADJACENT PROPERTY, STRUCTURES, STREETS AND UTILITIES IN ACCORDANCE WITH THE LOCAL BUILDING DEPARTMENT.
I. BACKFILL AROUND THE EXTERIOR PERIMETER OF WALLS SHALL NOT BE PLACED UNTIL AFTER THE WALLS ARE SUPPORTED BY THE COMPLETION OF INTERIOR FLOOR SYSTEMS. DO NOT PROCEED WITH BACKFILL UNTIL (7) DAYS AS A MINIMUM AFTER THE COMPLETION OF INTERIOR FLOOR SYSTEM UNLESS WALLS ARE ADEQUATELY BRACED. BACKFILL SHALL NOT BE PLACED UNTIL AFTER COMPLETION AND INSPECTION OF WATERPROOFING WHERE WATERPROOFING OCCUR.
J. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF ALL ACCUMULATED WATER FROM EXCAVATIONS AND DEWATERING OPERATIONS IN SUCH A WAY AS TO NOT CAUSE INCONVENIENCE TO THE WORK AND DAMAGE TO THE STRUCTURAL ELEMENTS.
K. STRUCTURAL NOTES SHALL BE USED IN CONJUNCTION WITH THE SPECIFICATIONS. IF A CONFLICT EXISTS, THE MORE STRINGENT GOVERNS.
L. GENERAL CONTRACTOR SHALL PROTECT EXISTING FACILITIES, STRUCTURES AND UTILITY LINES AND CONDUITS FROM DAMAGE. GENERAL CONTRACTOR IS SOLELY RESPONSIBLE FOR DAMAGE OR INJURY DUE TO HIS ACT OR NEGLECT. M. GENERAL CONTRACTOR IS SOLELY RESPONSIBLE FOR JOB SAFETY, MEANS AND METHODS OF CONSTRUCTION AND CONSTRUCTION PROCEDURES. N. DO NOT SCALE THESE DRAWINGS, USE DIMENSIONS NOTED. IF DIMENSIONS ARE MISSING CONSULT ARCHITECT/ENGINEER FOR ADVISE.
M. IF ANY ERRORS OR OMISSIONS APPEAR IN THE DRAWINGS, SPECIFICATIONS OR OTHER DOCUMENTS THE CONTRACTOR SHALL NOTIFY THE A/E IN WRITING OF SUCH OMISSIONS OR ERRORS PRIOR TO PROCEEDING WITH ANY WORK WHICH APPEARS IN QUESTION. IN THE EVENT OF THE CONTRACTOR'S FAILING TO GIVE SUCH NOTICE, HE SHALL BE HELD RESPONSIBLE FOR THE RESULTS OF ANY SUCH ERRORS OR OMISSIONS AND THE COST OF RECTIFYING THE SAME.
N. WHERE CRITICAL DIMENSIONS CANNOT BE DETERMINED FROM THE PLANS, OR WHERE NEW WORK ADJOINS EXISTING CONSTRUCTION, OR WHERE ONE MATERIAL ADJOINS AN IN-PLACE MATERIAL, CONTRACTOR SHALL TAKE FIELD MEASUREMENTS AS REQUIRED TO COMPLETE SHOP DRAWINGS AND INSTALLATION. REPORT ANY DISCREPANCIES BETWEEN FIELD MEASURED DIMENSIONS AND SCALED DRAWING DIMENSIONS TO A/E BEFORE PROCEEDING WITH THE WORK.
O. WHERE A LINE OF STRUCTURE, OPENING LOCATION, OR DIMENSION IS CRITICAL AND BASED ON THE REQUIREMENTS OF ANOTHER TRADE OR SUBCONTRACTOR, THAT SUBCONTRACTOR SHALL SUBMIT A SHOP DRAWING WITH THE REQUIRED DIMENSIONAL INFORMATION UPON WHICH THE CONTRACTOR SHALL BASE THE LAYOUT AND CONSTRUCTION. THIS PROCEDURE IS MANDATORY FOR CURTAIN WALL SYSTEMS, ARCHITECTURAL PRECAST SYSTEMS AND ALL MECHANICAL AND ELECTRICAL OPENINGS.
P. THE CONTRACTOR SHALL USE THE STRUCTURAL DRAWINGS TOGETHER WITH THE ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS TO LOCATE STEPPED FOOTINGS, DEPRESSED SLABS, SLOPES, DRAINS, OUTLETS, RECESSES, OPENINGS, REGLETS, BOLT SETTING, SLEEVES, DIMENSIONS, ETC. POTENTIAL CONFLICTS SHALL BE COMMUNICATED TO THE A/E BEFORE PROCEEDING WITH THE WORK.

DEMOLITION:

SUBMITTALS:
A. SUBMIT SCHEDULE INDICATING PROPOSED SEQUENCE OF OPERATION FOR SELECTIVE DEMOLITION WORK TO OWNER FOR REVIEW AND APPROVAL PRIOR TO COMMENCEMENT OF WORK. INCLUDE METHOD OF DEMOLITION AND PLAN FOR REMODELING WORK, COORDINATION FOR SHUT-OFF, CAPPING, CONTINUATION OF UTILITY SERVICES AS REQUIRED, TOGETHER WITH DETAILS FOR DUST AND NOISE CONTROL PROTECTION.
B. CERTIFICATION: SUBMIT COPY OF DEMOLITION FIRM CURRENT LICENSES.
C. COORDINATE WITH OWNER'S CONTINUING OCCUPANCY OF PORTIONS OF EXISTING BUILDING.

PROJECT RECORD DOCUMENTS
A. ACCURATELY RECORD ACTUAL LOCATIONS OF CAPPED UTILITIES, SUBSURFACE OBSTRUCTIONS, AND UNANTICIPATED STRUCTURAL, MECHANICAL AND ELECTRICAL ELEMENTS UNCOVERED DURING DEMOLITION.

QUALITY ASSURANCE
A. ORGANIZE AND PERFORM DEMOLITION WORK TO AVOID DAMAGE TO CONSTRUCTION INTENDED TO REMAIN.
B. DEMOLITION AND TRANSPORTATION OF DEBRIS SHALL COMPLY WITH APPLICABLE CODES AND REGULATIONS GOVERNING THESE OPERATIONS. FEES ARE PAID BY THE CONTRACTOR.
C. CONDUCT DEMOLITION AND REMOVAL OPERATIONS IN AN EXPEDIENT MANNER, WITH PRECAUTIONS TAKEN TO PREVENT DEMOLITION SITE FROM BEING AN "ATTRACTIVE NUISANCE."

D. NOTIFY THE OWNER AND A/E OF ANY CONDITIONS CAPABLE OF AFFECTING THE SAFETY OF OCCUPANTS OF ADJACENT BUILDINGS, THE NORMAL USE OF THESE FACILITIES, OR THE PHYSICAL CONDITION OF THE STRUCTURES.
- IN CASE OF ACCIDENTAL DISRUPTION OF UTILITIES OR THE DISCOVERY OF PREVIOUSLY UNKNOWN UTILITIES, STOP WORK IMMEDIATELY AND NOTIFY THE OWNER AND A/E.
- DO NOT CONTINUE WORK UNTIL OWNER, A/E AND CONTRACTOR AGREE ON A PLAN TO CORRECT THE SITUATION OR IDENTIFY UTILITY SERVICE LINE.

REGULATORY REQUIREMENTS
A. CONFORM TO FLORIDA BUILDING CODE 2014 FIFTH EDITION WITH LATEST REVISIONS, FOR DEMOLITION WORK. SAFETY OF STRUCTURES DUST CONTROL AND SAFEGUARDS REQUIRED DURING CONSTRUCTION.
B. NOTIFY AFFECTED UTILITY COMPANIES BEFORE STARTING WORK AND COMPLY WITH THEIR REQUIREMENTS.
C. DO NOT CLOSE OR OBSTRUCT EGRESS WIDTH TO EXISTS.
D. DO NOT DISABLE OR DISRUPT BUILDING FIRE OR LIFE SAFETY SYSTEMS WITHOUT THREE (3) DAY PRIOR WRITTEN NOTICE TO THE OWNER.

JOB CONDITIONS
A. OWNER WILL BE CONTINUOUSLY OCCUPYING AREAS OF BUILDING AND SITE IMMEDIATELY ADJACENT TO AREAS OF SELECTIVE DEMOLITION. CONDUCT DEMOLITION WORK IN MANNER THAT WILL MINIMIZE DISRUPTION OF OWNER'S NORMAL OPERATIONS. PROVIDE MINIMUM OF FIVE (5) WORKING DAYS ADVANCE NOTICE TO OWNER OF DEMOLITION ACTIVITIES, WHICH WILL SEVERELY IMPACT OWNER'S NORMAL OPERATIONS.
B. EXISTING WORK NOT SPECIFIED FOR REMOVAL THAT IS TEMPORARILY REMOVED, DAMAGED EXPOSED OR IN ANY WAY DISTURBED OR ALTERED BY REMOVAL WORK SHALL BE REPAIRED, PATCHED OR REPLACED TO THE OWNER AND A/E SATISFACTION AT NO ADDITIONAL COST TO THE BOARD.
C. PROVIDE BARRIERS AND WARNING DEVICES TO PROTECT THE PUBLIC AND USERS OF ADJACENT FACILITIES.

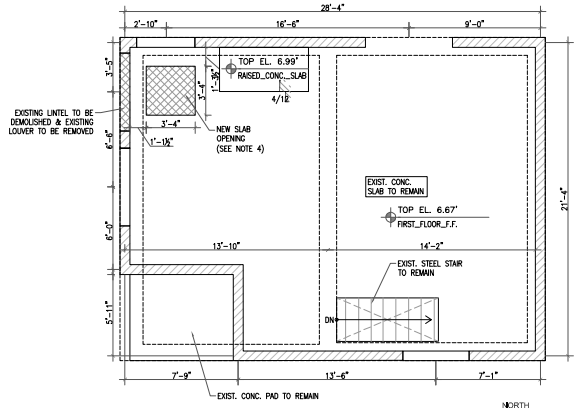
PREPARATION
A. WHERE SELECTIVE DEMOLITION WHICH WILL CREATE EXCESSIVE DUST OCCURS IMMEDIATELY ADJACENT TO OR WITHIN OCCUPIED PORTIONS OF BUILDING, CONSTRUCT DUST-PROOF PARTITIONS OR BARRIERS TO MITIGATE SPREAD OF AIRBORNE DUST OR DEBRIS.
B. PROVIDE WEATHERPROOF CLOSURES FOR EXTERIOR OPENINGS RESULTING FROM SELECTIVE DEMOLITION WORK.
C. IDENTIFY STUB OFF AND DISCONNECT UTILITY SERVICES THAT ARE NOT INDICATED TO REMAIN. REMAINING UTILITIES SHALL BE KEPT ACTIVE

DEMOLITION
A. DISCONNECT, REMOVE, CAP AND IDENTIFY DESIGNATED UTILITIES WITHIN DEMOLITION AREAS.
B. DEMOLISH IN AN ORDERLY AND CAREFUL MANNER. PROTECT EXISTING SUPPORTING STRUCTURAL MEMBERS AND ALL ITEMS TO REMAIN.
C. PROMPTLY REMOVE DEBRIS TO AVOID IMPOSING EXCESSIVE LOADS ON SUPPORTING WALLS, FLOORS OR FRAMING.
D. IF UNANTICIPATED MECHANICAL, ELECTRICAL OR STRUCTURAL ELEMENTS WHICH CONFLICT WITH INTENDED FUNCTION OR DESIGN ARE ENCOUNTERED INVESTIGATE MEASURE BOTH NATURE EXTENT OF THE CONFLICT. SUBMIT REPORT TO OWNER IN WRITTEN ACCURATE DETAIL.

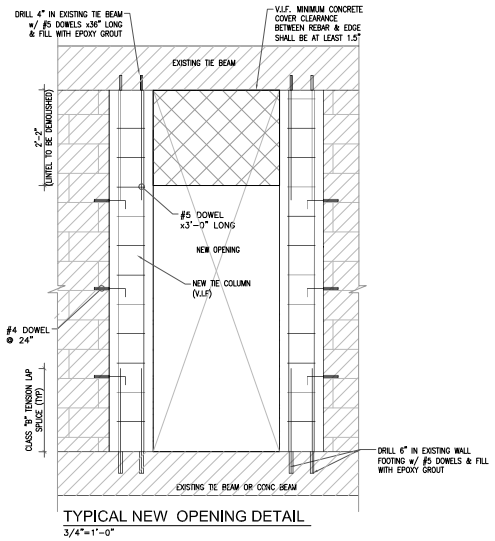
DISPOSAL OF DEMOLISHED MATERIALS
A. REMOVE DEBRIS, RUBBISH OTHER MATERIALS RESULTING FROM SELECTIVE DEMOLITION OPERATIONS FROM BUILDING SITE. LEGALLY TRANSPORT AND DISPOSE OF MATERIALS OFF SITE ON A REGULAR BASIS.
B. ACCUMULATION OF DEBRIS ON THE SITE WILL NOT BE ALLOWED.
C. IF HAZARDOUS MATERIALS ARE ENCOUNTERED DURING DEMOLITION OPERATIONS, COMPLY WITH APPLICABLE REGULATIONS LAWS, ORDINANCES CONCERNING REMOVAL, HANDLING AND PROTECTION AGAINST EXPOSURE OF ANY ENVIRONMENTAL POLLUTION.
D. BURNING OF REMOVED MATERIALS WILL NOT BE PERMITTED ON PROJECT SITE.

REPAIR
A. REPAIR DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED. RETURN DAMAGED STRUCTURES, SURFACES TO REMAIN TO CONDITIONS EXISTING PRIOR TO COMMENCEMENT OF SELECTIVE DEMOLITION WORK. REPAIR ADJACENT CONSTRUCTION SURFACES SOILED OR DAMAGED BY SELECTIVE DEMOLITION WORK, TO MATCH EXISTING.

CLEAN UP
A. UPON COMPLETION OF SELECTIVE DEMOLITION WORK, REMOVE TOOLS, EQUIPMENT, DEMOLISHED MATERIALS FROM SITE. REMOVE PROTECTIONS, LEAVE ROOF AREAS BROOM CLEAN.



GROUND FLOOR EXISTING & DEMOLITION PLAN
1/4"=1'-0"



TYPICAL NEW OPENING DETAIL
3/4"=1'-0"

NOTE: V.I.F ALL EXISTING CONDITIONS IN ORDER TO REPLACE THE CMU BLOCK w/ CONCRETE BEAM ACCORDING TO DETAIL PROVIDED.

LEGEND:

DENOTES AN EXISTING CONCRETE WALL/COLUMN, CMU WALL AND CONCRETE SLAB TO BE DEMOLISHED

DENOTES AN EXISTING CMU WALL TO REMAIN

TO THE BEST OF THE ENGINEER'S KNOWLEDGE, THE PLANS AND SPECIFICATIONS COMPLY WITH THE APPLICABLE MINIMUM BUILDING CODES AND THE APPLICABLE FIRE-SAFETY STANDARDS AS DETERMINED BY THE LOCAL AUTHORITY IN ACCORDANCE WITH THIS SECTION AND CHAPTER 633, FLORIDA STATUTES.

NOTES:
1-DIMENSIONS SHOWN SHALL BE FIELD-VERIFIED. ANY DISCREPANCIES SHALL BE NOTED AND THE ENGINEER OF RECORD NOTIFIED BEFORE CONTINUING WITH THE WORK.
2-CONTRACTOR TO SUBMIT SIGNED AND SEALED CALCULATIONS AND SHOP DRAWINGS FOR WINDOWS AND DOORS BY FLORIDA PROFESSIONAL ENGINEER BEFORE FABRICATION FOR APPROVAL BY THE ENGINEER OF RECORD TO SHOW COMPLIANCE WITH THE RESIDENTIAL FLORIDA BUILDING CODE 2020 (SEVENTH EDITION).
3-ALL ELECTRICAL, MECHANICAL AND PLUMBING PENETRATIONS THROUGH STRUCTURAL MEMBERS SHALL BE COORDINATED BY THE GENERAL CONTRACTOR.
4-CUT AROUND 2" ADDITIONAL & BUILD BACK WITH STRONG GROUT.

YHCE
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No. 43302

MASTER LIFT STATION #4
PEMBROKE PINES, FLORIDA
FOR: CITY OF PEMBROKE PINE

△	DATE	REVISION

DWG. TITLE
GENERAL NOTES , PLAN & DETAILS

SCALE
AS SHOWN

BY CHK'D
KA YHH

PROJECT NO.
H222370

DATE
10/14/2022

SHEET NUMBER
S-01

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CITY OF PEMBROKE PINES

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DIVISION 6 - WOOD AND PLASTICS (NOT USED)

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SECTION 01010

SUMMARY OF WORK

PART 1 - PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes general descriptions of the Contractor use of site, location of work, description of work, work sequence, owner occupancy and work by others.

1.02 RELATED SECTIONS

A. Section 01015 - General Requirements

B. Section 01025 - Measurement and Payment

C. Section 01030 - Special Project Procedures

D. Section 01505 - Control of Work

1.03 REFERENCES (NOT USED)

1.04 CONTRACTOR USE OF SITE

A. The Contractor shall limit his area of work to remain within those properties and easements as depicted in the Drawings or as approved in writing by the Owner.

B. Contractors' use of lands other than those depicted in the Drawings shall require written approval from the land owner and be at the Contractors risk and cost.

1.05 LOCATION OF WORK

A. The work is located at Master Lift Station No. 4 (MLS#4), located opposite to Palm Cove Elementary School, at the intersection between Washington St and SW 114 Ave in the Town of Pembroke Pines.

1.06 DESCRIPTION OF WORK.

A. The work includes the furnishing of all labor, materials, equipment, services, drawings, specifications and incidentals for MLS#4 Comminutor installation project.

B. Requires mandatory pre-bid site visit meeting.

C. The project requires electrical and structural modifications see attached drawings.

D. Concrete Cutting for new Lift Station Hatches.

E. Perform Concrete Modifications around floor openings for Hatches.

F. Furnish & Install Access Hatches.

G. Demolish the lintel and install an access door on the west side of the building.

H. Furnish & Install Channel Comminutor Package.

I. Furnish & Install Grinder Control Panel.

J. Electrical Work includes but is not limited to demolition of wiring of motor, installation of junction box.

K. Controls Work (includes display capability to existing SCADA).

L. Install portable and adjustable gantry crane for lifting and maintenance of the equipment.

M. Provide temporary facilities to continue the operation.

1.07 WORK SEQUENCE

A. Set up temporary bypass pumps.

B. Concrete cutting for new Lift Station Hatches.

C. Install and Furnish comminutor and control panel.

D. Install gantry crane for future maintenance.

E. Restore all work areas and test, start-up and train personnel on new system modifications.

1.08 OWNER OCCUPANCY

A. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

1.09 WORK BY OTHERS

A. The Contractor is advised that work by others may take place during the duration of the contract time. It shall be the Contractor's responsibility to coordinate and schedule all Work as not to delay or hinder his work or operations of lift station.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

Attachment J

SECTION 01015

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for miscellaneous provisions applicable to the Work.

1.02 RELATED SECTIONS

A. Section 01090 - References

B. Section 01310 – Construction Schedules

C. Section 01340 – Shop Drawings, Working Drawings and Samples

D. Section 01531 – Protection of Existing Property

E. Section 01720 – Project Record Documents

F. Other Sections as applicable.

1.03 TERMINOLOGY

A. Throughout the Contract Documents, the following definitions apply:

1. Owner- The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

2. Work- The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services and documentation necessary to produce such construction, and furnishing, installing and incorporating all materials and equipment into such construction, all as required by the Contract documents.

1.04 SAFETY

A. All work shall be done in a safe manner and in strict compliance with all requirements of the Federal Occupational Safety and Health Act (OSHA), The Florida Trench Safety Act and all other State and local safety and health regulations.

B. The Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due. Failure of the Owner to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibilities.

C. The Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger signs and warning lights for the protection of the public.

1.05 APPLICABLE CODES

A. The Contractor shall comply with the applicable standards codes and specifications governing the Contract Documents whether City, County, State or Federal. The Contractor is obligated to notify the Owner and Engineer of any deficiency contained in the Contract Documents immediately upon discovery. Where conflicts exist in such, the more stringent shall govern.

1.06 APPLICABLE PERMITS AND LICENSES

A. The Contractor shall abide by all permit conditions, whether, general, specific, limited or otherwise. A copy of all applicable permits and licenses, with the exception of City permits obtained by the Contractor, are attached hereto and made a part of the Contract Documents.

1.07 PUBLIC BID DISCLOSURE ACT 218.80 FS

A. All the local governmental entity permits or fees are to be disclosed, including, but not limited to, all license fees, permit fees, impact fees, or inspection fees, payable by the contractor to the unit of government that issued the bidding documents or other governmental agency,

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION RESPONSIBILITIES

A. Upon receipt of the Notice To Proceed, the Contractor shall arrange for a Pre-Construction meeting. The meeting shall be held with a minimum of one weeks' notice and shall include the Engineer, the Owner, and Representatives for all affected utility companies.

3.02 TEMPORARY UTILITIES

A. The Contractor shall be responsible to arrange for and supply all temporary utilities including, but not limited to, water, sewer, and electricity.

B. The cost of temporary utilities shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.03 UNDERGROUND LOCATING SERVICE

A. Prior to underground construction, the Contractor is required by the Underground Facility Damage Prevention and Safety Act, Chapter 556 FS to contact Sunshine 811, for the location of underground utilities.

3.04 HURRICANE PREPAREDNESS PLAN

A. Should the Performance of the work occur during Hurricane Season, within thirty 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 that the contractor proposes to perform at no additional cost to the owner in case of a hurricane warning. The plan shall detail these measures with specific action items defining responsible personnel.

3.05 INCLEMENT WEATHER

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

3.06 ADVANCE INVESTIGATIONS

A. The Contractor shall be responsible for uncovering and exposing existing utilities sufficiently in advance of pipe laying operations to confirm elevation, size, material and clearance separation(s). If, upon excavation, an existing utility is found to be in conflict with the proposed construction or be of a size or material different from what is shown on the plans, the Contractor shall immediately notify the Engineer, who will in turn prepare a recommendation. Failure of the Contractor to perform advance investigations shall not relieve it of any claims for delay or damages.

3.07 PRESERVATION AND RESTORATION

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this project. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

3.08 PROTECTION OF WORK AND MATERIAL

A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.

B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the CITY.

3.09 CONTRACTOR USE OF PREMISES

A. Contractor shall have limited use of the premises for construction operations, including limited use of the site. The Contractor's use of the premises is further limited to the Owner's right to perform construction operations with its own forces or to employ separate Contractors on portions of the project.

B. The Contractor shall be responsible for coordinating his daily activities in conjunction with any Contractors presently working within the vicinity of this project.

C. Confine operations to areas within rights-of-way and easements.

D. Keep existing driveways and entrances serving the premises clear and available to the Owner, Residents and the Owner's employees at all times.

1. Do not use these areas for parking or storage of materials.

2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

3.10 DISPOSAL

A. Do not dispose of any unsuitable fill, hazardous or organic material onsite. All such material shall be disposed of in a legal manner by the Contractor, the cost of which shall be included in the Bid.

3.11 ENVIRONMENTAL PROTECTION

A. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.

3.12 MATERIAL AND EQUIPMENT

A. Substitutions: After Bidding period, up to 30 days after date of Notice to Proceed, the Engineer will consider written requests from Contractor for proposed substitutions of products. Subsequent requests will be considered only in case of product unavailability or other condition beyond control of the Contractor. Submit a separate request for each proposed substitution;

1. Do not order or install substitute products without written acceptance from the Engineer of Record.

2. Do not imply or indicate substitutions on shop drawings or product data submittals without a separate formal request.

3. Engineer will determine acceptability of substitution in accordance with the bid documents.

4. Only one request for substitution for each product will be considered. If not accepted, Contractor shall provide specified product.

B. Product selection is governed by the Contract Documents and governing regulations, not by previous project experience.

1. Where a single or multiple products or manufacturers are named, provide one of the products indicated or submit a request for substitution for any product or manufacturer not named unless no substitution is permitted.

2. Where the Specifications only require compliance with performance requirements, an imposed code, standard or regulation, select a product that complies with the requirements, standards, codes or regulations specified.

3. Manufacturers named in a Specification section are those manufacturers considered capable of manufacturing products conforming to the specified requirements. The naming of a particular manufacturer does not imply acceptance or approval of just any standard product of that manufacturer.

3.13 ADJUSTMENT OF EXISTING UTILITIES

A. The Contractor shall raise or lower all manholes, valve boxes, etc. to finished grade. The cost of these adjustments shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.14 EXISTING IRRIGATION

A. All existing irrigation systems within the area of the Work shall be restored to original condition or better and adjusted to finished grade. The cost of repairs and/or adjustment to existing irrigation shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.15 DEWATERING

A. In accordance with SFWMD criteria contained in 40E-2.061 F.A.C., a dewatering permit is not required provided the following provisions are met:

1. Maximum daily pumpage is less than 5 million gallons (MG) and a maximum total project pumpage of less than 100 MG over a one year period;
2. All discharge shall remain on the project site;
3. No dewatering shall occur to a depth below elevation 0.0 feet NGVD within 1,000 feet of saline water, except when dewatering water with a chloride concentration of greater than 1,000 milligrams per liter;
4. No dewatering shall occur within 100 feet of a wastewater treatment plant rapid-rate land application system permitted under Part IV of Chapter 62-610, F.A.C.;
5. No dewatering shall occur within 1,000 feet of a known landfill or contamination; and,
6. No dewatering shall occur within 1,000 feet of a freshwater wetland unless dewatering activities are completed within 60 days.
7. All dewatering operations are subject to the Permit Conditions in Section 5.0 of the SFWMD APPLICANT'S HANDBOOK FOR WATER USE PERMIT APPLICATIONS (07-16-2014), including responsibility for mitigating any harm that may occur as a result of the dewatering to existing legal uses, off-site land uses, or natural resources.

B. The Contractor shall apply for a dewatering permit through the SFWMD if any of the above conditions cannot be met.

3.16 DEMOLITION

A. Limits of demolition which may be shown in the Contract Documents are general in nature. Actual limits of demolition shall be as determined by the field conditions in conformance with the requirements of the Work.

B. All sidewalks within the limits of construction which are not ADA compliant (cross-slopes which exceed 2% and/or running slopes which exceed 5% and/or changes in level of ¼" or greater) shall be demolished and reconstructed to meet these requirements.

C. When sidewalk tie-ins exist outside the limits of construction which are not ADA compliant, the Contractor shall replace those sections as directed by the Owner.

END OF SECTION

Attachment J

SECTION 01021

OWNER CONTINGENCY ALLOWANCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for administrative procedures for the Contractors utilization of monetary amounts for Owner contingency allowances when contained in the Contract Sum or Total Base Bid.

B. The Contractor has included in the Contract Price all Allowances so named in the Contract Documents and Shall cause the Works so covered to be performed for such sums and by such person or entities as may be acceptable to Owner and Engineer.

C. The contractor agrees that an Allowance, if any, is for the sole use of Owner to cover unanticipated or undetermined costs.

D. All owner Allowances which remain unused, in whole or in part, remain the property of the Owner.

1.02 RELATED SECTIONS

A. Section 00310 - Bid Form.

B. Section 01025 – Measurement and Payment.

C. Section 01152 – Application for Payment

D. Section 01310 - Construction Schedules.

E. Section 01340 – Shop Drawings, Working Drawings and Samples

F. Other Sections as Applicable.

1.03 SCHEDULE OF ALLOWANCES

A. Refer to Bid Form.

1.04 PROCEDURES FOR ADMINISTRATION OF ALLOWANCES.

A. Funds will only be drawn from Owner contingency allowances by Change Order.

B. Costs shall be as represented in the Unit Price Schedule or Unit Price Bid Form.

C. Payment shall be as represented in Section 01025 – Measurement for Payment.

1.05 COST INCLUDED IN PERMITTING ALLOWANCES

A. Cost of the permit application fee determined by the agency at the time of the Contractor's submittal. All other costs associated with obtaining the required permits shall be the responsibility of the Contractor.

1.06 COSTS INCLUDED IN ALLOWANCES

A. Cost of product to Contractor, less applicable trade discounts.

B. Delivery to site, products handling at site, including unloading, uncrating, and storage.

C. Applicable taxes unless covered by Owner Furnished Equipment clause.

D. Protection of products from elements and from damage.

E. Labor, insurance, payroll, bonding, equipment rental and installation and finishing, except when installation is specified as part of allowance.

F. Other expenses required to complete installation.

G. Contractor field and home office overhead and profit.

1.07 CONTRACTOR RESPONSIBILITIES

A. Promptly notify Engineer of any reasonable objections from supplier.

B. On notification of selection, execute purchase agreement with designated supplier.

C. Arrange for process shop drawings, product data, and samples.

D. Arrange for delivery. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

E. Install, adjust, and finish products.

F. Provide warranties for products and installation.

1.08 CORRELATION WITH CONTRACTOR SUBMITTALS

A. Schedule shop drawings, product data, samples, and delivery dates, in Progress Schedule for products selected under allowances.

1.09 PRODUCTS (NOT USED)

1.10 EXECUTION (NOT USED)

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes administrative and procedural requirements for determining Work completed under the unit price contract.

1.02 RELATED SECTIONS

A. Section 00300 – Bid Form

B. Section 01030 – Special Project Procedures

C. Section 01152 – Applications for Payment

D. Section 01370 – Schedule of Values

E. Other Sections as applicable.

1.03 REFERENCE STANDARDS

A. Manual of Uniform Traffic Control Devices (MUTCD)

B. FDOT Standard Specification for Road and Bridge Construction (Standard Specifications)

C. FDOT Design Standards for Design, Construction, Maintenance and Utility Operations in the State Highway System (Standard Indexes)

D. Broward County Public Works and Transportation Department, Highway Construction and Engineering Division Minimum Standards

1.04 GENERAL REQUIREMENTS

A. Prices shall include all costs required for the completed, in-place construction of the specified unit of work. This may include but not be limited to, materials and delivery; cost of installation; incidentals; labor including social security, insurance, and other required fringe benefits; workman's compensation insurance; bond premiums; rental of equipment and machinery; taxes; testing; surveys; incidental expenses; and supervision.

B. Installation, acceptance and payment shall be in accordance with the REFERENCE STANDARDS.

C. The Owner reserves the right to reject the Contractor's measurement of completed work that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

D. Contract Sum adjustments will be by Change Order on basis of net accumulative change for each unit price category.

E. Except as otherwise specified, unit prices shall apply to both deductive and additive variations of quantities.

F. Lump sum and unit prices in the Agreement shall remain in effect until date of final completion of the entire Work.

G. Partial payment for material and equipment properly stored and protected will be made in accordance with requirements of the General Conditions.

H. No separate payment will be made for Record Drawings.

I. Abbreviations:

1. Acre - AC
2. Allowance - AL
3. Cubic Yard - CY
4. Each - EA
5. Furnish and Install - F & I
6. Gallons - GA
7. Gross Mile - GM
8. Linear Feet – LF
9. Lump Sum - LS
10. Million Gallons – MG
11. Net Mile - NM
12. Square Foot – SF
13. Square Yard – SY
14. Ton - TN

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 MEASUREMENT AND PAYMENT

A. Payment shall constitute full compensation and will be made as indicated in the RELATED SECTIONS.

B. The Contractor shall submit a Schedule of Values for Engineer approval in accordance with Section 01370 prior to the first Application for Payment.

C. The quantity approved for payment shall be either:

1. Percentage of the Lump Sum price - A percentage of the lump sum price equivalent to the percentage of the project completion as determined by the Engineer as of the date of the pay request submitted. The percent completion of the project shall be based on the percent of the total project actually constructed and not on the percent of the Contract price completed.

2. Measured Quantities - The actual quantities in-place and accepted as measured by the Engineer on the date of the pay request submitted in the units specified in the bid form or schedule of values.

3.02 PROTECTION

A. Where pavement, pipes, valves, appurtenances, trees, shrubbery, fences, other property, or structures are in proximity to the WORK, adequate protection shall be provided. Such protection is considered incidental to construction and shall not be assigned to any pay item.

3.03 RESTORATION

A. Where pavement, pipes, valves, structures, appurtenances, trees, shrubbery, fences, other property or structures not designated as pay items, have been damaged, removed or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the Contract Documents, state laws, municipal ordinances or the specific direction of the Engineer, or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the Contractor to a condition equal to that before work began within a time frame approved by the Engineer. Such restoration is considered incidental to construction and shall not be assigned to any pay item.

3.04 BID ITEM NO.1: MOBILIZATION AND DEMOBILIZATION

A. Payment shall be made as percentage of the Lump Sum Price.

B. The Lump sum Price shall include but not limited to compensation for all labor, materials, equipment, and all other incidents required for all temporary facilities, transportation, communications, office, maintenance and other pre- or post-construction expenses necessary for the start or cessation of the work at Master Lift Station No. 4 (MLS#4).

C. The lump sum price shall exclude the cost for construction material and installation.

D. No further payment shall be made for remobilization unless all of the work is suspended by the Engineer for a period in excess of three months and through no fault to the Contractor.

E. The lump sum price shall not exceed five percent (5%) of the contract price.

3.05 BID ITEM NO.2: COMMINUTOR

A. The Lump Sum price shall include but not limited to demolition, installation, successful testing, and operation associated with the Installation of Comminutor at MLS#4. This item shall include but not limited to permitting, site preparation, demolition, installation, electrical control, coordination with Owner's Operations, and commissioning, submittals and manufacturer's services for the Comminutor at MLS#4.

3.06 BID ITEM NO.3: STRUCTURAL MODIFICATIONS

A. The Lump Sum price shall include but not limited to all work for the demolition of the Lintel, installation of access hatches and access doors, successful testing, provide maintenance gantry crane and operation associated with the Comminutor at MLS#4.

This item shall include but not limited to permitting, site preparation, inspections, approvals, repair or replace all defective work, electrical control, coordination with Owner's Operations, Startup and commissioning, submittals, and manufacturer's services for the Comminutor at MLS#4.

3.07 BID ITEM NO.4: TEMPORARY FACILITIES

A. The Lump sum Price shall include but not limited to the installation of temporary facilities which will be operational all the time.

B. The contractor is responsible for being on-site, identifying, and discussing with City employee all necessary temporary facilities before submitting a bid for the project.

3.08 BID ITEM NO.5: STARTUP AND TESTING

A. The Lump sum Price shall include but not be limited to providing startup and testing of the Comminutor after the installation at MLS#4.

B. Contractor shall be responsible for ensuring replacement equipment meets or exceeds the design standards set by the previous equipment.

C. The contractor is required to provide two weeks of support once the project progresses following installation.

END OF SECTION

SECTION 01090

REFERENCES

PART 1 - GENERAL

1.01 DESCRIPTION

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

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

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the specifications, all work specified herein shall conform to or exceed the requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications nor the applicable codes.

B. References herein to "Building Code" or “Code” shall mean the Florida Building Code. The latest edition of the code as approved and used at the local agency having jurisdiction, shall apply to the WORK herein, including, all addenda, modifications, amendments, or other lawful changes thereto.

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

D. Applicable Standard Specifications: The CONTRACTOR shall construct the WORK specified herein in accordance with the requirements of the Contract Documents and

the referenced portion of those referenced codes, standards, and specifications listed herein; except, that wherever references to "Standard Specifications" are made, the provisions therein for measurement and payment shall not apply.

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

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

1.03 TRADE NAMES AND ALTERNATIVES

A. For convenience in designation in the Contract Documents, materials to be incorporated in the WORK may be designated under a trade name or the name of a manufacturer and its catalog information. The use of alternative material which is equal in quality and of the required characteristics for the purpose intended will be permitted, subject to the following requirements:

1. The burden of proof as to the quality and suitability of such alternative equipment, products, or other materials shall be upon the CONTRACTOR.

2. The ENGINEER will be the sole judge as to the comparative quality and suitability of such alternative equipment, products, or other materials and its decisions shall be final.

3. Base Bid requirements outlined in the Supplement to Bid Form, shall supersede any language contained hereinafter.

B. Whenever in the Contract Documents the name or the name and address of the manufacturer or distributor is given for a product or other material, or if any other source of a product or material is indicated therefore, such information is given for the convenience of the CONTRACTOR only, and no limit, restriction, or direction is indicated or intended thereby, nor is the accuracy or reliability of such information guaranteed. It shall be the responsibility of the CONTRACTOR to determine the accurate identity and location of any such manufacturer, distributor, or other source of any product or material called for in the Contract Documents.

C. The CONTRACTOR may offer any material, process, or equipment which it considers equivalent to that indicated. Unless otherwise authorized in writing by the ENGINEER, the substantiation of offers of equivalency must be submitted within 30 days after execution of the Agreement. The CONTRACTOR, at its sole expense, shall furnish data concerning items it has offered as equivalent to those specified. The CONTRACTOR shall have the material as required by the ENGINEER to determine that the quality, strength, physical, chemical, or other characteristics, including durability, finish, efficiency, dimensions, service, and suitability are such that the items will fulfill its intended function. Installation and use of a substitute item shall not be made until accepted by the ENGINEER. If a substitute offered by the CONTRACTOR is found to be not equal to the specified material, the CONTRACTOR shall furnish and install the specified material.

D. The CONTRACTOR'S attention is further directed to the requirement that failure to submit data substantiating a request for the substitution of an "or equal" item within said 30-day period after the execution of the Agreement, shall be deemed to mean that the CONTRACTOR intends to furnish one of the specific brand-named products named in the specification, and the CONTRACTOR does hereby waive all rights to offer or use substitute products in each such case. Wherever a proposed substitute product has not been submitted within said 30-day period, or wherever the submission of a proposed substitute product fails to meet the requirements of the specifications and an acceptable resubmittal is not received by the ENGINEER within said 30-day period, the CONTRACTOR shall furnish only one of the products originally-named in the Contract Documents.

1.04 ABBREVIATION

A. Wherever in these specifications references are made to the standards, specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronyms or abbreviation only. As a guide to the user of these specifications, the following acronyms and abbreviations which may appear in these specifications shall have the meanings indicated herein.

1.05 ABBREVIATIONS AND ACRONYMS

A. Abbreviations and acronyms contained in the Contract Documents may include, but not be limited to, the following:

AAMA	Architectural Aluminum Manufacturer's Association
AAR	Association of American Railroads
AASHTO	American Association of the State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
ACPPA	American Concrete Pressure Pipe Association
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturer's Association
AHAM	Association of Home Appliance Manufacturers

AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association
ANS	American Nuclear Society
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASA	Acoustical Society of America
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association

AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturers Association
CBM	Certified Ballast Manufacturers
CEMA	Conveyors Equipment Manufacturers Association
CGA	Compressed Gas Association
CLPCA	California Lathing and Plastering Contractors Association
CLFMI	Chain Link Fence Manufacturers Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DCDMA	Diamond Core Drill Manufacturers Association
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
HI	Hydraulic Institute
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IME	Institute of Makers of Explosives
IP	Institute of Petroleum (London)

IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MBMA	Metal Building Manufacturers Association
MPTA	Mechanical Power Transmission Association
MTI	Marine Testing Institute
NAAM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NCCLS	National Committee for Clinical Laboratory Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NGLI	National Grease Lubricating Institute
NMA	National Microfilm Association
NRCA	National Roofing Contractors Association
NWMA	National Woodwork Manufacturers Association
NWWA	National Water Well Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast Concrete Institute

PDI	Plumbing and Drainage Institute
RIS	Redwood Inspection Service
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturers Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SBC	Southern Building Code Congress International, Inc. (SBCCI)
SIS	Swedish Standards Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPR	Simplified Practice Recommendation
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
TAPPI	Technical Association of the Pulp and Paper Industry
TFI	The Fertilizer Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USGS	United States Geological Survey
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WIC	Woodwork Institute of California

WPCF	Water Pollution Control Federation
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01152

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Submit Applications for Payment to the Engineer in accordance with the schedule established by Conditions of the Agreement between Owner and Contractor and the Contract Documents.

1.02 RELATED SECTIONS

A. Section 01050 - Field Engineering

B. Section 01310 - Construction Schedules

C. Section 01370 - Schedule of Values

D. Section 01380 - Construction Photographs

E. Section 01700 - Contract Close Out

F. Section 01720 - Project Record Documents

1.03 FORMAT AND DATA REQUIRED

A. Submit applications typed on forms provided by the Owner (or forms provided by Contractor and agreed to by Owner), Application for Payment, with itemized data typed on 8 1/2 inch x 14 inch white paper and continuation sheets.

B. Payment forms shall show significant detail to substantiate request. Additional detail may be required by the Engineer.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of scheduled component items of work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.

a. Round off values to nearest dollar, or as specified.

3. List each Change Order Number, and description, as for an original component item or work.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information, with a cover letter identifying:

1. Project
2. Application number and date
3. Detailed list of enclosures
4. For stored products:
    a. Item number and identification as shown on application.
    b. Description of specific material.
    c. Copy of material invoice.
    d. Address of location where item is stored
    e. Photographs of item (if requested)

B. Submit one copy of data cover letter for each copy of application.

C. As a prerequisite for payment, Contractor is to submit the following:

1. a "Surety Acknowledgment of Payment Request" letter showing amount of progress payment which the Contractor is requesting,
2. updated record drawings for review by the Engineer,
3. updated construction schedule for review by the Engineer,
4. construction photographs.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Provide FINAL COMPLETION documentation for the final statement of accounting as specified in Section 01700 - Contract Closeout.

C. Submit final record drawings.

1.07 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the Engineer at the times stipulated in the Agreement.

B. Number: Five copies of each Application.

C. When the Engineer finds Application properly completed and correct, he will transmit certificate of payment to Owner, with copy to Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Engineer shall schedule and administer preconstruction meetings, periodic progress meetings, and specially called meetings throughout the progress of work. The Engineer shall:

1. Prepare agenda for meetings.
2. Make physical arrangements for meetings.
3. Preside at meetings.
4. Record in writing the minutes; include significant proceedings and decisions.
5. Record the meeting with an audio recording device.
6. Reproduce and distribute copies of minutes within five working days after each meeting:
    a. To participants in the meeting.
    b. To parties affected by decisions made at the meeting.

B. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. The Contractor shall attend meetings to ascertain that work is executed consistent with Contract Documents and construction schedules.

1.02 RELATED SECTIONS

A. Document 00100 - Instructions to Bidders.

B. Section 01310 - Construction Schedules.

C. Section 01340 - Shop Drawings, Working Drawings, and Samples.

D. Section 01720 - Project Record Documents.

E. Other Sections as applicable.

1.03 PRECONSTRUCTION MEETING

A. Schedule a preconstruction meeting no later than 15 days after date of Notice to Proceed.

B. Location: A central site, convenient for all parties designated by the Owner.

C. Attendance:

1. Owner's Representative.

2. Engineer and his Professional Consultants.
3. Resident Project Representative.
4. Contractor's Superintendent.
5. Major Subcontractors.
6. Major Suppliers.
7. Utilities.
8. Others as appropriate.

D. Suggested Agenda:

1. Distribution and discussion of:
   a. List of major subcontractors and suppliers.
   b. Projected Construction Schedule.
2. Critical work sequencing/critical path scheduling.
3. Major equipment deliveries and priorities.
4. Project Coordination.
   a. Designation of responsible personnel.
5. Procedures and processing of:
   a. Field decisions.
   b. Proposal requests.
   c. Submittals.
   d. Change Orders.
   e. Applications for Payments.
6. Adequacy of Distribution of Contract Documents.
7. Procedures for maintaining Record Documents.
8. Use of Premises:
   a. Office, Work and Storage Areas.
   b. Owner's Requirements.
9. Construction facilities, controls and construction aids.
10. Temporary Utilities.

1.04 PROGRESS MEETINGS

A. Schedule regular periodic meetings. The progress meetings will be held as required by progress of the work.

B. Hold called meetings as required by progress of the work.

C. Location of the meetings: Project field office of the Contractor or Engineer.

D. Attendance:

1. Engineer, and his professional consultants as needed.
2. Subcontractors as appropriate to the agenda.
3. Suppliers as appropriate to the agenda.
4. Others as appropriate.

E. Suggested Agenda:

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems and conflicts.
4. Problems which impede Construction Schedule.
5. Review of off site fabrication, delivery schedule.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Pending changes and substitutions.
13. Review proposed changes for:
    a. Effect on Construction Schedule and on a completion date.
    b. Effect on other contracts of the Project.
14. Other business.
15. Construction schedule.
16. Critical/long lead items.

F. The Contractor is to attend progress meetings and is to study previous meeting minutes and current agenda items, in order to be prepared to discuss pertinent topics such as deliveries of materials and equipment, progress of work, etc.

G. The Contractor is to provide a current submittal log at each progress meeting in accordance with Section 01340.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

Attachment J

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Promptly after Award of the Contract and within ten days after the effective date of the Agreement, prepare and submit to the Engineer an estimated construction progress schedules for the work, with sub-schedules of related activities which are essential to its progress.

B. Submit revised progress schedules on a monthly basis.

C. No partial payments shall be approved by the Engineer until there is an approved up to date construction progress schedule on hand.

D. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor's schedule.

1.02 RELATED SECTIONS

A. Document 00700 – General Conditions of the Construction Contract

B. Section 01010 - Summary of Work

C. Section 01152 - Applications for Payment

D. Section 01200 - Project Meetings

E. Section 01340 - Shop Drawings, Working Drawings and Samples

F. Other Sections as applicable.

1.03 FORM OF SCHEDULES

A. Prepare schedules for submittal each month with pay request. The form of the schedule is to be Microsoft Project or approved equal. The Schedule is to indicate work completed to date and additions to or deletions from the schedule.

1. Provide separate horizontal bar for each trade or operation within each structure or item.

2. Horizontal time scale: In weeks from start of construction and identify the first work day of each month.

3. Scale and spacing: To allow space for notations and future revisions.

B. Format of listings: The chronological order of the start of each item of work for each structure.

C. Identification of listings: By major specification section numbers as applicable and structure.

1.04 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity.

2. Show the dates for the beginning of, and completion of, each major element of construction in no more than a two week increment scale. Specifically list, but not limited to:

a. Receiving Materials

b. Pipeline Installations

c. Testing

d. Restoration

e. Startup

f. Record Drawings

g. Permit Close-out

h. Punch List

i. Owner Activities, Including Inspections

1. Show projected percentage of completion for each item, as of the first of each month.

2. Show projected dollar cash flow requirements for each month of construction.

3. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of the Owner and Contractor.

4. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends work beyond contract completion date.

5. If the Contractor provides an accepted schedule with an early completion date, the Owner reserves the right to reduce the duration of the work to match

the early completion date by issuing a deductive Change Order at no change in Contract Price.

B. Submittal Schedule for Shop Drawings and Samples in accordance with Section 01340. Must show:

1. The dates for Contractor's submittals.
2. The dates submittals will be required for owner furnished products, if applicable.
3. The dates approved submittals will be required from the Engineer.
4. A list of all long lead items (equipment, materials, etc).

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

1. Major changes in scope.
2. Activities modified since previous submission.
3. Revised projections of progress and completion.
4. Other identifiable changes.

C. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.
2. Corrective action recommended, and its effect.
3. The effect of changes on schedules of other prime contractors.

1.06 SUBMISSIONS

A. Submit initial schedules to the Engineer within 10 days after the effective date of the Agreement.

1. The Engineer will review schedules and return review copy within 21 days after receipt.
2. If required, resubmit within 7 days after return of review copy.

B. Submit a minimum of five (5) copies of revised monthly progress schedules with that month's application for payment.

1.07 DISTRIBUTION

A. Distribute copies of reviewed schedules to:

1. Owner (Two copies)
2. Engineer (Two copies)
3. Job Site File (One copy)

4. Subcontractors (As needed)

5. Other Concerned Parties (As needed)

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01340

SHOP DRAWINGS, WORKING DRAWINGS AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

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

B. The Contractor shall submit five (5) copies of shop drawings or other data to the Engineer.

C. Within thirty (30) calendar days after the effective date of the Agreement, the Contractor shall submit to the Engineer a complete list of preliminary data for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specific items. Review of this list by the Engineer shall in no way expressed or implied relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Specifications. This procedure is required in order to expedite final review of Shop Drawings.

D. The contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and Engineer. This log should include the following items:

1. Submittal-Description and Number assigned.
2. Date to Engineer.
3. Date returned to Contractor (from Engineer).
4. Status of Submittal (Approved/Resubmit/Rejected).
5. Date of Resubmittal and Return (as applicable).
6. Date material released (for fabrication).
7. Projected date of fabrication.
8. Projected date of delivery to site.
9. Status of O & M submittal.

1.02 RELATED SECTIONS

A. Section 01310 - Construction Schedules

B. Section 01720 - Project Record Documents

C. Section 01730 - Operating and Maintenance Data

D. Other Sections as applicable.

1.03 CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents.

B. Determine and verify:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance and Specifications

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

D. Designate in the construction schedule, or in a separate coordinated schedule, the dates for submission and the dates that reviewed Shop Drawings, Working Drawings and Samples will be needed.

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

F. The Contractor shall submit to the Engineer all shop drawings, working drawings and samples sufficiently in advance of construction requirements and shall account for Engineers Shop Drawing review time accordingly.

G. The Contractor shall submit two (2) copies of descriptive or product data submittals to complement shop drawings for the Engineer plus the number of copies which the Contractor requires. The Engineer will retain two (2) sets. All blueprint shop drawings shall be submitted with one (1) set of reproducible and four (4) sets of print. The Engineer will review the drawings and return to the Contractor the set of marked-up drawings with appropriate review comments.

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

1.04 ENGINEER'S REVIEW OF SHOP DRAWINGS

A. The Engineer's review of drawings, data and samples submitted by the Contractor will cover only general conformity to the Specifications, external connections, and dimensions which affect the installation. The Engineer's review and exception if any, will not constitute an approval of dimensions, quantities, and details of the material, equipment, device, or item shown.

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

1. as permitting any departure from the Contract requirements;

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

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

C. If the drawings or schedule as submitted describe variations and/or show a departure from the Contract requirements which Engineers finds to be in the interest of the Owner and to be minor as not to involve a change in the Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. When reviewed by the Engineer, each of the Shop Drawings will be identified as having received such review being so stamped and dated. Shop Drawings stamped "REJECTED" and with required corrections shown will be returned to the Contractor for correction and resubmittal.

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

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

G. The Engineer will review one submittal and one re-submittal after which cost of review will be borne by the Contractor. The cost of engineering shall be equal to the Engineer's charges to the Owner under the terms of the Engineer's agreement with the Owner.

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

I. No partial submittals will be reviewed. Submittals not complete will be returned to the Contractor, and will not be considered "Rejected" until resubmitted.

J. The Engineer shall return Shop Drawing submittals to the Contractor within twenty-one (21) days calendar days from the date the Engineer receives them.

1.05 SHOP DRAWINGS

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

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

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

1. Number and title of the drawing.
2. Date of drawing or revision.
3. Name of project building or facility.
4. Name of contractor and subcontractor submitting drawing.
5. Clear identification of contents and location of work.
6. Specification title and number.

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

E. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

F. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, address and telephone number of the manufacturer's representative and service company so that service and spare parts can be readily obtained. In addition, a maintenance and lubrication schedule for each piece of equipment shall be submitted along with each shop drawing submittal.

G. All manufacturers or equipment supplier who proposes to furnish equipment or products under Divisions 11, 12, 13, 14, 15 and 16 shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include

at least five installations where identical equipment has been installed and has been in operation for a period of at least five (5) years.

H. Only the Engineer will utilize the color "red" in marking Shop Drawing submittals.

I. Before final payment is made, the Contractor shall furnish to Engineer two (2) sets of record shop drawings all clearly revised, complete and up to date showing the permanent construction as actually made for all reinforcing and structural steel, miscellaneous metals, process and mechanical equipment, piping, electrical system and instrumentation system.

1.06 WORKING DRAWINGS

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

B. Copies of working drawings as noted in subparagraph 1.06A above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for work.

C. Working drawings shall be signed by a Registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. The Contractor assumes all risks of error; the Owner and Engineer shall have no responsibility therefore.

1.07 SAMPLES

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

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

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

2. Full range of color, texture and pattern.

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

C. Each sample shall have a label indicating

1. Name of Project
2. Name of Contractor and Subcontractor
3. Material or Equipment Represented
4. Place of Origin
5. Name of Producer and Brand (if any)
6. Location in Project

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

D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required in subparagraph 1.07B above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Submit to the Engineer a Schedule of Values allocated to the various portions of the Work, within 14 days after the effective date of the Agreement.

B. Upon request of the Engineer, support the values with data which will substantiate their correctness.

C. The Schedule of Values shall be used as the basis for the Contractor's Applications for Payment.

1.02 RELATED SECTIONS

A. Section 01152 - Applications for Payment

B. Other Sections as applicable.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Present schedule on an 8-1/2 inch x 11 inch white paper; Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of Project and location
2. Engineer and Project number
3. Name and Address of Contractor
4. Contract designation
5. Date of submission

B. Schedule shall list the installed value of the component parts to include individual equipment, piping, electrical, paving, of the Work (as required) in sufficient detail to serve as a basis for computing values for progress payments during construction and for additions and deletions to the Work.

C. For the various portions of the Work:

1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.

D. The sum of all values listed in the schedule shall equal the total Contract Sum.

E. Schedules are subject to Engineer's approval wherein additional line item detail may be required.

1.04 ENGINEERS APPROVAL

A. The schedule of Values is subjected to the Engineer’s approval.

1. Additional line item detail may be required.

2. Supporting information may be required.
3. Additional comparison trade bids may be required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - PRODUCTS (NOT USED)

END OF SECTION

SECTION 01510

Error! Bookmark not defined.TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish, install, and maintain temporary utilities required for construction, remove on completion of work.

B. Pay all fees associated with temporary utilities including water consumption charges.

1.02 RELATED SECTIONS

A. Section 01010: Summary of Work

B. Other Sections as applicable.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electric Code.

B. Comply with Federal, State and Local codes and regulations and with utility company requirements.

C. Comply with County Health Department and Environmental Regulations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials may be new or used but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with utility company, provide service required for power and lighting, and pay all costs for service and for power used in the construction, testing and trial operation prior to final acceptance of the work by the Owner.

B. Install circuit and branch wiring, with the area distribution boxes located so that power and lighting is available throughout the construction by the use of construction type power cords.

C. Provide adequate artificial lighting for all areas of work when natural light is not adequate to work, and all areas accessible to the public.

2.03 TEMPORARY WATER

A. Arrange with the CITY to provide water for construction purposes.

B. Install branch piping with taps located so that water is available throughout the construction by the use of hoses.

C. C. Install at each and every connection to the Owner water supply a backflow preventer meeting the requirements of ANSI A40.6 and AWWA C511. Contractor shall be required to meter and pay for all water used.

2.04 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities in compliance with laws and regulations.

B. Service, clean and maintain facilities and enclosures.

PART 3 - EXECUTION

3.01 GENERAL

A. Maintain and operate systems to assure continuous service.

B. Modify and extend systems as work progress requires.

3.02 REMOVAL

A. Completely remove temporary materials and equipment when their use is no longer required.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

C. Restore permanent facilities used for temporary services to specified condition.

END OF SECTION

SECTION 01531

PROTECTION OF EXISTING PROPERTY

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this project. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

B. In the event of any claims for damage or alleged damage to property as a result of work, the Contractor shall be responsible for all costs in connection with the settlement of or defense against such claims. Prior to commencement of work in the vicinity of property adjacent to the work site, the Contractor, at his own expense, shall take such surveys as may be necessary to establish the existing condition of the property. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained.

1.02 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Other Sections as applicable.

1.03 PRESERVATION AND RESTORATION

A. Contractor shall be responsible for the preservation and protection of property adjacent to the Work site against damage or injury as a result of this project. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

1.04 ADJACENT PROPERTY OWNER NOTIFICATION

A. The Contractor shall prepare a written Notice to Property owners adjacent to the project Work site notifying them of the schedule of work affecting them and anticipated inconveniences they may expect. The notice shall meet the approval of the Engineer and be delivered to property owners at least 72 hours prior to construction adjacent to their property. This notice shall indicate the work to be performed, the time it will take to perform the work, the time when the water service to the property owner will be disrupted.

1.05 BARRICADES, WARNING SIGNS AND LIGHTS

A. In addition to the requirements of Section 01570 – Traffic Regulation, the Contractor shall provide, erect and maintain as necessary, strong and suitable barricades, danger

signs and warning lights for the preservation and protection of property adjacent to the work site. All barricades and obstructions along public roads shall be illuminated at night and all lights for this purpose shall be kept burning from sunset to sunrise.

1.06 TREES AND LANDSCAPING PROTECTION

A. General: The Contractor shall exercise all necessary precautions so as not to damage or destroy any trees or landscaping in or near the project site, and shall not trim or remove any trees or landscaping unless such trees or landscaping have been approved for trimming or removal by the jurisdictional agency or owner. All existing trees or landscaping which are damaged during construction shall be replaced by the Contractor or a certified tree/landscaping company to the satisfaction of the owner.

B. Replacement: The Contractor shall immediately notify the jurisdictional agency or owner if any tree or landscaping is damaged by the Contractor's operations. If, in the opinion of the jurisdictional agency or owner, the damage is such that replacement is necessary, the Contractor shall replace the tree or landscaping at its own expense. The tree or landscaping shall be of a like size and variety as the tree or landscaping damaged, or, if of a smaller size, the Contractor shall pay any compensatory payment.

C. All permit fees associated with the removal and replacement of trees and landscaping damaged or destroyed shall be the responsibility of the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01550

SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 GENERAL

A. This section provides general specifications for the contractors' access to the site and limitations on storage or lay-down area.

1.02 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Other Sections as applicable.

1.03 HIGHWAY LIMITATIONS

A. The Contractor shall make his own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the work.

1.04 TEMPORARY ACCESS RESTORATION

A. All areas disturbed by the construction activities shall be restored to proper grade, cleaned up, including the removal of debris, trash, and deleterious materials..

B. Temporary restoration shall include all driveways, sidewalks and roadways. They shall be swept clean and be maintained free of dirt and dust

C. All construction materials, supplies, or equipment, including piles of debris shall be removed from the area.

D. All temporarily restored areas shall be maintained by the Contractor. These areas shall be kept clean and neat, free of dust and dirt, until final restoration operations are completed.

E. Temporary restoration shall be completed within five days of pipe installation or as specified.

F. The Contractor is responsible to utilize dust abatement operations in the temporarily restored areas as required, to the satisfaction of the Engineer.

G. Final restoration shall be completed within thirty days of pipe acceptance. Final restoration shall include the completion of all required pavement replacement of roadways, driveways, curbs, gutters, sidewalks and other existing improvements disturbed by the construction; final grading, placement of sod, pavement marking, etc., all complete and finished, acceptable to the Engineer.

H. In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw

cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with the adjacent undisturbed pavement.

1.05 CONTRACTOR'S WORK AND STORAGE AREA

A. Contractors on-site work and storage area plan shall be submitted for Owners approval no later than 30 days after NTP.

1. Owner approval of the work are and storage plan is required prior to commencement.

B. The Contractor shall make his own arrangements for any necessary off-site storage or shop areas necessary for the proper execution of the work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Material and equipment incorporated into the Work.

1. Conform to applicable specifications and standards.

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

3. Manufactured and Fabricated Products.

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

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

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

d. Products shall be suitable for service conditions.

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

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

1.02 RELATED SECTIONS

A. Section 01340: Shop Drawings, Product Data, and Samples

B. Section 01720: Project Record Documents

C. Other Sections as applicable.

1.03 APPROVAL OF MATERIALS

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

B. Within 30 days after the effective date of the Agreement, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications. The data shall comply with Paragraph 1.07 of this Section.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during progress of the work, the Contractor shall submit samples of materials for such

special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.

D. The Contractor shall submit data and samples sufficiently early to permit work. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of claim against the Owner or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.04 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

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

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

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

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

2. Do not proceed with work without clear instructions.

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

1.05 TRANSPORTATION AND HANDLING

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

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

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

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

1.06 STORAGE AND PROTECTION

A. The Contractor shall furnish a covered, weather-protected storage structure, providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, electrical and instrumentation equipment, and special equipment to be incorporated into this project. Storage of equipment shall be performed to allow easy

access and be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including weather/humidity protection, connection of heaters, placing of storage lubricants in equipment, blocking, or skid storage, etc. Corroded, damaged, or deteriorated equipment and parts shall be replaced before acceptance of the project.

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

1. Store products subject to damage by the elements in weather-tight enclosures.

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

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

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

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

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

E. Moving parts shall be rotated a minimum of once weekly to insure proper lubrications, and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half-load, once weekly, for an adequate period of time to insure that the equipment does not deteriorate from lack of use.

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

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

H. Contractor shall be responsible for protection after installation by providing substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations.

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

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

1.07 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Products List

1. Within 30 days after the effective date of the Agreement, submit to the Engineer a complete list of major products proposed to be used, with the name of the manufacturer and the installing subcontractor.

B. Contractor's Options

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

2. For Products specified by naming several products or manufacturers, select any one of the products or manufacturers named, which complies with the specifications, subject to the base bid procedures outlined under Document 00400 – Supplemental Bid Form.

3. For products specified by naming one or more Products or Manufacturers and an "or equal", the Contractor must submit a request for substitutions of any Product or Manufacturer not specifically named.

C. Substitutions

1. For a period of 30 days after the effective date of the Agreement, the Engineer will consider written requests from Contractor for substitution of Products.

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

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

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

c. Effect on the construction schedule

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

e. Any required license fees or royalties

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

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

4. No substitutions will be considered by the Engineer after 30 days from the Contract Date.

D. Contractor's Representation

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

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

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

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

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

E. The Engineer will review requests for substitutions with reasonable promptness, and notify Contractor, in writhing, of the decision to accept or reject the requested substitution.

1.08 SPECIAL TOOLS

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

1.09 STORAGE AND HANDLING OF EQUIPMENT ON SITE

A. Because of the long period allowed for construction, special attention shall be given to the storage and handling of equipment on site. As a minimum, the procedure outlined below shall be followed.

1. Equipment shall not be shipped until approved by the Engineer. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer, unless upon arrival it is to be stored as specified in Paragraph 1.06. Operation and maintenance data, as described in Paragraph 1.08 of Section 01730 shall be submitted to the Engineer for review prior to shipment of equipment.

2. All equipment having moving parts, such as gears, electric motors, etc. and/or instruments, shall be stored in a temperature and humidity

controlled building approved by the Engineer, until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.

4. Manufacturer's storage instructions shall be carefully studied by the Contractor and reviewed with the Engineer by him. These instructions shall be carefully followed and a written record of this kept by the Contractor.

5. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication, and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half-load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.

6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed, and lubricated prior to testing and start up, at no extra cost to the Owner.

7. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested, and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.10 WARRANTY

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in Section 01740.

1.11 SPARE PARTS

A. Spare parts for certain equipment provided under Division 11 through 16 have been specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the Engineer. In addition, the Contractor shall furnish to the Engineer an inventory listing all spare parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost.

1.12 LUBRICANTS

A. During testing and prior to acceptance, the Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

1.13 GREASE, OIL AND FUEL

A. All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended b the manufacturer with each item of the equipment supplied under Division 11 through 16.

B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three weeks of operation.

1.14 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other acceptable materials.

1.15 FASTENERS

A. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor. Bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. All bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be Type 316 stainless steel unless otherwise specifically indicated or specified.

C. Unless otherwise specified, stud, tap, and machine bolts shall be of the best quality refined bar iron. Hexagonal nuts of the same quality of metal as the bolts shall be used.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EQUIPMENT, TESTING, AND INSPECTION

A. Regardless of the number of days specified in the individual sections for the manufacturer’s representative to be present on the site for inspection and testing, if the equipment fails to perform as specified, then the representative shall remain on site until the malfunction is corrected.

B. The cost for the additional days shall not be added to the cost for the Owner, but shall be to the account of the contractor.

END OF SECTION

Attachment J

SECTION 01630

SUBSTITUTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish and install products specified and named in their respective Specifications or on the Drawings unless substitution is allowed by the requirements stated in this Section.

B. For products specified only by reference standard, select product meeting that standard, by any manufacturer.

C. For products specified by naming several products or manufacturers, select any one of those products and manufacturers names which complies with their respective Specifications.

D. For products specified by naming only one or more products or manufacturers and stating "or equal", submit a request as for substitutions, for any product or manufacturer which is not specifically named.

E. Requests for any substitutions not submitted in accordance with the instructions herein will be denied.

1.02 RELATED SECTIONS

A. Section 01340 – Shop Drawings, Working Drawings and Samples

B. The technical specifications related to the proposed substitution.

1.03 PRODUCTS LIST

A. Within 30 days after award of Contract, submit to Engineer five copies of complete list of major Products which are proposed for installation.

B. Tabulate Products by specification section number and title.

C. For products specified only by reference standards, list for each such Product:

1. Name and address of manufacturer.

2. Trade Name.

3. Model or catalog designation.

4. Manufacturer's data:

5. Reference standards.

6. Performance test data.

1.04 SUBSTITUTION SUBMITTAL REQUIREMENTS – “OR APPROVED EQUAL”

A. Within a period of 30 days after award of Contract, Engineer will consider formal requests from the Contractor for substitution of products in place of those specified.

B. After the end of that period, the request will be considered only in case of product unavailability or other conditions beyond the control of the Contractor.

C. Submit a separate request for each substitution. Support each request with:

1. Complete data substantiating compliance of the proposed substitution with requirements stated in the Contract Documents:

a. Product identification, including manufacturer's name and address.

b. Manufacturer's literature; identify:

1) Product description.

2) Reference standards.

3) Performance and test data.

c. Samples, as applicable.

d. Name and address of similar projects on which product has been used, and the date of each installation

2. Itemized comparison of the proposed substitution with product specified; List significant variations.

3. Data relating to changes in the construction schedule.

4. Any effect of the substitution on separate contracts.

5. List of changes required in other work or products.

6. Accurate cost data comparing proposed substitution with product specified.

7. Designation of required license fees or royalties.

8. Designation of availability of maintenance services, and sources of replacement materials.

D. Substitute products shall not be ordered or installed without written acceptance of Engineer.

E. Engineer will determine the acceptability of proposed substitutions.

1.05 SUBSTITUTIONS WILL NOT BE CONSIDERED FOR ACCEPTANCE WHEN:

A. They are indicated or implied on Shop Drawings or product data submittals without a formal request from Contractor.

B. The manufacture of the product substitution does not meet the Qualifications as stated in the specifications.

C. They are requested directly by a subcontractor or supplier.

D. No data is provided relating to changes in construction schedule.

E. There is any effect of substitution on separate contracts.

F. Changes are required in other work or products.

G. There is no accurate cost data comparing proposed substitution with product specified.

H. There are required license fees or royalties above and beyond the specified vendor.

I. Availability of maintenance services, sources of replacement materials does not equal that provided by the specified vendor.

J. Acceptance will require substantial revision of Contract Documents.

1.06 CONTRACTOR'S REPRESENTATION

A. In making formal request for substitution Contractor represents that:

1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.

2. He will provide the same warranties or bonds for substitution as for product specified.

3. He will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.

4. He waives claims for additional costs caused by substitution which may subsequently become apparent.

5. Cost data is complete and includes related costs under his Contract, but not:

a. Costs under separate contracts.

b. Engineer's costs of redesign or revision of Contract Documents.

1.07 ENGINEER DUTIES

A. Review Contractor's requests for substitutions in accordance the Shop Drawing review requirements.

B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

1.08 SUBSTITUTION SUBMITTAL REQUIREMENTS – “NO SUBSTITUTIONS PERMITTED”

A. Contractor may not request a substitute item or vendor/manufacturer for which the specifications indicate “No Substitutions Permitted “.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Administrative and procedural requirements for project closeout.

1. Inspection procedures.

2. Project Record Document submittal.

3. Final cleaning.

B. Warranty and bond submittal.

C. Closeout submittals, warranties and bonds required for specific products of work.

1.02 RELATED SECTIONS

A. Section 00800 – Supplementary Conditions

B. Section 01310 - Construction Schedules

C. Section 01370 - Schedule of Values

D. Section 01380 - Construction Photographs

E. Section 01710 - Cleaning

F. Section 01720 - Project Record Documents

G. Section 01740 – Warranties and Bonds

H. Other Sections as applicable.

1.03 SUBSTANTIAL COMPLETION

A. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise Owner of pending insurance change-over requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

5. Submit record drawings, maintenance manuals, and similar final record information.

6. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

B. When the Contractor considers the Work to be substantially complete, he shall submit a written notice to the Engineer that the Work, or designated portion of the Work, is complete and ready for inspection.

C. Within a reasonable time of receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfulfilled requirements. When the Engineer and Owner concur that the Work, or designated portion of the Work, is substantially complete, the Engineer will prepare the Certificate of Substantial Completion following inspection.

D. Should the Engineer determine that the Work is not substantially complete, he will advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.04 FINAL COMPLETION

A. When Contractor considers the Work to be complete, he shall submit written certification to the Engineer that the Work is completed and ready for final inspection. Include the following:

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, the list has been endorsed and dated by the Engineer.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.

5. Submit consent of surety to final payment.

6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. The Engineer will inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the - Engineer.

1. Upon completion of inspection, the Engineer will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete, or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, re-inspection process will be repeated.

1.05 RECORD DOCUMENT SUBMITTALS (REFER TO SECTION 01720 – RECORD DRAWINGS.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Section 01550 – Site Access and Storage

C. Other Sections as applicable.

1.03 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with applicable codes, ordinances, regulations, and anti-pollution laws.

B. Do not dispose of any unsuitable fill, hazardous or organic material onsite. All such material shall be disposed of in a legal manner by the Contractor, the cost of which shall be included in the Bid.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property, and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

A. The Contractor shall keep the area of the Work and other areas utilized or impacted by construction in a neat and clean condition, free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Work site and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations.

B. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of

disposal, and in conformance with all applicable safety laws, and to the requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

C. Provide on-site containers for the collection of waste materials, debris, and rubbish as required.

3.02 DUST ABATEMENT

A. The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. Means for the control of dust shall include, but not be limited to, sweeping and water trucks. The Contractor shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

3.03 FINAL CLEANING

A. Remove temporary protection and facilities installed for protection of the Work during construction.

B. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

C. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION

DOCUMENT 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes the requirements for maintaining, recording, and submitting Project Record Documents including, but not limited to,

1. Record Drawings or As-Built Drawings
2. Record Specifications and other Contract Documents
3. Record Samples, Shop Drawings or Record Product Data

1.02 RELATED SECTIONS

A. Section 01152 – Applications for Payment

B. Section 01340 - Shop Drawings, Working Drawings and Samples

C. Section 01700 – Project Closeout

D. Other Sections as applicable.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain at the site for the Owner and Engineers review one record copy of:

1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other Modifications to the Contract
5. Engineer's Field Orders or Written Instructions
6. Approved Shop Drawings, Working Drawings, and Samples
7. Field Test Reports
8. Construction Photographs

B. Store Record Documents in the Contractor's field office apart from documents used for construction.

C. File Record Documents in accordance with the CSI format number system utilized in the Contract Documents.

D. Maintain Record Documents in a clean, dry, legible condition and in good order. Do not use Record Documents for construction purposes.

E. Make Record Documents available at all times for inspection by the Engineer.

F. As a prerequisite for monthly progress payments, the Contractor is to exhibit the currently updated Record Documents for review by the Engineer and the Owner.

1.04 RECORDING

A. Record Drawings:

1. Maintain a clean, undamaged set of prints of Contract Drawings to serve as the project Record Drawings.

2. Label each sheet "RECORD DRAWING" in neat large printed letters with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

3. The Record Drawings shall be presented at the same scale as the Contract Drawings.

4. The Record Drawings shall correctly and accurately show all changes from the Contract Drawings made during construction.

5. All information shall be verified and certified by an independent Professional Surveyor and Mapper registered in the State of Florida.

6. All vertical information shall be provided in the datum indicated in the Contract Drawings.

7. Horizontal and vertical locations referenced to base-line or permanent surface improvements.

8. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross reference at the corresponding location on the Record Drawings.

9. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

10. Mark new information that was not shown on Contract Drawings or Shop Drawings.

11. Note related Change Order numbers where applicable.

12. Organize Record Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

13. Do not use Record Drawings for construction purposes.

14. Record information concurrently with construction progress.

B. The Record Drawings shall be neat and legible including the following:

1. Above ground piping and equipment:

a. All equipment locations, dimensions and elevations as indicated in the Contract Drawings.

b. All building and tank locations, dimensions and elevations as indicated in the Contract Drawings.

c. All above ground piping size, material, class, lengths, dimensions, and elevations as indicated in the Contract Drawings.

d. Horizontal locations of piping, fittings, valves and appurtenances.

e. Elevations of the top of pipe, fittings, valves and appurtenances.as indicated in the Contract Drawings and at 50' maximum increments

f. All changes from the original design.

2. Underground pressure pipe including potable water mains sanitary sewer force mains, drainage force mains and the like:

a. All piping size, material, class, lengths, dimensions, bury depth and elevations as indicated in the Contract Drawings.

b. Horizontal locations of piping, fittings, valves and appurtenances.

c. Elevations of the top of pipe, fittings, valves and appurtenances.

d. Elevations as indicated in the Contract Drawings and at 50' maximum increments

e. Lengths of restrained pipe.

f. Water service locations.

g. Meter sizes.

h. All changes from the original design.

3. Gravity sanitary sewer:

a. All piping size, material, class, lengths, slopes, dimensions, and elevations as indicated in the Contract Drawings.

b. Horizontal locations of manholes.

c. Rim, invert, and size of all manholes.

d. Service terminal end locations.

e. Wet well construction including diameter, bottom, invert and float elevations.

f. All changes to piping from the original design.

4. Stormwater Drainage:

a. All piping size, material, class, lengths, dimensions and elevations as indicated in the Contract Drawings.

b. Horizontal locations of manholes and catch basins.

c. Rim, invert, bottom elevations and size of all manholes and catch basins.

d. All surface elevations indicated on the Contract Drawings including, but not limited to, swales, berms, yards, sidewalks, and the like.

e. Horizontal location and elevation of all storm water retention or detention areas.

f. All changes from the original design.

5. Limerock base:

a. Upon completion of all underground utilities and limerock base, and before placement of asphalt, provide the following for Engineer review:

1) Finished limerock base elevations taken at the location of finished asphalt elevations as indicated in the Contract Drawings.

2) Additional elevations as required by the Engineer, including, but not limited to:

(a) Finished limerock base at centerline, edge of median and edge of pavement.
(b) Back of sidewalk or right of way.
(c) Bottom of swale or flow line of gutter.
(d) Top of curb.
(e) High points, low points and grade breaks.
(f) Intersections.

6. Electrical, instrumentation and controls

a. Horizontal location of all electrical equipment and control cabinetry.

b. Elevations of the bottom of all electrical and control panels.

c. Horizontal location and elevation of all conduits including conduit size, route and wire size.

d. Horizontal location of all light poles and junction boxes.

7. Miscellaneous:

a. Horizontal location and elevation of all concrete slabs.

b. Horizontal location, size and material of all fencing.

c. Location size and material of all existing utilities whether indicated on the Contract Drawings or not.

d. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

e. Depths of various elements of foundation in relation to finish first floor datum.

f. Field changes of dimensions and details.

g. Details not on original contract drawings.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction.

1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.

2. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation.

3. Note related record drawing information and Product Data.

4. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

5. Changes made by field order or by Change Order.

D. Record Product Data (Shop Drawings): Maintain one copy of each Product Data submittal.

1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations.

2. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned later by direct observation.

3. Note related Change Orders and mark-up of record drawings and Specifications.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Engineer and the Owner to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work.

1.05 SUBMITTAL

A. Project Record Documents, demonstrating construction progress, shall be submitted with each Application for Payment.

B. Interim Project Record Drawings shall be submitted at significant project milestones including:

1. Construction of wet well or other structures.

2. Construction of catch basins, manholes, pipes and appurtenances.

3. As required by the Engineer.

C. Project Record Documents, demonstrating construction completion shall be submitted with the balance of Closeout documents at the conclusion of construction including:

1. Three sets of signed and sealed sets of prints.

2. One compact disc copy of record drawings in Autocad format.

D. Accompany submittals with transmittal letter in duplicate, containing:

1. Date
2. Project Title and Number
3. Contractor's Name and Address
4. Title and Number of each Record Document
5. Signature of Contractor or his Authorized Representative

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under Contract.

1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.

B. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

1.02 RELATED SECTIONS

A. Section 01340 – Shop Drawings, Working Drawings and Samples

B. Section 01700 – Contract Closeout

C. Section 01720 – Project Record Documents

D. Section 01740 – Warranties & Bonds

E. Other Sections as applicable.

1.03 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:

1. Trained and experienced in maintenance and operation of described products.

2. Familiar with requirements of this Section.

3. Skilled as technical writers to the extent required to communicate essential data.

4. Skilled as draftsman competent to prepare required drawings.

1.04 FORM OF SUBMITTALS

A. Prepare data in form of an instructional manual for use by Owner's personnel.

B. Format

1. Size: 8 1/2 inches x 11 inches

2. Paper: 20 pound minimum, white, for typed pages.

3. Text: Manufacturer's printed data, or neatly typewritten.

4. Drawings:

a. Provide reinforced punched binder tab, bind in with text.

b. Reduce larger drawings and fold to size of text pages, but not larger than 11 inches x 17 inches.

5. Provide fly-leaf for each separate product, or each piece of operating equipment.

a. Provide types description of product, and major component parts of equipment.

b. Provide indexed tabs.

6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:

a. Title of Project

b. Identity of separate structure as applicable.

c. Identity of general subject matter covered in this manual.

C. Binders

1. Commercial quality three-ring binders with durable and cleanable plastic covers.

2. Maximum ring diameter shall be 2 inches.

3. When multiple binders are used, correlate the data into related consistent groupings.

1.05 CONTENT OF MANUAL

A. Neatly typewritten Table of Contents for each volume, arranged in systematic order.

1. Contractor, name of responsible principal, address, and telephone number.

2. A list of each product required to be included, indexed to content of the volume.

3. List, with each product, name, address, and telephone number of:

a. Subcontractor of installer

b. Maintenance contractor, as appropriate

c. Identify area of responsibility of each

d. Local source of supply for parts and replacement.

4. Identify each product name and other identifying symbols as set forth in Contract Documents.

B. Product Data

1. Include only those sheets which are pertinent to the specific product.

2. Annotate each sheet to:

a. Clearly identify specific product or part installed.

b. Clearly identify data applicable to installation.

c. Delete references to inapplicable information.

C. Drawings

1. Supplement product date with drawings as necessary to clearly illustrate:

a. Relations of component parts of equipment and systems.

b. Control and flow diagrams.

2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

3. Do not use Project Record Documents as maintenance drawing.

D. Written text, as required to supplement product date for the particular installation:

1. Organize in consistent format under separate headings for different procedures.

2. Provide logical sequence of instructions of each procedure.

E. Copy of each warranty, bond and service contract issued:

1. Provide information sheet for Owner's personnel, give:

a. Proper procedures in event of failure.

b. Instances which might affect validity of warranties or bonds

1.06 MANUAL FOR MATERIALS AND FINISHES

A. Submit five copies of complete manual in final form.

B. Content for architectural products, applied materials and finishes

1. Manufacturer's data, giving full information on products.

a. Catalog number, size, composition.

b. Color and texture designations.

c. Information required for re-ordering special-manufactured products.

2. Instructions for care and maintenance.

a. Manufacturer's recommendation for types of cleaning agents and methods.

b. Cautions against cleaning agents and methods which are detrimental to product.

c. Recommended schedule for cleaning and maintenance.

C. Content, for moisture-protection and weather-exposed products

1. Manufacturer's data, giving full information on products

a. Applicable standards.

b. Chemical composition.

c. Details of installation.

2. Instructions for inspection, maintenance, and repair.

D. Additional requirements for maintenance data: Respective sections of Specifications.

E. Provide complete information for products specified.

1.07 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit five copies of complete manual in final form.

B. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.
    a. Function, normal operating characteristics and limiting conditions
    b. Performance curves, engineering data and tests
    c. Complete nomenclature and commercial number of replaceable parts
2. Operating procedures
    a. Start-up, break-in, routine and normal operating instructions
    b. Regulation, control, stopping, shut-down and emergency instructions
    c. Summer and winter operating instructions
    d. Special operating instructions
3. Maintenance Procedures
    a. Routine operations
    b. Guide to "trouble-shooting"
    c. Disassembly, repair and reassembly
    d. Alignment, adjusting and checking
4. Servicing and lubrication schedule
    a. List of lubricants required
5. Manufacturer's printed operating and maintenance instructions
6. Description of sequence of operation by control manufacturer
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance
    a. Predicted list of parts subject to wear
    b. Items recommended to be stocked as spare parts
8. As-installed control diagrams by controls manufacturer
9. Each contractor's coordination drawings
    a. As-installed color coded piping diagrams
10. Charts of valve tag numbers, with location and function of each valve
11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage

12. Other data as required under pertinent sections of specifications

C. Contents, for each electric and electronic system, as appropriate

1. Description of system and component parts

a. Function, normal operating characteristics, and limiting conditions

b. Performance curves, engineering data and tests

c. Complete nomenclature and commercial number of replaceable parts

2. Circuit directories of panel-boards

a. Electrical service

b. Controls

3. As-installed color coded wiring diagrams

4. Operating procedures:

a. Routine and normal operating instructions

b. Sequences required

c. Special operating instructions

5. Maintenance procedures

a. Routine operations

b. Guide to "trouble-shooting"

c. Disassembly, repair and reassembly

d. Adjustment and checking

6. Manufacturer's printed operating and maintenance instructions

7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

8. Other data as required under pertinent sections of specifications

D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.

E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

F. Provide complete information for product specified.

1.08 SUBMITTAL SCHEDULE

A. Submit two copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within 30 days after Notice to Proceed.

1. The Engineer will review the preliminary draft and return one copy with comments.

B. Submit two copies of completed data in final form no later than 30 days following the Engineer's review of the last shop drawing and submittal specified under Section 01340.

1. One copy will be returned with comments to be incorporated into final copies.

C. Submit specified number of copies of approved data in final form directly to the offices of the Engineer, Calvin, Giordano & Associates, within 30 calendar days of product shipment to the project site and preferably within 30 days after the reviewed copy is received.

D. Submit six copies of addendum to the operation and maintenance manuals as applicable and certificates as specified in paragraph 1.01B of Section 01030 within 30 days after final inspection and plant start-up test.

E. Final Operation and Maintenance submittals shall be in large three-ring binders organized by specification Section and plainly marked per paragraph 1.04Ca.

1.09 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in operation, adjustment, and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction.

1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

1.10 ENGINEER'S O & M CHECKLIST

A. The Engineer will review Operation and Maintenance Manuals submittals on operating equipment for conformance with the requirements of this Section. The review will generally be based upon the O&M Review Checklist (presented on the pages at the end of this section for the benefit of the Contractor and his suppliers).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

O & M REVIEW CHECKLIST

EQUIPMENT SUBMITTED _____	DATE OF SUBMITTAL _____
MANUFACTURER _____	DEGREE OF APPROVAL _____
SPECIFICATION SECTION _____	DRAWING NUMBER _____

_____ Is the submittal correct for model/series/configuration originally submitted with shop drawings?

_____ Is the binding correct with assigned color/printing etc.? (Pertains to final three volumes)

_____ Is the submittal properly indexed?

_____ Does the submittal pertain only to equipment being furnished?

_____ Is the submittal easily understood and instructively arranged?

_____ Does the submittal include start-up, shutdown and troubleshooting procedures?

_____ Are sufficient drawings and schematics included to supplement written descriptions?

_____ Is the listing of name plate data for each piece of supplied equipment provided and attached?

_____ Are all submitted “C” and “D” size drawings printed on paper that is 11 inches high and folded to 8 1/2 inches wide?

_____ Is proper and complete instruction for servicing included?

_____ Is there a suggested operating log sheet for equipment?

_____ Is schedule for lubrication provided?

_____ Is there a recommended preventative maintenance schedule?

_____ Are necessary safety precautions clearly indicated where they relate to the equipment?

_____ Is the Area Representative information provided, i.e., Name, Address, Telephone Number?

_____ Are specified spare parts indicated and listed?

The following are the points of rejection requiring resubmittal by Contractor:

_____

_____

_____

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Compile warranties and bonds as specified in the Contract Documents.

B. Co-execute submittals when so specified.

C. Review submittals to verify compliance with Contract Documents.

D. Submit to the Engineer for review and transmittal to Owner.

1.02 RELATED SECTIONS

A. Section 00100 - Instructions to Bidders

B. Section 01700 - Contract Closeout

C. Other Sections as applicable.

1.03 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bond, service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: two (2) each.

C. Table of Contents: neatly typed, in orderly sequence. Provide complete information for each item.

1. Product or work item

2. Firm, with name of principal, address and telephone number

3. Scope

4. Date of beginning of Warranty, bond or service and maintenance contract

5. Duration of warranty, bond or service maintenance contract

6. Provide information for Owner's personnel:

a. Proper procedure in case of failure

b. Instances which might affect the validity of warranty or bond

7. Contractor, name of responsible principal, address and telephone number

1.04 FORM OF SUBMITTALS

A. Prepare in duplicate packets

B. Format:

1. Size 8 1/2 inches x 11 inches, punch sheets for standard 3-post binder

2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:

a. Title of Project

b. Name of Contractor

C. Binders: Commercial quality, three-post (3) binder, with durable and cleanable plastic covers and maximum post width of 2 inches.

1.05 WARRANTY SUBMITTAL REQUIREMENTS

A. For all equipment, submit a one-year warranty from the equipment manufacturer, unless otherwise specified. The manufacturer's warranty period shall be concurrent with the Contractor's for one year commencing at the time of acceptance by the Owner.

B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment and which has a 1 HP motor or which lists for more than $1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.

C. In the event that the equipment manufacturer or supplier is unwilling to provide a one-year warranty commencing at the time of Owner acceptance, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two-year (2) warranty from the manufacturer shall not relieve the Contractor of the one-year warranty starting at the time of Owner acceptance of the equipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

03100

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 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. 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.

2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

3. Specific test and inspection requirements are not specified in this Section.

1.02 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 Architect.

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.

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.

1.03 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 Architect 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 Architect for a decision before proceeding.

1.04 INFORMATIONAL SUBMITTALS

A. 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 Architect.

2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force- resisting system quality-assurance plan prepared by Architect.

B. 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.

1.05 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 Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

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

C. 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.

1.06 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 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. 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. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

d. When testing is complete, remove test specimens, and assemblies; 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 Architect, 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.

J. 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 Architect.

2. Notify Architect seven days in advance of dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed unless otherwise indicated.

7. The following mock-ups are required for review and acceptance by the Architect. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

a. Canopy section of one full structural bay to include structure, cladding, and any specialties work.

b. Full section of storefront at first floor to include glazing, shadow box, and concrete flood wall.

c. Full section of storefront at fourth floor.

d. Stone cladding at south corner of stair core from west façade to contact with storefront for a minimum of 15 ft vertically.

1.07 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. 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. 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.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. 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 manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. 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.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect 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.

F. 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.

G. 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.

1.08 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, 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 Architect 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 Architect 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

2.01 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 Architect.

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 Architect's reference during normal working hours.

2.02 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.

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

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish labor, materials, equipment and incidentals required to place cement and concrete masonry, reinforcing steel, forms, water stops, and miscellaneous related items including sleeve, reglets, anchor bolts, inserts and embedded items specified under other Section.

1.02 RELATED WORK

A. Concrete reinforcement is specified in Section 03200.

B. Joints are specified in Section 03251.

C. Walkways are specified in Section 02510.

1.03 REFERENCE

A. ASTM C-150 Portland Cement

B. FS SS-C-1960/3 Portland Cement

C. ASTM C-94 Ready-Mix Concrete

D. ACI 318-89 Reinforced Concrete

E. ASTM C-143 Concrete Mix

F. ASTM C-231 Concrete Testing

G. ASTM C-33 Concrete Aggregates

H. ASTM C-87 Mortar Strength

I. ASTM C-40 Concrete Aggregates

J. ASTM C-494 Concrete Ad Mixtures

K. ACI 304 Truck Mixers

L. ASTM C-31 Field Testing

M. ASTM C-39 Concrete Testing

N. ASTM C-42 Concrete Testing

1.04 DESCRIPTION

A. Concrete shall be of portland cement, ASTM C-94, fine aggregate, coarse aggregate, water and admixtures as specified and shall be ready-mixed, or transit-mixed concrete. All constituents, including admixture, shall be batched at the central batch plant.

B. Reinforced concrete shall conform to ACI Specification 318-89 or latest revision.

C. Field testing and inspection services required will be provided by the Owner. Cost of

such work, except as specifically stated otherwise, will be paid for by the Owner. Methods of test will comply in detail with the latest applicable ASTM Methods of Testing.

D. Samples of constituents and of concrete as placed will be subjected to laboratory tests. Materials incorporated in the work shall conform to approved samples.

E. Under special circumstances, the Engineer may allow minor deviations from the material requirements specified, provided the resulting concrete quality is not adversely affected or provided a suitable adjustment in cement content is made to compensate for such deviations without cost to the Owner.

1.05 SUBMITTALS

A. Submit, shop drawings showing placement of forms, form joints, major inserts and blockouts.

1.06 QUALITY ASSURANCE

A. The actual acceptance of aggregates and development of mix proportions to produce concrete conforming to the specific requirements shall be determined by means of prior laboratory tests made by the Concrete Supplier or the Contractor at his expense with the constituents to be used on the work.

B. The Concrete Supplier shall submit through the Contractor to the Engineer for approval the concrete mix he intends to use, designed within the limits of these specifications, listing the brand of cement, source and results of tests of aggregates and admixtures not later than 14 days prior to the beginning of placing concrete.

C. The limiting strengths, water-cement ratios and cement factors as shown on Table A shall apply. Maximum water-cement ratio for structures shall be 0.53 by weight.

TABLE A

Minimum Comp. Str. Psi at 28 days	**Maximum Net Water Content gals/100 lbs***	**Minimum Cement Factor 100 lbs/yd³****
2500	7.4	4.3
3000	7.0	4.8
3500	6.4	5.64
4000	5.85	5.64

*Maximum; decrease if possible. This represents total water in mix at time of mixing, including free water on aggregates, and water in admixture solution.

**Minimum; increase as necessary to meet other requirements. These cement factors apply to "controlled" concrete subject to specific inspection.

D. When high-early-strength portland cement is permitted, the same strength requirements shall apply except that the indicated strengths shall be attained at seven days instead of twenty-eight days.

E. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the

desired properties. All changes so ordered shall be made at the Contractor's expense.

F. If, during the progress of the work, the Contractor desires to use materials other than those originally approved, or if the materials from the sources originally approved change in characteristics, the Contractor shall, at his own expense, have made new acceptance tests of aggregates and establishment of new basic mixtures and submit them to the Engineer for approval.

G. Consistency of the concrete as measured by the ASTM Designation C143 shall be as shown in Table B.

TABLE B

Portion of Structure	Slump Max. (inches)*	Min. (inches)
Pavement and slab on ground	3	2
Plain footings, gravity walls, slabs and beams	3	2
Heavy reinforced foundation, walls and footings	4	2
Thin reinforced walls and columns	4	2

**May be increased 1-inch if proper method of consolidation is used.*

H. Concrete shall be of such consistency and mix composition that it can be readily worked into the corners and angles of the forms and around the reinforcement, inserts, and wall castings without permitting materials to segregate or free water to collect on the surface, due consideration being given to the methods of placing and compacting.

I. No excessively wet concrete will be permitted, and if at any time concrete of such consistency beyond the limits of Table B is delivered to the job, the Engineer may direct the Contractor to reject same or to add extra cement for which no additional payment will be made. A supply of the approved cement shall be kept available at the site for this purpose. No additional water shall be added by drivers of transit-mix trucks except that established for the design. Failure to comply with this requirement shall be justification for rejecting the concrete.

J. The entrained air, as measured by the Pressure Method, ASTM C231, shall be as shown in Table C.

TABLE C

Nominal maximum Size of Coarse Aggregate (inches)	Total Air Measured at Discharge from truck (%)
2	2.5-5.5
1	6.5
¾	4.0-8.0

1.07 ACCEPTANCE TESTS

A. Conformity of aggregates to these Specification, and the actual proportions of cement, aggregates, and water necessary to produce concrete conforming to the requirements set forth in Table A, shall be determined by tests made with representative samples of the materials to be used on the work. Tests will be made by an accredited testing

laboratory, and approved by the Engineer.

B. Cement may be subject to testing to determine that it conforms to the requirements of this Specification. Methods of testing shall conform to the appropriate specification, but the place, time, frequency and method of sampling will be determined by the Engineer in accordance with the particular need.

C. Water content of the concrete shall be based on a curve showing the relation between water content and 7 and 28-day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four or more points, each representing an average value of at least three test specimens at each age, and shall have a range of values sufficient to yield the desired data, including all the compressive strengths called for on the Drawings, without extrapolation. The water content of the concrete to be used, as determined from the curve, shall correspond to the test strengths of the laboratory trial mixtures as shown on Table D.

TABLE D

Design Strength	**Min. Lab. 7 Days***	**Strength 28 Days****
3000	2500	3500
3500	3000	4100
4000	3500	4600

**May be employed by preliminary design.*
***To be used for final designs.*

D. In no case, however, shall the resulting mix conflict with the limiting values for maximum water-cement ratios and minimum cement contents as specified in Table A.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall conform to these Specifications and any state or local specification requirements.

B. Cement for all cast in place concrete shall be a domestic portland cement (ASTM C-150, Type II) or high early strength portland cement (Type III) free from injurious water soluble salts or alkalies. High early strength cement may only be used, with written approval of the Engineer. Air entraining cements may be used with written approval of the Engineer. Cement brands shall be subject to approval.

C. Aggregates:

1. Fine aggregate shall consist of washing inert sand conforming to the requirements of ASTM Specification C-33, and the following detailed requirements:

Sieve	**% Passing**
No. 4	95-100
No. 16	60-75
No. 50	13-30

No. 100	3-8

Fineness Modulus	2.4-2.6
Organics	Organic Plate 2, per ASTM C-40
Silt	2.0% maximum
Mortar Strength	95% minimum as per ASTM C87, Section 10
Soundness	8% maximum loss, using magnesium sulfate, subject to 5 cycles

2. Coarse aggregate shall consist of well-graded crushed rock or washing gravel conforming to the requirements of ASTM Specification C-33 and the following detailed requirements:

Organics	Organic Plate 1, per ASTM C-40
Silt	1.0% maximum
Soundness	8% maximum loss, using magnesium sulfate, subject to 5 cycles

3. The following designated sizes* of aggregate shall be the maximum employed in concrete:

   2 inch for plain concrete

   1 inch for reinforced sections 10 inch and over in thickness

   3/4 inch for reinforced sections less than 10 inch in thickness

4. *Note: The "Designated Size" and the corresponding gradations shown represent the end or combined gradation of the coarse aggregate to be used in the final concrete.

D. Water:

1. Water shall be clean and free from injurious amounts of oils, acid, alkali, organic matter or other deleterious substances.

2. When subjected to the mortar strength test described in ASTM C87, the 28 day strength of mortar specimens made with the water under examination and normal portland cement shall be at least 100 per cent of the strength of similar specimens made with distilled water.

3. Potable tap water will normally fulfill the above requirements.

4. Raw water (groundwater) and canal water shall not be allowed in the mix.

E. Admixtures:

1. A water reducing agent shall be used in all concrete. The admixture shall conform to ASTM Specification C494. Proportioning and mixing shall be as recommended by the manufacturer.

2. Admixtures causing accelerated setting of cement in concrete shall not be used. Air entraining admixtures with demonstrated compatibility with the concrete mix shall be used as required as a moderate addition to the water

reducing agent to obtain the specified percent air in the resultant concrete.

PART 3 - EXECUTION

3.01 MEASURING MATERIALS

A. Materials shall be measured by weighing except as otherwise specified or where other methods are specifically authorized by the Engineer. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. Scales shall have been certified by the local Sealer of Weights and Measures within one year of use. Each size of aggregate and the cement shall be weighed separately. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one percent of the desire amount. Cement in standard packages (sacks) need not be weighed, but bulk cement and fractional packages shall be weighed.

B. Water shall be measured by volume or by weight. The water-measuring device shall be capable of control to 1/2% accuracy. All measuring devices shall be subject to approval. Admixtures shall be dispensed either manually with use of calibrated containers or measuring tanks, or by means of an approved automatic dispenser designed by the manufacturer of the specified admixture.

3.02 MIXING

A. Concrete shall be ready-mixed or transit-mixed, as produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Adding water in controlled amounts during the mixing cycle shall be done only with the express approval of, and under the direction of, the Engineer.

B. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the name plate. Discharge at the site shall be within 1-1/2 hours and within one hour when ambient temperature is above 85 degree F after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1-1/2 minutes per batch and then shall be truck-mixed or agitated a minimum of 8 minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least 10 minutes immediately after charging the truck, followed by agitation without interruption until discharged.

C. All central plant and rolling stock equipment and methods shall conform to the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association, as well as ACI Standard 304 and ASTM Specification C94.

D. The retempering of concrete or mortar which has partially hardened, that is, mixing with or without additional cement, aggregate, or water, will not be permitted.

E. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive

layers of concrete in the forms.

3.03 FIELD TESTS

A. Sets of four field control cylinder specimens will be taken at random by the Engineer during the progress of the work, in conformity with ASTM Designation C31; the total number of specimens taken on the project may average one set per 150 cu yds, and in general not less than one set of specimens will be taken on any one day when concrete is being placed. When average ultimate 28-day strength of control cylinders in any set falls below the required ultimate strength or below proportional minimum 7 day strengths where proper relation between 7 and 28 day strengths have been established by tests, proportions, water content, or temperature conditions shall be changed to secure the required strength.

B. The Contractor shall cooperate in the making of such tests to the extent of allowing free access to the work for the selection of samples, providing heated (when required) moist storage facilities for specimens, affording protection to the specimens against injury or loss through his operations, and furnishing material and labor required for the purpose of taking concrete cylinder samples, curing boxes and shipping boxes. All shipping of specimens will be paid for by the Owner.

C. Slump tests will be made in the field by the testing laboratory.

3.04 INSPECTION AND CONTROL

A. The preparation of forms, placing of reinforcing steel, conduits, pipes, and sleeves, batching, mixing, transportation, placing and curing of concrete shall be at all times under the inspection of the Engineer.

B. The Contractor shall engage the services of an approved testing laboratory to establish the basic mixtures of concrete as required by the specifications.

C. The Owner will engage the services of a testing laboratory to test field control cylinder specimens and to conduct other tests as specified herein or as deemed required by the Engineer to insure the quality.

D. Air entrainment shall be measured by the testing laboratory or his representative at time of concrete deposit in accordance with ASTM Designation C231.

3.05 CONCRETE APPEARANCE

A. Concrete for every part of the work shall be homogeneous structure which, when hardened, will have the required strength, durability and appearance.

B. Formwork, mixtures and concrete placement workmanship shall be such that concrete surfaces, when exposed, will require only minimal finishing with no excess honeycombing, voids or irregular color lines.

3.06 FORMS

A. Forms shall be used for all concrete masonry, including footings. Forms shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance, and to the elevations indicated on the Drawings.

B. Forms shall be made of wood, metal, or other approved material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from

knotholes and loose knots; where used for exposed surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.

C. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in 4 feet. Forms shall be tight to prevent the passage of mortar and water and grout.

D. Forms for walls shall have removable panels at the bottom for cleaning, inspection, and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcements above the fresh concrete.

E. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.

F. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports, and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

G. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.

H. Before form material is re-used, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.

I. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at lease 1/2-inch in diameter and 1-inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Throughbolts or common wire shall not be used for form ties.

3.07 PLACING AND COMPACTING

A. Unless otherwise permitted, the work begun on any day shall be completed in daylight of the same day.

B. Concrete is not to be placed until reinforcing steel, pipes, conduits, sleeves, hangers, anchors and other work required to be built into concrete have been inspected and approved by the Engineer. Remove water and foreign matter from forms and excavation. All soil bottom for slabs and footings shall be approved by the Engineer before placing concrete.

C. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which prevent separation of ingredients and displacement of reinforcement, and which avoid rehandling. Partially hardened concrete is not to be used.

D. "Cold joints" are to be avoided, but if they occur, are to be treated as bonded

construction joints.

E. At construction joints the surfaces of the concrete already placed, including vertical and inclined surfaces, shall be thoroughly cleaned of foreign materials and laitance, and weak concrete and roughened with suitable tools to expose a fresh face. At least two hours before and again shortly before the new concrete is deposited, the joints shall be saturated with water. After glistening water disappears, the joints shall be given a thorough coating of neat cement slurry mixed to the consistency of very heavy paste. The surfaces shall receive a coating at least 1/8-inch thick, well scrubbed-in by means of stiff bristle brushes whenever possible. New concrete shall be deposited before the neat cement dries.

F. Deposit concrete to maintain, until the completion of the unit, a horizontal plastic surface. Vertical lifts shall not exceed 24-inches and preferably 18-inches.

G. Chutes for conveying concrete shall be of U-shaped designed and sized to insure a continuous flow of concrete. Flat (coal) chutes shall not be employed. Chutes shall be metal or metal-lined and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45 degrees from the horizontal and shall be such as to prevent the segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than 5 feet above the surface of the concrete in the forms, a spout shall be used, and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally over distances exceeding 5 feet.

H. In thin sections of considerable height, concrete shall be placed using suitable hoppers, spouts with restricted outlets, or otherwise, as required or approved.

I. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents of "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to removed included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every 10 cubic yards of concrete placed per hours. In addition, one spare vibrator in operating condition shall be on the site.

J. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be well-tamped, and rolled until thoroughly compacted prior to placing concrete.

K. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the Drawings or approved by the Engineer.

3.08 CURING AND PROTECTION

A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations. Special curing procedures shall be implemented as described herein to minimize the cracking of concrete in water retaining structures.

B. Concrete placed at air temperature below 40 degrees F shall have a minimum temperature of 60 degrees F. When the air temperature is below 40 degrees F and falling, the water and aggregates shall be heated before mixing. Accelerating chemicals shall not be used prevent freezing. All concrete shall be so protected that the temperature at the surface will not fall below 50 degrees F for at least 7 days after placing. The Contractor shall submit for approval by the Engineer the methods he proposes to use against low temperatures. No salt, manure, or other chemicals shall be used for protection.

C. All concrete, particularly exposed surfaces, shall be treated immediately after concreting or cement finishing is completed to provide continuous moist curing above 50 degrees F for at least 7 days, regardless of the ambient air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or other approved means; horizontal surfaces, slabs, etc., shall be ponded to a depth of 1/2 inch or kept continuously wet by use of wet burlap.

1. Slabs of water retaining structures shall be wet cured continuously with wet burlap or other approved means for a minimum of 14 days if Type II cement is used for 3 days if Type III cement is used.

2. Walls of water retaining structures shall have all their exposed surfaces covered from direct sunlight and forms left in place for a minimum of 3 days. Curing shall commence within four hours after concrete placement.

D. In cold weather supplementary continuous warm curing (above 50 degrees F) shall provide a total of 350-day degrees (i.e., 5 days 70 degrees F, etc.) of heat.

E. In hot weather, concrete when deposited shall have a placing temperature which will not cause difficulty from loss of slump, flash set or formation of cold joints. In no case shall the temperature of concrete being placed exceed 90 degrees F.

F. Finished surface and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

3.09 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has cured as specified above in subparagraph 3.08C and the concrete has attained a strength of at least 30 percent of the ultimate strength prescribed by the design, and not before reaching the following number of day-degrees (whichever is the longer):

Forms for	Day-Degree*
Beams and slabs	500
Walls and vertical surfaces (non-water retaining)	100
Walls and vertical surfaces (water retaining)	150

*Day-degree: Total number of days times average daily air temperature at surface

of concrete. For example, 5 days at a daily weighted average temperature of 60 degrees F equal 300 day-degrees. Temperatures below 50 degrees F not to be included.

B. Shores shall not be removed until the concrete has attained at least 60% of the specified strength and also sufficient strength to support safely its own weight and the construction live loads upon it, but concrete shall be minimum age of 14 days before such removal.

3.10 FAILURE TO MEET REQUIREMENTS

A. Should the strengths shown by the test specimens made and tested in accordance with the above provision fall below the values given in Table A, the Engineer shall have the right to require changes in proportions as outlined above to apply to the remainder of the work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed, the cost of such additional curing to be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In such cases of failure to meet strength requirements the Contractor and Engineer shall confer to determine the adjustment, if any, can be made in conformity with Sections 16 and 17 of ASTM Specification C94 for Ready-Mixed Concrete.

B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for structure in accordance with ASTM Methods C42 and C39. In case of failure of the latter, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, and columns in which such concrete was used. Test need not be made until concrete has aged 60 days.

C. Slabs or beams, under load test, shall be loaded with their own weights plus a super-imposed load of 2 times design live load. The load shall be applied uniformly over portion being tested in approved manner, and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at end of 24-hour period does not exceed value:

D equals 0.001 (L x L)/t

in which "L" is span in feet, "t" is depth of slab or beam in inches.

D. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, slab or beam under test recovers at least 75% of observed deflection.

E. Should the strength of test cylinders fall below 60% of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced.

3.11 PATCHING AND REPAIRS

A. It is the intent of these Specifications to require that forms, mixture of concrete and

workmanship shall be such that concrete surfaces, when exposed, will require minimal finishing as specified in Paragraph 3.05 above.

B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties (except where ties are left in place during sandblasting) shall be filled and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.

C. Immediately after removal of forms remove plugs and break off metal ties as required by Paragraph 3.06. Holes are then to be promptly filled upon stripping as follows: Moisten the hole with water, followed by a 1/16 inch brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the holes with 1 1.5 mixture of cement and concrete sand mixer slightly damp to the tough (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spider web. Trowel smooth with heavy pressure. Avoid burnishing.

D. Rub lightly with a fine carborundum stone at an age of l to 5 days if necessary to bring the surface down with the parent concrete. Exercise care to avoid damaging or straining the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

E. Defective concrete and honeycombed areas shall be chipped reasonably square and at least 1 inch deep to sound concrete by means of hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded in the parent concrete, subject to Engineer's final inspection. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/8 inch wide all around the steel. For areas less than 1 1/2 inch deep, the patch may be made in the same manner as described above for filling for tie holes, care being exercised to use adequately dry (nontrowelable) mixtures and to avoid sagging. Thick repairs will require build-up in successive l 1/2 inch layers on successive days, each layer being applied (with slurry, etc.) as described above. To aid strength and bonding of the multiple layer repairs, the Engineer may order the use of Embeco non-shrink, metallic aggregate by the Master Builders Company, Cleveland, OH or Ironite by Fox Industries, Madison IL as an additive as follows:

Material	Volumes	Weights
Cement	1.0	1.0
Embeco	0.15	0.25
Sand	1.5	1.5

F. For very heavy (generally formed) patches; the Engineer may order the addition of pea gravel to the mixture and the proportions modified as follows:

Material	Volumes	Weights
Cement	1.0	1.0
Embeco	0.2	0.33
Sand	1.0	1.5
Pea Gravel	1.5	1.5

G. In cases where the Embeco is employed in multiple patches and a rusty finish is not desired on the surface, such as exposed faces of walls, etc., the final layer (or at least the final 1/2 inch) shall be composed of the 1 1.5 grout without Embeco. After hardening, rub lightly as described above for form tie holes.

3.12 INSTALLATION SCHEDULE

A. Concrete for all structures shall have minimum compressive strength at 28 days of 4000 psi unless otherwise indicated on the drawings.

3.13 FIELD CONTROL

A. The Contractor shall advise the Engineer of his readiness to proceed at least one working day prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.

B. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work.

C. The Contractor shall cooperate in obtaining cores by allowing free access to the work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. The Contractor shall repair all core holes to the satisfaction of the Engineer. The work of cutting and testing the cores will be at the expense of the Owner if cores test satisfactorily and will be at the expense of the Contractor if cores test unsatisfactorily.

END OF SECTION

SECTION 03700

MODIFICATIONS AND REPAIR TO EXISTING CONCRETE

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to cut, repair, demolish, excavate or otherwise modify parts of existing structures or appurtenances as shown on the Drawings and as specified herein as necessary to complete the work under this Contract.

1.02 RELATED WORK

A. Concrete and non-shrink grout is included in Section 03300.

B. Work under this Section shall include connecting new concrete to existing concrete.

1.03 GENERAL

A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.

B. When removing materials or portions of existing structures and when making openings in existing structures, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, nor to damage the structures or contents by falling of flying debris. Unless otherwise permitted, line drilling will be required in cutting existing concrete.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Epoxy Bonding Compound:

1. The epoxy bonding compound shall be furnished in two components for combining immediately prior to use in accordance with the manufacturer's written instructions and as stipulated in these Specifications.

2. The components of the epoxy resin system shall conform to the following requirements.

a. Component A - Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A condensation type, containing suitable viscosity control agents and having an apoxide equivalent of 180-200.

b. Component B - Component B shall be primarily a reaction product of an alkyl glycidyl ether and a polyfunctional aliphatic amine containing suitable viscosity agents modified with 2, 4, 6 tri (dimethylamino-methyl) phenol.

c. The component ratio of B:A shall be 1:1 by volume.

d. The resultant compound shall be polysulfide free.

3. PROPERTIES OF MIXED COMPONENTS

2.1 Solids Content	100% by weight
2.2 Pot Life	20-30 min @ 73°F
2.3 Track-Free Time (thin film)	3-5 hours @ 73°F
2.4 Final Cure ASTM D-695 (75% ultimate strength)	3 Days @ 73°F
2.5 Initial Viscosity (A+B)	2400-3200 cps min at 73°F
2.6 Color Mixed	Straw

4. PROPERTIES OF CURED MATERIAL

3.1	Neat Material	
3.1.1	Tensile Strength (ASTM D-638)	5300 PSI min at days 73°F cure
3.1.2	Tensile Elongation (ASTM D-638 modified)	4.8% @ 14 days, 73°F cure
3.1.3	Compressive Strength (ASTM D-695)	700 PSI min @ 28 days 73°F cure
3.1.4	Compressive Modulus (ASTM D-695)	250,000 PSI min @ 28 days, 73°F cure
3.1.5	Water Pick Up (ASTM D-570)	1.0% max
3.1.6	Bond Strength (Plastic to Hardened)	1500 PSI min 14 days, 73°F cure
3.1.7	Deflection Temperature (ASTM D-1525)	180°F min.

5. Epoxy bonding compound shall be Sikadur Hi-Mod as manufactured by Sika Chemical Corp., Lyndhurst, N.J., or equal as manufactured by W.R. Grace Co., Cambridge, MA or Adhesive Engineering Co., Lawrence, MA.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Field measurements shall be taken in the required buildings and at the required yard structures to determine the amount of concrete to be removed and/or repaired and the amount of patching to be done.

3.02 CONSTRUCTION METHODS

A. Where new concrete is to be made integral with existing concrete, either of the following methods as noted, shown or specified in Contract Drawings shall be used by the Contractor:

1. Bonding to a saturated surface.
2. Bonding by using bonding agent.
3. Use of anchor bolts, expansion bolts or dowels in connecting concrete.

3.03 MODIFYING OR REPAIRING EXISTING CONCRETE

A. Remove concrete to the depths shown or required. Roughen contact surfaces by chipping, sandblasting, scarifying or other approved methods. Thoroughly clean the surface removing loose particles and dust.

B. Cut off projecting reinforcement when required to provide at least l inch cover. Where shown, reinforcement shall be bent across cut face and covered with new concrete.

C. Thoroughly wash the roughened concrete surfaces and keep the surfaces saturated for at least 6 hours before placing new concrete. All free water shall be removed prior to placing the concrete. An epoxy bonding compound as specified may be used in lieu of saturating surface for 6 hours.

D. Cement mortar, where required, shall be placed to a thickness slightly in excess of the finished surface and shall be steel-trowel-finished, flush with the adjacent surface.

E. When the finish surface is not specified to be coated the color of new concrete in the exposed surfaces shall match the color of the existing adjoining concrete as closely as possible.

F. Cement mortar shall consist of 1 part portland cement and two parts of sand by volume. No accelerating admixtures shall be employed in surface treatment. Where shown on the Drawings, a non-shrink grout shall be used for patching and filling.

3.04 CONNECTIONS, NEW CONCRETE TO EXISTING CONCRETE

A. The Contractor shall drill 1 1/2 inch holes for dowels. The drilled hole shall first be filled with epoxy bonding compound, then dowels shall be inserted by tapping. These holes shall be blown clear of loose particles and dust prior to installing epoxy bonding compound. Where shown on the Drawings, expansion bolts shall be installed in place of bonded dowels.

B. Unless otherwise noted on the Drawings, No. 5 dowels set 12 inches into the concrete, and projecting 12 inches, 24 inches on center shall be used.

C. Where it is necessary to expose existing reinforcement, the reinforcing rods shall be cleaned by wire brushing and new reinforcement shall be hooked into existing reinforcement and lapped or welded as directed. Reinforcing rods shall have at least 3/4 inch clearance around each bar.

D. All mixing and application of the epoxy shall be done in strict accordance with the printed instructions of the approved manufacturer. The Contractor shall submit to the Engineer, when requested, evidence indicating that the proposed applicators are fully qualified to perform the work and any proposed applicator found to be not qualified shall, be removed forthwith by the Contractor.

E. Preparation of Concrete Surfaces:

1. Surfaces must be clean and sound. Surfaces may be dry, damp, or wet, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials by mechanical abrasion methods such as sandblasting.

2. If the concrete surfaces are sound and it is only necessary to remove laitance, grease or dust, the Contractor may, with the prior written approval of the Engineer, forego sandblasting and wash the concrete with a degreasing and etching chemical applied in accordance with the manufacturer's (ProSoCo, Inc., Kansas City, Kansas, Sure-Klean Degresser & Etch, or approved equal) written instructions and as stipulated in these Specifications hereinafter.

3. Degreasing and Etching Chemical:

   Color: Water White; Flash Point: Above 150 Deg.VF; Weight/gallon: 9.0 lbs.; Composition and Materials: A blend of organic and inorganic acids with a special solvent system incorporating wetting agents for emulsification.

4. Application of degrease and etching compound. Pre-wet concrete surfaces with clean water. Brush concentrated cleaner onto concrete surface. Let stand 3 to 4 minutes and reapply, brushing stained areas vigorously. Rinse off with fresh water applied at a minimum pressure of 800 psi and a minimum volume of five gallons per minute.

F. Proportioning/Mixing/Applying Epoxy Compound:

1. Volumetric ratio of bonding compound is 1:1 (B:A). To mix, proportion 1 part B and 1 part A into clean pail. Mix thoroughly for 3 minutes with a steel mixing paddle on low-speed (400 to 600 rpm) drill until blend is a uniform straw color. Mix only that amount of epoxy that can be used in 30 minutes at 73 degrees F.

2. Application for Bonding:

   a. The area to be overlaid shall be covered with one coat of the epoxy compound applied with long-nap paint rollers, brushes, brooms or by spray. The rate of application shall be 80 sq. ft./gal. maximum or smooth concrete (20 mils). As the concrete increases in roughness, the rate of coverage decreases proportionally.

   b. While the epoxy compound is still tacky (3-5 hrs. at 73oF) place the concrete. If the bonding compound should harden before the concrete is placed, apply a fresh coat over the hardened coat and proceed.

3. Application for Grouting: To prepare a grout to anchor bolts or level base plates, mix the epoxy compound with granules recommended and supplied by the epoxy manufacturer. The amount granules used should be the maximum amount possible while still maintaining a pourable consistency. The ratio should be approximately 1:1-1/2 by loose volume (Granules). See technical data on anchor bolt grouting and grouting base plates published by the manufacturer.

4. Limitations:

   a. Do not thin the epoxy bonding compound. Solvents will prevent proper cure.

   b. Use only oven-dry granules to avoid encapsulation of moisture.

Exposure to temperatures (after cure) above 180 degrees F (dry) and 120 degrees F (wet) not recommended.

G. WEATHER LIMITATIONS

1. The epoxy compound shall be placed only when both the concrete surface temperature and the ambient temperature is 40 degrees F and rising.

H. SAFETY

1. The Contractor shall require applicators to wear protective clothing, gloves, goggles and barrier creams.

3.05 OPENINGS IN CONCRETE

A. Where openings are required for pipes, thimbles for gates, gate stems or other installations in existing concrete structures, the Contractor shall cut the existing concrete within the limits required, as shown on the Drawings or specified, expose the existing reinforcing steel and perform the work in such a manner as to prevent damage to the existing adjacent structures or equipment.

B. Unless otherwise permitted, line drilling will be required.

C. Where concrete is cut to provide openings for gate stems, pipe sleeves shall be accurately installed and grouted in place in an approved manner.

1. The exposed reinforcement shall be cleaned by wire brushing, then cut and bent to permit the installation and finally bent around the new pipe or thimble. Additional reinforcement shall be provided as shown on the Contract Drawings for typical reinforcing details of openings in walls and slabs, except as otherwise shown, specified or required.

2. After installation of pipelines and thimbles, etc., the existing concrete shall be prepared as specified above in Paragraph 3.03C and the void between the outside of the pipe or thimble and the existing concrete shall be filled with non-shrink grout.

END OF SECTION

SECTION 03800

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concrete masonry units.

2. Steel reinforcing bars.

1.02 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

1.04 INFORMATIONAL SUBMITTALS

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

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

1.05 FIELD CONDITIONS

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

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

PART 2 - PRODUCTS

2.01 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

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

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.02 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.

2. Density Classification: Normal weight.

2.03 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold- weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

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

D. Aggregate for Mortar: ASTM C 144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.

E. Aggregate for Grout: ASTM C 404.

F. Water: Potable.

2.04 REINFORCEMENT

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

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Heckmann Building Products Inc.; No. 376 Rebar Positioner.

b. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.

c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

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

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Spacing of Cross Rods: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.05 TIES AND ANCHORS

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

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

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized-steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized-steel wire.

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- thick steel sheet, galvanized after fabrication.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch diameter, hot-dip galvanized-steel wire.

D. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.06 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" and as follows:

1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.

a. Products: Subject to compliance with requirements, provide one of the following:

1) Advanced Building Products Inc.; Peel-N-Seal.

2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.

3) Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.

4) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.

5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.

6) Hohmann & Barnard, Inc.; Sando-Seal.

7) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.

8) Polyguard Products, Inc.; Polyguard 400.

9) Williams Products, Inc.; Everlastic MF-40.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

1. Products: Subject to compliance with requirements, provide products by the following:

a. Mortar Net USA, Ltd.

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

2.07 MISCELLANEOUS MASONRY ACCESSORIES

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

B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.08 MORTAR AND GROUT MIXES

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

1. Do not use calcium chloride in mortar or grout.

2. Use portland cement-lime mortar unless otherwise indicated.

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

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

1. For masonry below grade or in contact with earth, use Type S.

2. For reinforced masonry, use Type S.

3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.

4. For interior nonload-bearing partitions, Type O may be used instead of Type N.

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

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.

3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

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

3.02 TOLERANCES

A. Dimensions and Locations of Elements:

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

B. Lines and Levels:

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

C. Joints:

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

3.03 LAYING MASONRY WALLS

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

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

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

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

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

F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.04 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.

2. Bed webs in mortar in all courses of piers, columns, and pilasters.

3. Bed webs in mortar in grouted masonry, including starting course on footings.

4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

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

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

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

3.05 MASONRY-JOINT REINFORCEMENT

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

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

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

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

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

3.06 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

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

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

3.07 FLASHING

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

B. Install flashing as follows unless otherwise indicated:

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

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

3.08 REINFORCED UNIT MASONRY INSTALLATION

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

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

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

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

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

2. Limit height of vertical grout pours to not more than 60 inches.

3.09 FIELD QUALITY CONTROL

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

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of siteprepared mortar.

2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

3. Place grout only after inspectors have verified proportions of site-prepared grout.

3.10 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.11 REPAIRING, POINTING, AND CLEANING

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

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

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.

2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.12 MASONRY WASTE DISPOSAL

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

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

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

END OF SECTION

SECTION 09900

PROTECTIVE COATINGS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This Section covers the work required to provide all labor, materials, equipment and incidentals to perform all of the necessary surface preparation and painting required to complete this contract in its entirety.

B. It is the intent of these Specifications to paint all concrete, exposed miscellaneous metal, pipe, fittings, valves, equipment and all other work required to be painted unless otherwise specified. Minor items omitted in the schedule of work shall be included in the work of this Section where they come within the general intent of the specifications as stated herein.

C. The following surfaces or items are "NOT" required to be coated:

1. Aluminum: gratings, checkered plates, hatches, handrails, toe boards, stairways and walkways
2. Stainless steel, brass, bronze, and aluminum other than exposed tubing
3. Piping buried in the ground or embedded in concrete
4. Ducts, pipes and other miscellaneous items covered with insulation or plastic coated
5. Concealed surfaces of pipe or crawl spaces
6. Finish hardware
7. Nonferrous architectural metals, unless specifically noted otherwise
8. Packing glands and other adjustable parts and nameplates of mechanical equipment
9. Exterior concrete slabs and equipment

1.02 RELATED WORK

Individual specification sections.

1.03 ABBREVIATIONS

The abbreviations and definitions listed below, when used in this Section, shall have the following meanings:

ANSI	American National Standards Institute
ASTM	American Society of Testing Materials
AWWA	American Water Works Association
DFT	Dry Film Thickness
FPP	Fiberglass Reinforced Plastic

HCI	Hydrochloric Acid
MDFT	Minimum Dry Film Thickness
MDFTPC	Minimum Dry Film Thickness Per Coat
mil	Thousandths of an Inch
MIL-P	Military Specification - paint
NACE	National Association of Corrosion Engineers
NSF	National Sanitary Foundation
OSHA	Occupational Safety and Health Act
SFPG	Square Feet Per Gallon
SFPGPC	Square Feet Per Gallon Per Coat
SP	Surface Preparation
SSPC	Steel Structures Painting Council

1.04 SUBMITTALS

A. Submittals will be made with the coating system data sheet included at the end of this section.

B. The following shall be submitted for each proposed coating system: manufacturer's specifications, surface prepared details, application procedures, technical data sheets, and dry film thickness or coverage.

C. Unless otherwise specified, hereinafter and before any painting work is started prepare with type of paint and application specified, and on similar substrate, to which paint is to be finally applied, samples not less than 8” in size.

D. Furnish additional samples as required until colors, finishes and textures are acceptable. Retain accepted samples to be used as the quality standard for final finishes.

E. Before proceeding with the work under this Section, finish one complete space or item of each color scheme required showing selected colors, finishes and textures are acceptable. Retain accepted samples to be used as the quality standard for final finishes.

F. Schedule of Painting Operations: The Contractor shall submit for review a complete schedule of painting operations 30 days from the notice to proceed.

1.05 QUALITY ASSURANCE

A. The paint manufacturer shall provide a representative to visit the job site at intervals during surface preparation and painting as may be required for product application quality assurance and to determine compliance with manufacturer’s instructions and these Specifications, and as may be necessary to resolve field problems attributable to, or associated with, the manufacturer’s products furnished under this Contract.

B. A site visit report shall be prepared and submitted by paint manufacturer’s representative documenting compliance with the manufacturer’s recommended applications.

1.06 INSPECTION

A. The Contractor shall give the Engineer a minimum of three days advance notice of the completion of any surface preparation work or start of coating application work.

B. Before application of the prime coat and each succeeding coat, all surfaces to be painted shall be inspected by the Engineer. Any and all defects of deficiencies shall be corrected by the Contractor before application of any subsequent coating.

C. Coating applications shall be checked for required MDFT as per these specifications. All coated surfaces failing to meet the MDFT requirements shall be rejected.

D. For all coatings subject to immersion, full cure must be obtained for the completed system. Consult the coatings manufacturer's written instructions for these requirements. The coatings shall not be immersed for any purpose until completion of the curing cycle.

E. Inspection by the Engineer of the waiver of inspection of any particular portion of the work shall not be construed to relieve the Contractor of his responsibility to perform the work in accordance with these specifications.

1.07 PAINT DELIVERY AND STORAGE

All materials shall be new and shall be delivered to the project site in unopened containers that plainly show, at the time of use, the designated name, date of manufacturer, color, and name of manufacturer. Paints shall be stored in a suitable protected area that is heated or cooled as required to maintain temperatures within the range recommended by the paint manufacturer.

1.08 PROJECT SITE CONDITIONS

The location of this project is Broward County, Florida requires observance and conformance with EPA Volatile Organic Compound (VOC) restrictions. EPA limits the content of VOC's in painting materials to 2.5 lb/gallon. Information regarding the VOC content of proposed paints will be required during submittals.

1.09 WARRANTY

Contractor shall warrant to the Owner and guarantee the work under this Section against defective workmanship and materials for a period of two years commencing on the date of Final Acceptance of the Work. This warranty does no alleviate the Contractor or supplier of implied or other specified or written warranties for long term product quality.

PART 2 - PRODUCTS

2.01 GENERAL

Products containing lead will not be allowed. Oil shall be pure boiled linseed oil.

2.02 PAINT MATERIALS

A. Products shall be as manufactured by Tnemec Company, Inc., Kerneos Alumininate Technologies or approved equals.

B. The following paint products are by Tnemec Company, Inc. and Kerneous, as applicable, and are used for the basis of establishing the desired quality expected for the project.

Product Type	Company	Product Name
Coal Tar Epoxy	Tnemec	46H-413
Polyamine Epoxy (Non Potable)	Tnemec	Series 104 H.S. Epoxy
Vinyl Ester	Tnemec	Series 120 Vinester
Polyamide Epoxy	Tnemec	Series 66Hi-Build Epoxoline
Mortar	Kerneos	Supercoat PG

2.03 COLORS

A. Provide as selected by the Owner.

B. Formulate with colorants free of lead, lead compounds, or other materials which might be affected by presence of hydrogen sulfide or other gas likely to be present at the project.

C. Proprietary identification of colors if for identification only. Any authorized manufacturer may supply matches.

2.04 TESTING GAUGES

A. Furnish a magnetic type dry film thickness gauge, to test coating thickness specified in mils, as manufactured by:

1. Nordson Corp., Anaheim, CA, Mikrotest

2. Or equal

B. Furnish an electrical holiday detector, low voltage, wet sponge type to test finish coat, except zinc primer, high-build elastomeric coatings, and galvanizing, for holidays and discontinuities as manufactured by:

1. Tinker and Rasor, San Gabriel, CA, Model M-1

2. Or equal

C. Furnish a high voltage holiday detector for elastomeric coatings in excess of 25 mils dry film thickness. Unit to be as recommended by the coatings manufacturer.

PART 3 - EXECUTION

3.01 PROTECTION OF SURFACES NOT TO BE PAINTED

A. Mask or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates and other surfaces not intended to painted which cannot be removed.

B. Provide drop cloths to prevent paint materials form falling on or marring adjacent surfaces.

C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting processes. Openings in motors shall be masked to

prevent paint and other materials from entering motors.

3.02 ENVIROMENTAL CONDITIONS

A. Coatings shall not be applied in temperature exceeding the manufacturer's recommended maximum and minimum allowable, nor under adverse conditions such as dust, smoke-laden atmosphere, damp or humid weather.

3.03 SAFETY

A. Coating shall be performed in strict accordance with the safety recommendations of the coating manufacturer; with the safety recommendations of the national Association of Corrosion Engineers contained in the publication, Manual for Painter Safety; Federal, state and local agencies having jurisdiction.

B. Ultimate responsibility for safety is Contractor's.

3.04 PREPARATION OF SURFACES

A. All surfaces to be coated shall be prepared as specified herein and shall be dry and clean before coating. Specific surface preparation shall be specified for the individual coating systems.

B. Steel shall be blasted unless otherwise specified. Blasting shall be done with a centrifugal wheel or compressed air blasting equipment, using proper abrasives to attain an average profile depth of 1.5 mils.

Do not re-use sand or flint abrasives. Short abrasives must be thoroughly clean of contamination before re-use. Blow dust and grit from surface with clean, dry air. Coat within 8 hours or before rust contamination occurs.

C. All concrete shall have cured for 28 days.

3.05 COATING SYSTEM INDEX

The following is a general index to the coating system description described herein:

System No.	Title
1	Exterior of New Concrete
2	Interior of New Valve Vaults, Air Release Structures
3	Exposed Metal Highly Corrosive
4	Submerged Metal - Domestic Sewage
5	Exposed Metal - Moderate Corrosive Conditions
6	Concrete Lining – Pump Station Wetwell, and Manhole
7	Interior and Exterior Concrete

3.06 COATING SYSTEMS

A. <u>System No. 1 Exterior of New Concrete Structures, Valve Vault, Wet Well</u>

Surface Preparation: All curing oils, form oils, laitance, soluble salts and loose concrete must be removed. Concrete must be dry and thoroughly clean before coatings.

Prime Coat:	None required.
Top Coat:	Coal tar epoxy at 8.0 mils DFT per coat.
MDFT:	16 mils DFT for two-coat system. Allow minimum of 24 hours drying time between coats.
Color:	First Coat – Red Second Coat – Black

B. System No. 2 – Interior of New Valve Vaults, Air Release Structures

Surface Preparation:	Concrete: All curing oils, form oils, laitance, soluble salts and loose concrete must be removed. Concrete must be dry and thoroughly clean before coatings. Concrete shall be cured 28 days, brush off blast.
Filler/Surfacer:	Concrete substrate surface with cracks and/or voids greater than ½ : in depth or width or areas where underlying aggregate has been exposed shall be patched with filler and surfacer. Material shall be applied in accordance with the manufacturer's application instructions.
Prime Coat:	Vinyl Ester 12.0 to 18.0 mils DFT or polyamide epoxy, Tnemec Series 66 or 69 Hi-Build, 4 mils DFT.
Top Coat:	Vinyl Ester 12.0 to 18.0 mils DFT or polyamide epoxy, Tnemec Series 66 or 69 Hi-Build, 8 mils DFT.
MDFT:	Minimum 30 mils of DFT for two-coat vinyl ester system or 12 mils MDFT polyamide epoxy system. Time between coats and method of application shall be as per manufacturer's written instructions.
Color:	First Coat – Beige (5002) Second Coat – Gray (5001)

C. System No. 3 – Exposed Metal – Highly Corrosive

Surface Preparation:	Abrasive blast clean to an SSPC-SP10 (near white metal).
Prime Coat:	Polyamine epoxy at 6.0 to 8.0 mils DFT.
Top Coat:	High build acrylic polyurethane at 2.0 to 4.0 mils DFT.
MDFT:	9 mils DFT for two-coat system.
Color:	As selected by Owner from manufacturer's standard available colors.

D. System No. 4 – Submerged Metal – Domestic Sewage, Pump Station Wet Well Piping

Surface Preparation:	Abrasive blast or centrifugal wheel blast, SSPC-SP5.
Prime Coat:	Polyamide, anti-corrosive, epoxy primer, 1 coat, 2.5 MDFT.

Top Coat:	Coat-tar epoxy, 2 coats, 16 MDFT.
MDFT:	18.5 mils MDFT for system.

E. System No. 5 – Exposed Metal – Moderate Corrosive Conditions, Valve Pit Piping and Valves

Surface Preparation:	Abrasive blast or centrifugal wheel blast, SSPC-SP10.
Prime Coat:	Polyamide, anti-corrosive, epoxy primer, 1 coat, 2.5 MDFT.
Top Coat:	Polyamide epoxy, Tnemic Series 66 or 69, 2 coats, 8 MDFT
MDFT:	10.5 mils DFT for three coats.

F. System No. 6 –Concrete Lining – Pump Station Wet Well, and Manholes

Surface Preparation:	All curing oils, form oils, laitance, soluble salts and loose concrete must be removed. Concrete must be saturated with water prior to application of the lining materials.
Inflow Prevention:	Existing manholes may need rapid setting crystalline enhanced hydraulic cement product specifically formulated for infiltration control that shall be used to stop minor flows. The material shall have the following strength requirements: Compressive Strength (ASTM C597B) 600 psi (24 hours) 1,000 psi (7 days) and Bond Strength (ASTM C321) 30 psi (1 hour), 80 psi (1 day).
Lining:	See section 03769 Sewage Pump Station Structure and Manhole Rehabilitaton.
Curing:	If environment is not moist enough for natural curing, the Contractor may be required to apply a curing compound per the requirements of ASTM C309.

G. System No. 7 – Interior and Exterior Concrete

Surface Preparation:	Abrasive blast, 4,000 psi
Coating:	3 coats, Polyamide epoxy, Tnemec Series 66 or 69 Hi-Build Epoxoline.
MDFT:	12 mils DFT for three-coat application.

3.07 UNIDENTIFIES SURFACES

Any surfaces not specifically named in the schedule and not specifically accepted shall be prepared, primed and coated in the manner and with material consistent with these Specifications. The Engineer shall select which of the manufacturer's products, whether the type is indicated herein or not, shall be used for such unnamed surfaces. The painting shall be done within the scope of the contract.

3.08 WORKMANSHIP

A. On metal surfaces apply each coat of paint at the rate specified by the manufacturer to achieve the minimum dry mil thickness required. If material has thickened or must

be diluted for application by spray gun, the coating shall built up to the same film thickness achieved with undiluted material. One gallon of paint as originally furnished by the manufacturer shall not cover a greater area when applied by spray gun than when applied unthinned by the application of an additional coat(s). On masonry, application rates will vary according to surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the painters responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or applying additional coats of paint.

B. All safety equipment shall be painted in accordance with OSHA Standards as approved.

C. Materials shall be mixed in proper containers of adequate capacity. All materials shall be thoroughly stirred before use and shall be kept stirred while using. No unauthorized thinners or other materials shall be added to any paint.

D. Only skilled painters shall be used on the work and specialists shall be employed where required.

E. Steel members, metal castings, mechanical and electrical equipment and other metals which are shop primed before deliver at the site will not require a prime coat on the job. All piping and other bare metals to be painted shall receive one coat of primer before exposure to the weather, and this prime coat shall be the first coat as specified in the painting schedule.

F. Finish surfaces shall not show brush marks or other irregularities. Undercoats shall be thoroughly and uniformly sanded with No. 00 sandpaper or equal to remove defects and provide a smooth, even surface.

G. Before final acceptance of the work, all damaged surfaces of coating shall be cleaned and repainted as directed by the Engineer.

3.09 APPLICATION SCHEDULE

A. System No. 1 – Exterior of New Concrete – This system shall be used on the exterior of all new pre-cast concrete valve vaults, manholes, and constructed wetwell.

B. System No. 2 – Interior of New Valve Vaults and Air Release Structures – This system shall be used in the interior of all new concrete valve vaults. Pre-cast concrete shall be coated prior to installation. Coating shall extend through the pre-cast joints.

C. System No 3 – Exposed Metal – Highly Corrosive – This system shall be used on all metal surfaces exposed to weather including equipment, conduits, piping, exposed metal frames and elsewhere as scheduled. Galvanized piping and aluminum hatches do not require painting.

D. System No. 4 – Submerged Metal – Domestic Sewage, Pump Station Wet Well Piping – This system shall be used for wet well piping, wet well ferrous metals.

E. System No. 5 – Exposed Metal – Moderate Corrosive Conditions, Valve Pit Piping and Valves – This system shall be used for interior piping, structural steel and interior dry pit metals.

F. System No. 6 –Concrete Lining – Pump Station Wet Well, and Manholes– This system shall be used in wet well and manholes. Existing manholes to be rehabilitated as specified.

G. System No. 7 – Existing Concrete Exposed – This system shall be used on the headworks structure area as specified in the contract drawings.

3.10 CLEANUP

A. It shall be the responsibility of the Contractor to collect and dispose of property, all waste materials from the site in accordance with all requirements of the Federal, state, and local environment protection agencies.

B. At completion of the work, remove all paint where it has been spilled, splashed, splattered, sprayed, or smeared on all surfaces, including glass, light fixtures, hardware, equipments, painted and unpainted surfaces.

C. After completion of all paintings, the Contractor shall remove from the job site all painting equipment, surplus materials and debris resulting from this work.

3.11 MANUFACTURER'S SERVICE

Furnish paint manufacturer representative to visit job site at intervals during surface preparation and painting as may be required for product application quality assurance, and to determine compliance with manufacturer's instructions and these specifications, and as may be necessary to resolve field problems attributable to, or associated with, manufacturer's products furnished under this Contract.

3.12 COATING SYSTEM DATA SHEET

To be included with submittal. See form on next page.

END OF SECTION

COATING SYSTEM DATA SHEET
(to be included with submittal)

Coating System Number (From Spec): _____

Coating System Title (From Spec): _____

Coating Supplier Name & Address: _____

_____

_____

Local Representative Name & Address: _____

_____

Manufacturer Representative Authorized to Certify Proper Installation Name & Address: _____

_____

Surface Preparation: _____

_____

Coating Material (Generic)	Product Number/Name (Proprietary)	Coats/Minimum Coverage	Color

Notes:

_____

_____

SECTION 11330

CHANNEL MONSTER®

OPEN CHANNEL-ELECTRIC GRINDER WITH ROTATING SCREEN DRUM-SERIES CMD-XDS2.0

PART 1 - GENERAL

1.01 SUMMARY

A. This section of the specification describes the grinder(s) and controller(s). The equipment shall be installed as shown on the plans, as recommended by the supplier, and in compliance with all OSHA, local, state and federal codes and regulations.

B. The number of Channel Monster(s) and controller(s) shall be 1.

C. All stainless steel will be 316 unless noted.

1.02 REFERENCES

A. Grinder(s) shall, as applicable, meet the requirements of the following industry standards:

1. American Society for Testing and Materials (ASTM) A36: Carbon Steel Plate
2. American Society for Testing and Materials (ASTM) A536-84: Ferritic Ductile Iron Castings
3. American Society for Testing and Materials (ASTM) A48-83: Grey Iron Casting
4. American Society for Testing and Materials (ASTM) A743 Stainless Steel Casting
5. American Iron and Steel Institute (AISI) 303 Stainless Steel
6. American Iron and Steel Institute (AISI) 304 Stainless Steel
7. American Iron and Steel Institute (AISI) 316 Stainless Steel
8. American Iron and Steel Institute (AISI) 4130 Heat Treated Alloy Steel
9. American Iron and Steel Institute (AISI) 4140 Heat Treated Alloy Steel
10. American Iron and Steel Institute (AISI) 8620 Heat Treated Alloy Steel
11. American Iron and Steel Institute (AISI) 17-4 Stainless Steel
12. Society of Automotive Engineers (SAE) 660 Bearing Bronze

B. Controllers shall, as applicable, meet the requirements of the following Regulatory Agencies:

1. National Electrical Manufacturer's Association (NEMA) Standards
2. National Electric Code (NEC)

3. Underwriters Laboratory (UL and cUL)

4. International Electrotechnical Commission (IEC)

1.03 DOCUMENTS

A. Submittals

1. Supplier shall submit six (6) sets of submittals. Submittals shall include equipment descriptions, functional descriptions, dimensional and assembly drawings, catalog data, and job specific drawings.

B. Operation and Maintenance Manuals.

1. The supplier shall provide three (3) Operation & Maintenance manuals. An electronic version shall be supplied to create additional copies. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques, a recommended schedule, and the recommended lubricants.

1.04 QUALITY ASSURANCE

A. Identification

1. Equipment shall be identified with a corrosion resistant nameplate affixed in a conspicuous location.

2. Nameplate information shall include manufacturer's name and address, equipment model number, and serial number.

B. Manufacturer

1. Supplier shall have a minimum 30 years experience as a manufacturer of municipal waste water equipment and a minimum 1,000 prior installations of similar equipment.

2. Supplier shall provide a list of reference sites for similar equipment for verification by the Engineer or Owner's Representative.

3. Supplier shall conduct factory testing and verification of equipment prior to shipment.

4. Supplier shall have factory owned bi-coastal service centers.

C. Installation & Start-up

1. Supplier shall provide services of a factory trained representative to check installation and review start-up of equipment and controls.

2. Supplier Representative shall inspect and approve site installation and supervise a review of the operation of the equipment.

3. Supplier Representative shall provide training on operation and maintenance requirements of the equipment.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Packaging

1. Containers or skids shall be constructed for normal shipping, handling, and storage.

2. Containers shall provide adequate protection for the equipment in a dry indoor environment between +40o F (+4.5o C) and +100o F (+37.8o C).

1.06 WARRANTY

1. Manufacturer's standard 12-month limited warranty shall start from Owner acceptance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Grinder(s) and controller(s) shall be in accordance with these specifications and plans and shall be supplied by one of the following manufacturers:

1. JWC Environmental, 2850 Red Hill Ave., Suite 125, Santa Ana, CA 92705; Tel: 800-331-2277 www.jwce.com
JWC Environmental Model CMD3210-XDS-2.0 Channel Monster.

JWC Environmental Model PC2200 Controller.

2. Approved equal.

B. Manufacturers requesting to be selected as an approved equal shall submit certified documentation including installation lists with phone numbers, equipment drawings, flow performance curves, electrical schematics and cut sheets, O&M draft showing compliance with these specifications a minimum of ten (10) days prior to bid opening. Selected equipment manufacturers shall be added to the list of approved manufacturers.

C. Selected approved equal manufacturers shall conduct an onsite test within ten (10) days of installation demonstrating compliance with all areas of this specification.

2.02 GRINDER

A. General

1. Grinder shall reduce or shred influent solids for protection of downstream equipment. Grinder shall be two shafted design consisting of individual cutters and spacers, with cutters on drive and driven shafts of equal diameter. The grinder shall have two rotating screen drums that shall collect solids too large to pass through the screen drum and direct them to the cutters for solids reduction. Grinder shall have a single motor and speed reducer to drive both the cutters and the screen drum.

B. Components

1. Wipes Cutters and Spacers

a. Cutting stack shall be a nominal height of 32-inches.

b. Cutter shall be an individual disk constructed of AISI alloy steel surface ground to thickness of .438-inches +.000/-.001 (7.87 mm +.000/-.003).

c.

d. Cutters shall be heat treated to produce a hardness of 45-53 Rockwell C.

e. Wipe cutters shall have 17 cam shaped teeth with serrated tips. Tooth height shall not be greater than ½-inch (13 mm) above the root diameter of the cutter. OD shall be 4.71-inches (120 mm).

f. Spacers shall be an individual disk constructed of AISI alloy steel surface ground to a thickness of .446-inches +.001/-.000 (8.10mm +.003/-.000).

g. Spacers shall have a hardness of 34-38 Rockwell C.

h. Spacers shall have a knurled outside diameter with no tooth profiles.

2. Shafts

a. Shafts shall be constructed from AISI 4140 alloy steel with a minimum tensile strength of 170,000 PSI (1,172 kPA).

b. Shafts shall measure a nominal 2-inches (51 mm) across flats of hex.

c. Shafts shall be hardened to 38-42 Rockwell C.

3. Intermediate Shaft Collars with Vertical Support Structure

a. Intermediate shaft collars shall be constructed of ASTM A743 stainless steel, AISI 17-4 stainless steel and SAE 660 bearing bronze.

b. Shaft collars shall be lubricated with high temperature marine grade grease at the factory.

c. Grease fittings on the shaft collars shall be provided for periodic maintenance.

d. Intermediate shaft collars shall provide radial support to the shafts during severe grinding demands.

e. Vertical support structure shall be constructed of stainless steel.

f. Vertical support structure shall have brackets to locate and secure intermediate shaft collars within the cutter stack.

g. Vertical support structure shall have a shape that coincides with the radial profile of the cutters to allow for a close interface.

h. Vertical support structure shall have adjustable brackets for mounting to the top and bottom end housings.

i. Intermediate shaft collars and vertical support structures shall only be supplied on cutter stacks of 32-inches (813mm) and taller.

4. Seal Cartridges

a. Seal cartridges shall be rated to a maximum of 90 PSI (620 kPA).

b. Seal cartridges shall not require flushing.

c. Dynamic and rotating seal faces shall be constructed of tungsten carbide with 6% nickel binder.

d. O-rings shall be constructed of Buna-N (Nitrile).

e. Radial and axial loads shall be borne by sealed, oversized, deep-groove ball bearings.

5. Housings and Covers

a. End housings and top cover shall be constructed of ASTM A536-84 ductile iron.

b. End housings shall have integral bushing deflector to guide solids from seal cartridges.

c. Bottom cover shall be constructed of ASTM A-36 rolled steel.

6. Side Rails

a. Side rails shall be constructed of ASTM A536-84 ductile iron.

b. Drum side rail shall have a UHMW sealing strip for creating an adjustable interface between the side rail and the rotating drum.

c. Cutter side rail shall have evenly-spaced horizontal slots to increase flow and decrease water head loss through the grinder. Slots shall only be located on the upstream or influent side of the rail and the effluent side of the rail shall be void of slots to allow for unobstructed flow.

d. Inside profile of the cutter side rail shall be concave and follow the radial arc of the cutters.

e. Clearance between the outside diameter of cutters and concave arc of the cutter side rail shall not exceed 5/16-inch (7.9 mm).

f. Side rails shall have integral guide slot for installing into framework.

7. Perforated Screen Drum

a. Perforated screen drum shall be constructed of 11 gauge (.120") stainless steel with 1/2-inch (12.7 mm) diameter holes.

b. Perforated screen drum shall have center ring supports, end flanges, and stub shafts to properly support the perforated screen.

c. Perforated screen drum shall have no shaft in center of drum.

d. Perforated screen drum shall be electropolished.

8. Speed Reducer

a. Reducer shall be manufactured by Sumitomo Machinery Corporation of America.

b. Reducer shall be internal planetary mechanism with trochoidal curved tooth profile.

c. Reducer shall be a vertically mounted with 29:1 single reduction.

d. Reducer shall be grease lubricated.

9. Motor

a. Motor shall be 5 hp (3.7 kW), XPNV, 1770 rpm, 460 volt, 3 phase, 60 Hz

b. Motor shall be U.L. rated NEMA 6P, Class I, Div. I Groups C&D, Class II Div. II, Groups F&G, Class III Div. I

c. Motor shall have additional rating of 40 consecutive days of submergence at a maximum depth of 40 feet.

d. Motor shall not utilize fan cooling at any time during operation.

e. Motor shall utilize ceramic shaft seal requiring no oil lubrication.

f. Motor shall have a minimum service factor of 1.15, 91% minimum efficiency factor at full load, minimum 76% power factor at full load.

C. Performance

1. Grinder shall be capable of processing up to 1800 GPM peak (Refer to JWC flow curves for actual operating point).

2. Grinder shall provide a minimum peak shaft torque of 3,981 lb-in/hp (603 Nm/kW).

3. Grinder shall provide a minimum peak force at cutter tip of 1,717 lbf/hp (10,240 N/ kW).

2.03 FRAME AND SUPPORTS

A. General

1. Frame and/or supports shall provide a method for properly securing the grinder in an open channel or wet well. The frame shall allow installation or removal without any disassembly of the frame or grinder.

B. Components

1. Frame and/or supports shall be constructed of AISI 316 stainless steel.

2. Frame shall provide proper support and interface to prevent unwanted bypass.

3. Frame shall utilize guides that insert into the grinders side rail slots to properly position and locate the grinder.

2.04 CONTROLLER

A. General

1. Controller shall provide control of the grinder and screen drum and be designed to control one (1) 5 hp (3.7 kW), 460 volts, 3 phase, 60 Hz. The controller shall have indicator lights, switches and other control devices.

B. Components

1. Enclosures

a. Enclosure shall be fiberglass reinforced polyester NEMA 4X.

b. Enclosure shall house the control devices, motor starter, and PLC.

2. Grinder ON-OFF/RESET-REMOTE three-position 22mm type, NEMA 4X selector switch

a. In the OFF/RESET position, the grinder shall not run.

b. In the ON position, the grinder shall run continuously.

c. In the REMOTE position, the grinder shall start and stop as controlled by an external device.

d. Selector switch shall be the only method for resetting the controller after a failure.

3. Pilot Lights

a. Lights shall be LED type 22 mm, rated NEMA 4X.

b. Lights shall indicate POWER ON, RUN, and FAIL.

4. Programmable Logic Controller (PLC)

a. PLC shall be manufactured by Panasonic.

b. PLC shall have a minimum of 16K of memory.

5. Motor Starter

a. Starter shall be a full-voltage reversing type with 120 volt operating coil.

b. Overload relays shall be adjustable and sized to full load amperes (FLA) of the motor.

6. Control Transformer

a. Control transformer shall be minimum 130 VA.

b. Control transformer primary and secondary shall be fused for over current protection.

7. Current Transducer

a. Current transducer shall be manufactured by Veris Industries.

b. Current transducer shall have adjustable set point from 1-135A with 200ms or less response time.

C. Performance

1. When a grinder jam condition occurs, the controller shall stop the grinder and reverse the grinder rotation to clear the obstruction. If the jam is cleared, the controller shall return the grinder to normal operation. If three (3) reverses occur within a 30 second interval, the controller shall stop the grinder motor and activate the grinder FAIL indicator and relay.

2. When a power failure occurs while the grinder is operating, the grinder will resume operation once power is restored.

3. When a power failure occurs while the grinder is in a fail condition, once power is restored the fail indicator shall reactivate and remain until reset.

4. Reset of the grinder and shall be accomplished from the controller only.

PART 3 - EXECUTION

3.01 INSTALLATION

Grinder(s) and controller(s) shall be installed in accordance with supplier's installation instructions, and in accordance with all OSHA, local, state, and federal codes and regulations.

3.02 TESTING

Test of grinder(s) shall demonstrate correct alignment, smooth operation. Test period shall demonstrate simulated jam conditions for both grinder and screen drums.

3.03 TRAINING

A field training course shall be provided for operation and supervisory staff members. Field instruction shall cover items for successful operation contained in the operation & maintenance manuals.

END OF SECTION

SECTION 13300

CONTROL SYSTEM
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Work includes engineering, furnishing, installing, testing, documenting, and placing in operation the complete Instrumentation and Control Systems or Control System (CS). The work is specified in this Section and further detailed in the following sections:

1. Section 13310 - Field Instruments
2. Section 13315 - Control Panels
3. Section 13320 - Control System
4. Other sections as applicable.

B. The overall system general requirements are given in this section. These requirements apply to each additional section of these specifications as noted herein and as specified in the associated sections.

C. Instrumentation and control systems for this project are intended to be supplied completely under this section. However, some special control devices specifically called out in other specification sections is to be part of those sections, furnished with that equipment. The instruments and controls shall, however, be furnished in conformance to and in coordination with, this section.

D. A SYSTEM SUPPLIER is to be retained by the PUMP MANUFACTURER and is to have overall responsibility for designing, furnishing, interfacing, adjusting, testing, documenting, and starting-up the various CS equipment described in the Contract Documents. The CONTRACTOR is to have overall responsibility for making sure the various systems, trades, suppliers, vendors, subcontractors, etc. come together as a complete coordinated system which will reliably perform the specified functions. The CONTRACTOR shall provide written notification of the intended SYSTEM SUPPLIER at bid time.

E. The SYSTEM SUPPLIER shall provide all equipment, materials, programming, software, calibrations and services that are required to successfully interface and interconnect the system and any other control systems and associated equipment that are specified or designated in any drawings or provisions of these specifications for the purpose of providing a fully integrated and functional control system.

F. The SYSTEM SUPPLIER shall be CC Control Corp., Curry Controls Company, Revere Control Systems, Inc. or Champion Controls. No other SYSTEM SUPPLIERS will be considered.

G. The CONTRACTOR shall ensure that the SYSTEM SUPPLIER coordinates closely with suppliers of other specialty equipment.

1.02 DIVISION OF WORK

A. It is the ultimate responsibility of the CONTRACTOR to furnish a complete and fully operable CS that reliably performs the specified functions. The CONTRACTOR is to assume full responsibility for additional costs, which may result from unauthorized deviations from the specifications. The CONTRACTOR is to establish the actual division of work with the minimum requirements as specified herein.

1. The SYSTEM SUPPLIER shall be responsible for:

a. Panel layouts, wiring, and PLC programming
b. All hardware and software submittals
c. The SYSTEM SUPPLIER shall develop the panel shop drawings, wiring diagrams, plumbing diagrams, PLC, and all other submittals defined herein and in the specification sections identified in paragraph 1.01A hereof. Coordination with the CONTRACTOR and other subcontractors shall be the responsibility of the SYSTEM SUPPLIER.
d. The final Lift Station system operation and reliability
e. The final demonstration tests and training shall be under the on-site supervision of the SYSTEM SUPPLIER.
f. The CS warranty period shall be through the SYSTEM SUPPLIER.
g. Ordering, fabrication, assembly, delivery, and start-up of the CS
h. All panel fabrication shall be performed at the SYSTEM SUPPLIER's shop. The SYSTEM SUPPLIER's personnel shall perform the system checkout tests for the CS.
i. Providing any special manufacturer's cables as required.
j. Designing the final installation and connection requirements of the CS at the jobsite through development of interconnection diagrams.
k. Coordinating all interface requirements with mechanical and electrical system suppliers and furnish any signal isolation devices that might be required in order to insure compatibility between all equipment.
l. Verifying correctness of all final power and signal connections to the CS.
m. The SYSTEM SUPPLIER shall make final adjustments to, and calibrate all, field elements provided with the CS. Ensuring that:
1) All components provided under this section are properly installed.
2) The proper type, size, and number of control wires with their conduits and junction boxes are provided and installed, and
3) Proper electric power circuits are provided for all components and systems.

2. The CONTRACTOR shall be responsible for:

a. Including within the ELECTRICAL SUBCONTRACTOR's scope:
1) The termination of field and power wiring to control panels and field elements. Termination shall be made in accordance with final accepted interconnection diagrams developed by the SYSTEM SUPPLIER. The electrical subcontractor shall

mark on the interconnect diagram the field wire numbers used for each termination point. The SYSTEM SUPPLIER shall finalize the interconnect diagrams by including these field wire numbers in the final as built version.

2) Installing all network cables, including fiber optic cable, interconnecting PICS (Process Instrumentation Control System) supplied equipment.

3) Installing any special manufacturer's cables furnished by the SYSTEM SUPPLIER.

4) Physical installation of control panels.

b. Including within the MECHANICAL SUBCONTRACTOR's scope

1) Installation of any field instrumentation. Installation shall be made in accordance with the manufacturer's recommendations and under the direction of the SYSTEM SUPPLIER.

c. Equipment storage and protection until installed following the storage and handling instructions recommended by the SYSTEM SUPPLIER. Anti-static and winterization requirements shall be per the SYSTEM SUPPLIER's instructions and the SYSTEM SUPPLIER shall periodically verify that these instructions are followed.

d. Incorporating all necessary components into the system.

e. Ensuring that the SYSTEM SUPPLIER coordinate work with other Divisions and Sections of the Specifications.

f. Requiring the SYSTEM SUPPLIER to observe and advise on the installation of equipment furnished by SYSTEM SUPPLIER and installed by Contractor to the extent required to certify, with the operational check-out tests, that the equipment will perform as required.

g. Ensuring that information on equipment provided under other Divisions and needed by the SYSTEM SUPPLIER to coordinate the CS is provided in a timely manner.

h. Equipment found to be defective prior to system acceptance shall be replaced and installed at no additional cost to the OWNER.

i. In the bid price, the CONTRACTOR shall include obtaining the services of authorized field personnel from the manufacturers of specialty instruments, and from the suppliers of application software packages. These personnel shall be on site to supervise installation, start-up, and checkout of the respective portions of the CS.

3. The OWNER shall be responsible for:

a. Network communications programming, and computer system application software, setup, computer hardware configuration drawings, layouts, software, and documentation between lift station and HMI (Human Machine Interface).

b. All application software configurations, including modification of all operator interface screens, reports, and database(s) to incorporate new Lift Station.

c. The integration of the system, including the PLC networking, and computer system network.

d. Furnishing of all data highway, fiber optic, and network cables and associated taps, drops etc.

1.03 RELATED WORK

A. Division 15 – Mechanical. Installation of all mechanical piping and fittings, as well as in-line instruments supplied with and/or for the CS.

B. Division 16 - Electrical. All conduits are provided and installed under Division 16, Electrical. With the exception of certain specified networking and special manufacturer's cables, all wiring and cables are provided and installed under Division 16, Electrical. Division 16 also covers physical installation of the control panels supplied with and/or for the CS.

C. Field devices, such as motorized valves, pump motors, solenoid valves, etc. and local control panels for specialized subsystems, such as chemical feed systems, etc. are supplied and installed under other Divisions contained in these Specifications.

1.04 SUBMITTALS

A. Furnish, as prescribed under the General Requirements, all required submittals covering the items included under this section and its associated sections of the work.

B. Submit complete, neat, orderly, and indexed submittal packages. Handwritten diagrams are not acceptable and all documentation submittals shall be made using CADD generated utilities as specified herein.

C. Partial submittals or submittals that do not contain sufficient information for complete review or are unclear will not be reviewed and will be returned by the ENGINEER as not approved.

D. Provide all shop-drawing submittals on disk in PDF format.

E. Design Related Submittals: Provide individual shop drawing submittals as further defined in each specification section defining the CS. Provide the following additional submittals covering the complete system:

1. Loop diagrams. Consisting of complete wiring and/or plumbing diagrams for each control loop, including all existing loops, showing all terminal numbers, the location of the dc power supply, the location of any booster relays or common dropping resistors, surge arrestors, etc. The loop diagrams shall meet the minimum requirements of ISA S5.4, plus divide each loop diagram into four areas for identification of element locations: CS I/O point(s), panel face, back-of-panel, and field, respectively.

   On each diagram present a tabular summary of:

   a. The output capability of the transmitting instruments
   b. The input impedance of each receiving instrument
   c. An estimate of the loop wiring impedance based on the wire sizes and lengths shown
   d. The total loop impedance
   e. Reserve output capacity.

2. System interconnect diagram. Showing all connections required between component parts of the items covered in this section and between the

various other systems specified in this Contract. Number all electrical terminal blocks and field wiring. Identify each line at each termination point with the same number. Do not use this number again for any other purpose in the complete control scheme.

F. Test Procedures. Submit the Test Procedures to be followed during all system testing. Procedures shall include test descriptions, forms, and check lists to be used to control and document the required tests.

1. Prior to the preparation of the detailed test procedures, submit outlines of the specific proposed tests. Submittals shall include examples of the proposed forms and check lists that will be used by the SYSTEM SUPPLIER during the system testing.

2. After the preliminary test procedure submittals have been reviewed by the ENGINEER and returned stamped either "Approved" or "Approved as Noted, Confirm", the SYSTEM SUPPLIER shall submit the proposed detailed test procedures for ENGINEER approval. Following this, the system tests may be started.

3. Upon completion of each required test, document the test by submitting a copy of the signed off test procedures to the ENGINEER.

G. Training Plan. The SYSTEM SUPPLIER shall submit a training plan which includes:

1. An overview of the training plan, explaining why specific courses are proposed.
2. Definitions of each course.
3. Specific course attendance.
4. Schedule of training courses including dates, duration, and locations of each class.
5. Resumes of the instructors who will actually implement the plan.

H. Spares, Expendables, and Test Equipment Lists Submittal. This single submittal shall contain separate sections for each Subsystem each including:

1. A list of, and descriptive literature for, spares, expendables, and test equipment as specified in the individual Specification Sections covering the CS.

2. A separate list of, and descriptive literature for, additional spares, expendables, and test equipment recommended by the SYSTEM SUPPLIER.

3. Unit and total costs for the additional spare items recommended for each subsystem.

4. Storage instructions for all spare parts.

1.05 FINAL SYSTEM DOCUMENTATION

A. After the demonstration tests have been completed and as a part of the final acceptance requirements, submit the CS record drawings. Record drawings corrected for any changes that may have been made up through Substantial Completion shall include:

1. System block diagram
2. Instrument loop wiring diagrams

3. Panel wiring diagrams covering the complete panel including any components retained from the existing system.
4. Panel elevations
5. Interconnection diagrams showing terminal numbers at each wiring termination

B. Record drawings shall be developed or converted to the latest version of AutoCAD. Provide two copies of all AutoCAD files on separate Compact Disks. Provide two hard copies of drawings in 11 x 17 inch format. Provide two copies of record drawings in PDF format.

C. Operating and Maintenance (O&M) Manuals: Provide the specified number of complete sets of three-ring bound O&M manuals in accordance with Division 1. Provide separate manuals for each Specification Section, clearly marked. Include descriptive material, drawings, and figures bound in appropriate places. Provide two CDs each containing the complete O&M manual in PDF format. Include:

1. Cross-references to 3rd party O&M manuals. These references shall be specific to a particular page or section and not merely a general reference.
2. Additional operating and maintenance instructions in sufficient detail to facilitate the operation, removal, installation, adjustment, calibration, and maintenance of each component provided with the CS.
3. Internal wiring diagrams (not already shown on the panel wiring diagram record drawings) for all components provided in the CS that clearly show all terminal block number designations and wire numbers.
4. All the submittal data for each component from the approved shop drawing submittals with corrections made on approved as noted items.

D. Refer to individual specification sections for final documentation requirements that are in addition to the above.

1.06 QUALITY CONTROL

A. The SYSTEM SUPPLIER shall meet all of the requirements of these specifications, and, unless specifically stated otherwise, no prior acceptance of any subsystem, equipment, or materials has been made.

B. Component equipment shall be as supplied by one of the manufacturers named in the individual specification sections or approved equal. The design of the PICS is based on the first- named manufacturer's equipment if there is a difference.

C. All equipment furnished by the SYSTEM SUPPLIER shall be of the latest and most recent design and shall have overall accuracy as guaranteed by the manufacturer.

D. To facilitate the OWNER's operation and maintenance, products shall be of the same major instrumentation MANUFACTURER, with panel-mounted devices of the same type and model as far as possible.

E. In order to insure the interchangeability of parts, the maintenance of quality, the ease of interfacing between the various subsystems, and the establishment of minimums with regard to ranges and accuracy, strict compliance with the above requirements shall be maintained.

F. The SYSTEM SUPPLIER shall designate a single point of contact for interface with

the ENGINEER on this project. The ENGINEER reserves the sole right to approve or reject this point of contact.

G. The SYSTEM SUPPLIER shall provide, on-site, an experienced project engineer to supervise and coordinate all of the on-site CS activities. An experienced technician may be provided to assist the project engineer in field element installation, field calibration, and checkout tests. The SYSTEM SUPPLIER's project engineer shall be on- site during the period required to effect all of the critical on-site activities related to the CS, particularly the software debugging, PICS training, and witnessed testing activities.

H. The SYSTEM SUPPLIER's selected project personnel shall meet the following requirements:

1. Project engineer shall have at least 10 years' experience in installing similar systems and shall have a minimum of secondary education in the field of electronics or similar technical discipline.

2. Project technician assisting the project engineer for field element calibration and check out shall have at least five years experience in installing similar systems.

3. Key staff resumes shall be submitted for ENGINEER’s approval with the Project Plan as further detailed under submittals.

1.07 STANDARDS

A. The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable state and local requirements. UL listing and labeling shall be adhered to under this Contract.

B. Any equipment that does not have a UL, FM CSA, or other approved testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment famished has been manufactured in accordance with the National Electrical Code and OSHA requirements.

C. Any additional work needed resulting from any deviation from codes or local requirements shall be at no additional cost to the OWNER.

D. Instrument Society of America (ISA) and National Electrical Manufacturers Association (NEMA) standards shall be used where applicable in the design of the CS.

E. All equipment used on this project to test and calibrate the installed equipment shall be in calibration at the time of use. Calibration shall be traceable to National Institute of Standards (NIS - formally NBS) calibration standards.

1.08 WARRANTY AND GUARANTEES

A. The SYSTEM SUPPLIER shall furnish to the OWNER a written guarantee in accordance with Division 1.

B. The SYSTEM SUPPLIER shall guarantee all equipment whether or not of his own manufacture.

1.09 SPARES AND EXPENDABLES

A. Obtain from the manufacturer(s) and provide the recommended critical spare parts as part of the work. Refer to the individual requirements listed in the associated specification sections for the CS for specific parts lists to be provided as a minimum. The spare parts are the property of the OWNER.

B. Obtain from the manufacturer(s) and furnish any special tools, calibration equipment and testing apparatus required for the proper adjustment and maintenance of the material provided.

PART 2 - PRODUCTS

This Part not used.

PART 3 - EXECUTION

3.01 SEQUENCE OF WORK

A. Coordination Meetings. In order to ensure timely performance of the Contract and the system's conformance with these specifications, coordination meetings shall be held at the OWNER's engineering office. The first meeting will be held 30 days after award of the Contract to the CONTRACTOR. The CONTRACTOR and SYSTEM SUPPLIER shall provide for their attendance at this meeting in their quotation. A schedule for additional coordination meetings (approximately one each month) will be derived at this initial meeting for periodic update, coordination, and conflict resolution during the project duration.

B. Prerequisite Activities and Lead Times. Do not start the following key project activities until the listed prerequisite activities have been completed and lead times have been satisfied:

1. Hardware Purchasing, Fabrication, and Assembly: Associated design related submittals completed (no exceptions, or approved as noted).

2. Shipment: Completion and approval of all design related submittals.

3. Startup: Operational Checkout Tests.

4. OWNER Training: Owner Training Plan completed and O&M manuals delivered.

5. Demonstration Tests: Operational Check-out Tests, Startup, OWNER Training, and Demonstration Test Procedures must be complete. Give 4 weeks' notice prior to the planned test start date.

3.02 PRODUCT HANDLING

A. Store and protect equipment until installation following the storage and handling instructions recommended by the equipment manufacturers. Place special emphasis on proper anti-static protection of sensitive equipment.

B. Protection During Construction. Throughout this Contract, provide protection for materials and equipment against loss or damage and from the effects of weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Provide covers for

panels and other elements that may be exposed to dusty construction environments. Specific storage requirements shall be in accordance with the SYSTEM SUPPLIER's recommendations.

C. Corrosion Protection. Protect all consoles, panels, enclosures, and other equipment containing electrical or instrumentation and control devices, including spare parts, from corrosion through the use of corrosion-inhibiting vapor capsules. Prior to shipment, include capsules in the shipping containers, and equipment as recommended by the capsule manufacturer. During the construction period, periodically replace the capsules in accordance with the capsule manufacturer's recommendations. Replace all capsules just prior to Final Acceptance.

D. ESD Protection. Provide for the proper handling, storage, and environmental conditions required for the CS components deemed static sensitive by the equipment manufacturer. Utilize anti-stat wrist straps and matting during installation of these items to prevent component degradation.

E. Adequately pack manufactured material to prevent damage during shipping, handling, storage and erection. Pack all material shipped to the project site in a container properly marked for identification. Use blocks and padding to prevent movement.

F. Ship materials that must be handled with the aid of mechanical tools in wood-framed crates.

G. Ship all materials to the project site with at least one layer of plastic wrapping or other approved means to make it weatherproof. Anti-stat protection shall be provided for all sensitive equipment.

H. Inspect the material prior to removing it from the carrier. Do not unwrap equipment until it is ready to be installed. If any damage is observed, immediately notify the carrier so that a claim can be made. If no such notice is given, the material shall be assumed to be in undamaged condition, and any subsequent damage that is discovered shall be repaired and replaced at no additional expense to the OWNER.

I. The Contractor shall be responsible for any damage charges resulting from the handling of the materials.

3.03 INSTALLATION

A. Install the CS in locations indicated on the Drawings and follow manufacturers' installation instructions explicitly, unless otherwise indicated. Wherever any conflict arises between manufacturers' instruction, and these Contract Documents, follow ENGINEER's decision, at no additional cost. Keep a copy of manufacturers' instructions on the jobsite available for review at all times

B. Install materials and equipment in a workmanlike manner utilizing craftsmen skilled in the particular trade. Provide work, which has a neat and finished appearance. Coordinate I&C work with the OWNER and work of other trades to avoid conflicts, errors, delays, and unnecessary interference with operation of the existing plant during construction.

C. Where existing materials and equipment are removed or relocated, remove and deliver to the OWNER all materials no longer used unless otherwise directed by the ENGINEER. Repair affected surfaces to conform to the type, quality, and finish of the

surrounding surface in a neat and workmanlike manner. Follow any specific instructions given by the ENGINEER.

D. Provide materials and equipment with manufacturer's standard finish system. Provide manufacturer's standard finish color, except where specific color is indicated. If manufacturer has no standard color, finish equipment with light gray color.

E. Keep the premises free from accumulation of waste material or rubbish. Upon completion of work, remove materials, scraps, and debris from premises and from interior and exterior of all devices and equipment. Touch-up scratches, scrapes, or chips in interior and exterior surfaces of devices and equipment with finishes matching as nearly as possible the type, color, consistency, and type of surface of the original finish. Clean and polish the exterior of all panels and enclosures upon the completion of the demonstration tests.

F. Ground each analog signal shield on one end at the receiver end only. Properly ground all surge and transient protection devices. Coordinate grounding system with Division 16 - ELECTRICAL.

G. Surge Protection. Provide appropriately sized electrical transient protection devices for all electrical elements of the system to protect the CS equipment and equipment which interfaces with the CS from transient surges in power and signal wiring (from lightning and other ground potential differences). Locate and properly ground surge suppressors at: any connection between power sources and electrical equipment including panels, assemblies, and field devices; and at both ends of all analog signal circuits.

3.04 TRAINING

A. The cost of training programs to be conducted with OWNER's personnel shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the System being supplied.

B. The SYSTEM SUPPLIER shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.

C. The SYSTEM SUPPLIER shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, such materials shall be delivered to OWNER.

D. The training program shall represent a comprehensive program covering all aspects of the operation and maintenance of the system.

E. All training schedules shall be coordinated with, and at the convenience of the OWNER. Shift training may be required to correspond to the OWNER's working schedule.

F. Specific details of the nature and duration of training to be provided are defined in the individual specification sections.

3.05 TESTING – GENERAL

A. All elements of the CS, both hardware and software, shall be tested to demonstrate that the total system satisfies all of the requirements of the Contract Documents.

B. As a minimum, the testing shall include shop tests, operational check-out tests, and Demonstration Tests.

C. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and, upon the system producing the correct result (effect), the specific test requirements will have been satisfied.

D. All tests shall be conducted in accordance with, and documented on, prior approved procedures, forms, and checklists. Each specific test to be performed shall be described and a space provided after it for signoff by the appropriate party after its satisfactory completion. Copies of these signoff test procedures, forms, and checklists will constitute the required test documentation.

E. Provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment, and data, provide suitable means of simulation. Define these simulation techniques in the test procedures.

F. The SYSTEM SUPPLIER shall coordinate all of their testing with the CONTRACTOR, the ENGINEER, all affected suppliers, and the OWNER.

G. The ENGINEER reserves the right to test or retest any and all specified functions whether or not explicitly stated in the approved test procedures. The ENGINEER's decision shall be final regarding the acceptability and completeness of all testing.

END OF SECTION

SECTION 13315

CONTROL PANELS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This Specification Section defines general requirements applicable to all control panels and enclosures furnished under the Contract. Additional requirements are defined in other Specification Sections as defined in paragraph 0.

B. The control panels shall be furnished by the same SYSTEM SUPPLIER furnishing services and equipment as outlined in Section 13300 – CONTROL SYSTEM GENERAL REQUIRMENTS.

C. The SYSTEM SUPPLIER shall furnish all labor, materials, equipment, services, and incidentals required to install and place into operation all control panels shown on the Contract Drawings and as specified herein.

D. Size free-standing control panel(s) as necessary to contain all equipment associated with the Work, including future equipment, and to adequately dissipate heat generated by equipment mounted in or on the panel. It shall not be necessary to provide additional panels to accommodate future system expansion.

E. Smaller surface-mount panels shall be sized to adequately dissipate heat generated by equipment, with ventilation components mounted inside or on the panel front face.

F. The SYSTEM SUPPLIER shall design, furnish and install all interior wiring within the control panels and furnish complete wiring diagrams showing the electrical circuits inside the panel and interconnections between the panel and external instruments and components.

1.02 RELATED WORK

A. Control Panels are further defined, and furnished under, the following Specification Sections:

1. Specification Section 16050 – ELECTRICAL defines additional requirements.

2. ALL field instruments are to be mounted on the control panels as shown in the Contract Drawings.

1.03 SUBMITTALS

A. Submit the following control panel shop drawings in a single package:

1. Layout diagrams. Include panel elevations (front, side, interior), and sizing. Panel front elevations shall be of sufficient scale to allow all engraved nameplates and inscriptions to be legible without the use of schedules.

2. Wiring Diagrams. Diagrams shall be complete electrical wiring diagrams showing all components and auxiliary devices such as relays, alarms, fuses, lights, fans, heaters, etc. All wires and terminals shall be numbered on the diagrams, and line cross-references shall be labeled. Include on these drawings a tag number to identify each component, referenced to a component identification list.

3. Power requirements and heat dissipation summary for all control panels. Power requirements shall state required voltages, currents, and phase(s). Heat dissipations shall be maximums and shall be given in Btu/hr. Summary shall be supplemented with calculations.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Equipment to be installed in a hazardous area shall meet Class, Group, and Division classification as shown on the Contract Electrical Drawings, or comply with the local or National Electrical Code, whichever is the most stringent requirement.

B. Electronic equipment shall utilize printed circuitry, suitably coated to prevent contamination by dust, moisture, and fungus. Solid-state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and 0 to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and slightly corrosive service conditions.

C. All equipment shall be designed to operate on a 60 Hz alternating current power source, at a normal 120 volts, +/- 10 percent, except where noted. All regulators and power supplies required for compliance with the above shall be provided between the power supply and the interconnected instrument loop. Where equipment requires voltage regulation, constant voltage transformers shall be supplied.

D. All equipment, cabinets and devices furnished hereunder shall be heavy-duty type, designed for continuous industrial service. The system shall contain products of a single MANUFACTURER, insofar as possible, and shall consist of equipment models which are currently in production.

E. All switches shall have double-pole, double-throw contacts, rated at a minimum of 600 volts-amperes (VA), unless noted otherwise.

F. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment shall resume normal operation without manual resetting when power is restored.

2.02 LIGHTNING/SURGE PROTECTION

A. Surge suppressors and arrestors meeting the requirements of ANSI Standard C-62.41 (latest revision) shall be provided on all wiring entering all panels and enclosures.

B. DC signals. Lightning and surge protection shall be provided on all 4-20 mA signal wires. The protectors shall meet the following criteria:

1. 35 mm DIN rail mounted
2. Response time: less than five nanoseconds
3. Automatic reset
4. Operating signal voltage: up to 30 VDC
5. Operating signal current: up to 150 mA
6. Capable of withstanding 1,200 Amps at IEEE/ANSI C-62.41 8 x 20 micro-seconds combination wave
7. Capable of withstanding 100 Amps at IEEE/ANSI C-62.41 10 x 1 milliseconds

long wave

8. Nominal series resistance of 5 ohms each leg
9. Manufacturer and Model:
   a. EDCO DRS-036, or ENGINEER aproved equal.

C. Discrete Signals

1. All discrete outputs regardless of their destination shall be equipped with interposing relays each fitted with a snubber circuit across the coil.

D. Single phase AC Power (to 15 Amps). Lightning and surge protectors for AC power supply lines up to 15 Amps service shall meet the following criteria:

1. Serial protection with replaceable fuse
2. Failure indicator
3. Response time of less than five nanoseconds
4. Capable of withstanding up to 10,000 Amps at IEEE/ANSI C-62.41 8 x 20 microseconds combination wave
5. Manufacturer and Model:
   a. EDCO HSP121BT, or approved equal

E. Single phase AC Power (over 15Amps). Lightning and surge protectors for AC power supply lines over 15 Amps service shall meet the following criteria:

1. Parallel protection using MOVs and thermal fusing technology
2. Failure indicator
3. Response time of less than five nanoseconds
4. Capable of withstanding up to 6,500 Amps at IEEE/ANSI C-62.41 8 x 20 microseconds combination wave
5. Manufacturer and Model
   a. EDCO FAS-120AC, or approved equal

2.03 CONTROL PANELS AND ENCLOSURES

A. Enclosure Rating

1. Outdoor enclosures shall be rated NEMA 4X, and manufactured from 304 SS.
2. Outdoor enclosures shall be furnished with stainless steel sun shields on all sides except the front panel, and shall be affixed in such a manner as to not compromise the NEMA 4X rating.
3. Indoor enclosures shall be rated NEMA 4 or 4X. If NEMA 4 is selected, then a suitable coating system shall be specified for the area intended, and as further defined in Section 09990 – Protective Coatings.

B. Finish

1. All front panel openings for panel-mounted equipment shall be cut with counter-boring and provided with trim strips as required to give a neat finished appearance.
2. With the exception of stainless steel panels, all steel panel surfaces shall be treated with phosphatized treatment inside and out, and then finished on the exterior with two coats of baked enamel of the approved color. Interiors of panels shall be white, ANSI No. 51.
3. Stainless steel panels shall be No. 7 polished, 316 stainless steel.

C. Doors

1. All control panels shall have a continuous piano hinge door. A minimum of 80% of the panel interior shall be exposed by doors.
2. Panel door openings shall be NEMA 4X rated and shall be sealed and fully gasketed.
3. The inside of each door shall be equipped with a drawing pocket.
4. Two-door enclosures shall have a removable center post.
5. Sealed panel doors shall be equipped with quick-release latches.
6. NEMA 1 rated panel doors shall be equipped with a three-point latching mechanism.
7. Where noted, doors shall be equipped with a fully gasketed glass window for viewing internally mounted devices without opening the door.

D. All components and terminals shall be accessible without removing other components, except for covers.

E. Surface mounted panels shall have conduit entry from the bottom only. Freestanding, NEMA 1 panels shall have an open area in the bottom for conduit entry.

F. All panels shall be provided with an isolated copper grounding bus to ground all signal and shield connections.

G. Free standing control panels shall each be equipped with an internal 40-watt fluorescent light and one 120 VAC, 15 amp, duplex utility receptacle.

H. Nameplates

1. All front-face panel mounted controls shall be equipped with screw mounted laminated plastic nameplates to completely define their use. The use of adhesive to mount front panel nameplates will not be acceptable.
2. All internal components shall be equipped with identification tags, using PID identifiers where applicable.
3. All wiring shall be labeled.

I. Electrical

1. Provide a main circuit breaker and branch circuit breaker(s) for each branch circuit as required to distribute power from the main power feed.
2. All breakers shall accessible when the panel door is open.
3. No more than 20 devices on any single circuit.
4. No more than 12 amps for any branch circuit.
5. Panel (or site) lighting, receptacles, heaters, controls, telemetry and fans on separate branch circuits.

J. Wiring

1. Power wiring shall be 300 volt, type THWN stranded copper, No. 14 AWG size, for 120 VAC service.
2. Discrete wiring shall be 300 volt type THWN stranded copper, sized for the current carried, no smaller than No. 16 AWG.
3. Analog signal wiring shall be 300 volt, stranded copper in twisted shield pairs, no smaller than No. 16 AWG.

4. Panel wiring shall be routed through wire troughs or Panduits.
5. Hinge wiring shall be secured at each end, with the bend portion protected by a plastic sleeve.
6. Analog or DC wiring shall be separated from any AC power or control wiring by at least six inches.
7. Each wire shall be uniquely identified using plastic, snap-on numbered tags.
8. Terminal blocks shall be provided for all field wiring entering the panel. The greater of 4 or 15% spare terminal blocks shall be provided.
9. No more than one wire per screw and yoke termination.

K. Construction

1. Minimum metal thickness: 14-gauge.
2. Stiffeners as required to prevent deflection under instrument loading and permit lifting without racking or distortion.
3. Use removable lifting rings where required, and fill plugs to replace rings after installation.

L. Miscellaneous Equipment

1. All panels shall be protected from internal corrosion by the use of corrosion-inhibiting vapor capsules by Northern Instruments (Model Zerust VC), Hoffman (Model A-HCI), or ENGINEER approved equal.
2. All sealed panels shall be equipped with combination drain/breathers, Crouse-Hinds Model ECD18; or ENGINEER approved equal.

M. All enclosures shall be manufactured items by Hoffman Engineering, or ENGINEER approved equal.

2.04 PANEL MOUNTED DEVICES

A. Selector Switch

1. Heavy-duty, oil-tight, industrial type selector switches rated for NEMA 4 service.
2. Contacts rated for 120 VAC service at 10 amperes, continuous.
3. Number of positions and contact arrangements as required.
4. Factory-engraved legend plate indicating position definition.
5. Accommodating a panel thickness between 1/16 to 1/4 Inch.
6. Black knob type operator.
7. Square D Class 9001, Type K; Allen-Bradley type 800T, or ENGINEER approved equal.

B. Pushbutton

1. Heavy-duty, oil-tight, industrial type push buttons rated for NEMA 4 service.
2. Contacts rated for 120 VAC service at 10 amperes continuous.
3. Number of positions and contact arrangements as required.
4. Factory-engraved legend plate indicating function.
5. Accommodating a panel thickness between 1/16 to 1/4 inch.
6. Operator: Red extended head for STOP, green flush head for START, black flush head for other functions.

7. Square D Class 9001, Type K; Allen-Bradley type 800T, or ENGINEER approved equal.

C. Process Indicator

1. Signal loop powered.
2. 3 ½ digit with selectable decimal point.
3. 0.4 inch digit LCD
4. Factory supplied nameplate legend in process units
5. Separate span and zero adjustment
6. NEMA 4X enclosure
7. Dynalco LMD-120D, or ENGINEER approved equal.

D. Indicating Light

1. Heavy-duty, oil-tight, push-to-test industrial type with integral transformer for 120 VAC application.
2. Rated for NEMA 4 service.
3. Screwed on flat-faced lenses in colors shown on the drawings.
4. Factory-engraved legend plates.
5. Square D type K, Allen-Bradley Type 800T, or ENGINEER approved equal.

E. Control/Interposing Relays

1. Compact, general-purpose, plug-in type.
2. Socket mounted.
3. Contacts rated for not less than 10 amperes at 120 VAC.
4. Equipped with neon status lights and test buttons.
5. Permanent, legible identification.
6. Potter & Brumfield series KRPA, or ENGINEER approved equal.

F. Time Delay Relay

1. Available functions: On delay, Off delay, or one shot.
2. Socket mounted.
3. Knob adjustment.
4. Contacts rated for not less than 10 amperes at 12 VAC.
5. Timing range as appropriate for the application.
6. Magnecraft series W211, or ENGINEER approved equal.

G. Terminal Blocks

1. Screw terminals capable of accepting 10-26 AWG wire.
2. Fused disconnect style.
3. DIN-rail mounting.
4. Connectors shall be either copper or steel. Use of aluminum connectors shall not be permitted without prior approval of the Engineer.
5. Phoenix Contact UT4 HES1, or ENGINEER approved equal.

H. Process Indicator/Retransmitter

1. 120 VAC/60 Hz powered.
2. 4 digit with selectable decimal point.
3. 0.6 inch digit LED with three colors, and programmable, based on process value
4. Separate span and offset adjustment to scale input.
5. Isolated 4-20 mA retransmission output
6. Dual programmable SPDT contact outputs rated for 3A at 250 VAC
7. RS-232, RS-485 Serial Communications Options

8. NEMA 4X, IP65 Front
9. Precision Digital PD765, or ENGINEER approved equal

2.05 SPARES AND EXPENDABLES

A. Provide the following spare parts

1. Five percent (rounded up) spare relays of each type provided.
2. Five percent (rounded up) spare surge suppressors of each type provided
3. Five percent (rounded up) spare panel mounted device of each type used

B. Provide the following expendables

1. Two year supply of corrosion inhibitor capsules
2. Ten percent (rounded up) spare fuses of each type and rating supplied
3. Ten percent (rounded up) spare indicator light bulbs of each type and color supplied

PART 3 - EXECUTION

3.01 INSTALLATION

A. Control panels shall be provided to the electrical subcontractor for installation and connection of field and power wiring.

B. All free-standing control panels shall be installed on a minimum of 3 inches high concrete housekeeping pad.

C. Verify the correct installation of all panels supplied under this Specification Section.

– END OF SECTION –

SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

A. Provide all labor, materials, tools, supplies, equipment, and temporary utilities to complete the work shown on the Drawings and specified herein for lighting systems for soccer/Lacrosse fields and associated facilities. All systems are to be completely installed and fully operational. Specifically, the work includes, but is not limited to:

1. Electric services, secondary feeders, branch circuits, contactors, all connections to controls, and equipment
2. Installation of underground conduits and splices
3. Complete lighting systems
4. Complete grounding system including system and equipment

1.02 RELATED DOCUMENTS

A. The general provisions of the Contract, including General Conditions and Special Conditions, apply to all the work specified herein.

1.03 LAWS, PERMITS, FEES AND NOTICES

A. Secure and pay all permits, fees, and licenses necessary for the proper execution and completion of the work. Submit all notices and comply with all laws, ordinances, rules and regulations of any public agency bearing on the work. Contractor shall be a licensed electrical contractor in the county of construction.

1.04 DEPARTURES

A. If any departures from the Contract Drawings of Specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted as soon as practicable to the ENGINEER for advance written approval.

1.05 BASIS FOR WIRING DESIGNS

A. The Contract Drawings and Specifications describe specific sizes of switches, breakers, fuses, conduits, conductors, motor starters and other items of wiring equipment. These sizes are based on specific items of power consuming equipment (heaters, lights, motors for fans, compressors, pumps, etc.). Wherever another trade provides power consuming equipment that differs from the Drawings and Specifications, the wiring for such equipment shall be changed to proper sizes to match at no additional expense to the OWNER.

1.06 AS-BUILT INFORMATION

A. A set of "red-lined" electrical drawings shall be carefully maintained at the job site. Actual conditions are to be put on the drawings in red on a daily basis, so the drawings

will continuously show locations and routings of cables, conduits, pull boxes, circuit numbers, and other information required by the ENGINEER.

1.07 EXCAVATING FOR ELECTRICAL WORK

A. General – Excavation or drilling, backfill and repair of paving and grassing shall be in the bid of the electrical contractor. The actual work need not be performed by electrical trades. However, the electrical contractor is responsible for all excavation, drilling, dewatering, backfilling, tamping, and repair of pavements and grassing required in support of electrical work. All areas disturbed by electrical work shall be repaired to their original condition, or as indicated on the drawings.

B. Coordination

1. The electrical contractor must check for existing utilities before commencing any excavation or drilling.

2. Contract drawings and other trades are to be consulted to avoid interferences with other utilities on this project.

3. In the event of damage to existing utilities, the OWNER and ENGINEER shall be immediately notified, and damage shall be immediately repaired.

C. Precautions – The electrical contractor must take every reasonable precaution to avoid interferences. In the vicinity of a suspected interference, excavations shall be dug by hand.

1.08 JOB SITE VISIT

A. Visit the project site before submitting a bid. Verify all dimensions shown on the Contract Drawings and determine the characteristics of existing facilities which will affect performance of the work, but which are not shown on the Drawings or described within these Specifications.

1.09 CODES AND STANDARDS

A. Applicable provisions of the following codes and standards, and other codes and standards required by the State of Florida and local jurisdictions, are hereby imposed on a general basis for electrical work (in addition to specific applications specified by individual work sections of these specifications).

1. U.L. – Electrical materials shall be approved by the Underwriters' Laboratories, Inc. This applies to materials which are covered by U.L. standards.

2. NEC – National Electrical Code (NFPA-70-2014)

3. OSHA – Standards of the Occupational Safety and Health Administration are to be complied with.

4. NEMA – National Electrical Manufacturers Association Standards are to be met wherever standards have been established by that agency, and proof is specifically required with material submittals for switchboards, motor control centers, panelboards, cable trays, motors, switches, circuit breakers, and fuses.

5. ANSI – American National Standards Institute

6. Florida Building Code

1.10 ELECTRICAL SUBMITTALS

A. The CONTRACTOR shall submit shop drawings, samples and certificates in accordance with the Special Conditions for additional instructions on substitutions. Submittals will not be accepted for partial systems. Submit all materials for each specifications section at one time. Submittals must be arranged, correlated, indexed and bound in orderly sets for ease of review.

B. Shop drawings and manufacturer's data sheets are required for all electrical materials. Samples are to be supplied for any substitute as requested by the ENGINEER.

C. Submit Shop Drawings, manufacturer's data, and certifications on all items of electrical work prior to the time such equipment and materials are to be ordered. Order no equipment or materials without approval from the ENGINEER.

1.11 OPERATION AND MAINTENANCE MANUALS

A. The CONTRACTOR shall submit Operation and Maintenance (O&M) Manuals in accordance with Division 1, General Requirements. O&M Manuals must contain, but are not limited to, the following:

1. Brief description of system and basic features
2. Manufacturer's name and model numbers of all components of the system
3. List of local factory authorized service companies
4. Operating instructions, including preparation for starting up, seasonal changes, shut down and service
5. Maintenance instruction
6. Possible breakdowns and repairs
7. Manufacturer's literature describing each piece of equipment
8. Control diagrams by the control manufacturer
9. Description of sequence by the control manufacturer
10. Parts list
11. Wiring diagrams

1.12 SPARE PARTS

A. Submit in accordance with Division 1, General Requirements, a list of Recommended Spare Parts for all major items of equipment. Include descriptions of each part, part number, and cost.

1.13 PROJECT DOCUMENTS

A. For "As Built" drawing requirements, see Division 1.

B. In addition, each "As Built" single line diagram shall be framed under glass and mounted on wall near respective contactors and controls.

PART 2 - PRODUCTS

2.01 GENERAL

A. Electrical Temporary Facilities – The CONTRACTOR shall include in his bid the cost of furnishing, installing and maintaining all materials and equipment required to provide temporary light and power to perform the work of all trades during construction and until work is completed. Adequate lighting and receptacle outlets for operation of hand tools shall be provided throughout the project, including shanties, trailers, field offices, temporary toilet enclosures, and shall be extended as construction progresses.

B. All reasonable safety requirements shall be observed to protect workers and the public from shock and fire hazards.

1. Ground fault interrupters shall be employed in accordance with Codes.

2. Ground wires are required in all circuits. Ground poles are required on all outlets. All metallic cases shall be grounded.

3. Rain-tight cabinets shall be used for all equipment employed in wet areas.

2.02 ELECTRICAL PRODUCTS

A. Unless otherwise indicated in writing by the ENGINEER, the products to be furnished under this specification shall be the manufacturer's latest design. Where two or more units of the same class of equipment are required, these units shall be products of the same purpose and rating shall be interchangeable throughout the project.

B. All products shall be newly manufactured. Defective equipment or equipment damaged in the course of the installation or a test shall be replaced or repaired in a manner meeting the approval of the ENGINEER, at no additional expense to the OWNER.

2.03 SUBSTITUTIONS

A. Comply with instruction in the Contract General Conditions and Special Conditions regarding substitutions.

2.04 ELECTRICAL IDENTIFICATION

A. Color Coding – Conductor colors shall be in accordance with NEC and NEMA requirements. Refer also to applicable sections of these specifications. Three-phase feeder and branch circuits shall be identified as follows:

120 / 240	277 / 480
A – Black	A – Brown
B – Red	B – Orange
C – Blue	C – Yellow
N - White	N – Gray
Green or bare for grounding conductors	
Green with Yellow trace for Special Grounding	

2.05 NAMEPLATE

A. The following items shall be equipped with nameplates – All motors, motor starters, motor control centers, pushbutton stations, control panels, time switches, disconnect or relays in separate enclosures, transformers, receptacles, wall switches, high voltage boxes, and cabinets. All light switches and outlets shall carry a phenolic plate with the supply circuit number. Electrical systems shall be identified at junction and pull boxes, terminal cabinets and equipment racks.

B. Nameplates shall adequately describe the function of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage and phase of the supply. For example, "Panel A, 277 / 480 V, 3-phase, 4-wire." The name of the machine on the motor nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and P.B. station nameplates for that machine. Nameplates shall be laminated phenolic plastic, white front and back with black core, with lettering etched through the outer covering; black engraved letters on white background. Lettering shall be 3/16 inch high at pushbutton stations, thermal overload switches, receptacles, wall switches and similar devices, where the nameplate is attached to the device plate. At all other locations, lettering shall be 1/4 inch high, unless otherwise detailed on the drawings. Nameplates shall be securely fastened to the equipment with No. 4 Phillips, rough-head, cadmium-plated, steel self-tapping screws or nickel-plated brass bolts. Motor nameplates may be nonferrous metal not less than 0.03 inch thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Engraved lettering shall be filled with contrasting enamel. Equipment nameplate schedule for all equipment shall be submitted with shop drawing submittal for ENGINEER's approval.

C. All junction and splice boxes shall be labeled using permanent shipping tags attached to boxes, not covers.

2.06 WIRE AND CABLE IDENTIFICATION

A. All wire and cable shall be identified at each termination point and at each pull box, splice box, junction box, or manhole. Provide permanent, waterproof, non-metallic (paper unacceptable) tags indicating the circuit number in 3/16 inch letters. Circuit numbers shall be protected with clear shrinkable tubing.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels and similar information needed for distinct identification; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage. Comply with OWNER's instruction for storage locations.

3.02 ELECTRICAL COORDINATION

A. The CONTRACTOR is responsible for coordination with the OWNER, ENGINEER, the power company, and the telephone company on all matters that have a bearing on the electrical work.

B. The Drawings indicate the extent, the general location, and arrangement of equipment, conduit, and wiring. Study the Drawings, including details, so the equipment shall be properly located and readily accessible. Locate all electrical equipment to avoid interference with mechanical and / or structural features. Make necessary changes in spacings and locations of lighting fixtures, panelboards, cabinets, receptacles and other items of equipment provided that the overall patterns of layouts are not disrupted and remain uniform.

3.03 CUTTING AND PATCHING

A. Cut and prepare all openings, chases, and trenches required for the installation of equipment and materials. Repair, remodel, and refinish in strict conformance with the quality of workmanship and materials in the surroundings. Obtain written permission from the ENGINEER for any alterations to structural members before proceeding. All penetrations through fire walls or floor / ceiling slabs shall be sealed to maintain the fire integrity of the wall or slab.

3.04 MAINTENANCE

A. Render all necessary measures to insure complete protection and maintenance of all systems, materials, and equipment prior to final acceptance. Any materials or equipment not properly maintained or protected to assure a “factory new” condition at the time of final acceptance shall be replaced immediately at no additional cost to the OWNER.

3.05 WATERPROOFING

A. Whenever any work penetrates any waterproof area, seal and render the work waterproof. All work shall be accomplished so as not to void or diminish any waterproofing bond or guarantee.

3.06 TESTS

A. Conduct an operating test of equipment prior to the ENGINEER's approval. The equipment shall be demonstrated to operate in accordance with the requirements of these Specifications. The tests shall be performed in the presence of the ENGINEER or an authorized representative. The CONTRACTOR shall furnish all instruments, electricity and personnel required for the tests.

3.07 CLEANUP

A. Maintain continuous cleanup during the progress of the work, and use appointed storage areas for supplies. The premises shall be kept free from accumulations of waste materials and rubbish.

END OF SECTION

SECTION 16011

CODES & STANDARDS

PART 1 - GENERAL

1.01 THIS SECTION COVERS THE CODES, SPECIFICATIONS AND STANDARDS CONSIDERED MINIMUM REQUIREMENTS FOR MATERIALS, WORKMANSHIP AND SAFETY FOR ALL DIVISIONS 16 AND RELATED ELECTRICAL WORK.

1.02 SPECIFICATIONS, CODES AND STANDARDS

A. Reference within this Specification to standards, codes or reference specifications implies that any item, product or material so identified must comply with all minimum requirements as stated therein, except packaging and shipping, unless indicated otherwise. Only the latest revised editions are applicable.

Some of the references used in this Division are as follows:

NFPA	National Fire Protective Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers' Association
U.L.	Underwriters' Laboratories, Inc.
ANSI	American National Standards Institute
FS	Federal Specification

B. The Specifications, codes and standards indicated below and in other Sections, including the current addenda, amendments and errata, referred to by basic designation only, form a part of this specification.

NFPA-70	National Electrical Code (Current Edition)
NFPA-90A	Air Conditioning & Ventilation (Current Edition)
NFPA-101	Code for Safety to Life (Current Edition)
F.B.C.	Florida Building Code (Current Edition)

1.03 UNDERWRITERS' LABORATORIES

A. Where materials and equipment are available under the continuing inspection and labeling service of U.L.; provide such material and equipment.

B. Listing by Underwriters' Laboratories shall be evidenced by the label or:

U.L. - Electrical Construction Materials List (Green Book)
U.L. - Electrical Appliance & Utilization Equipment List
U.L. - Building Materials List

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE

A. Provide all material as required for a complete project as required by the Drawings and in this Specification.

1.02 SHOP DRAWING SUBMITTALS

A. Submit shop drawings for the following:

All raceways
Wiring and Splices
Contactors, Relays, Photocells
Poles and Fixtures

PART 2 - PRODUCTS

2.01 RACEWAY

A. Galvanized Rigid Conduit (ANSI C80.0) – Rigid galvanized steel conduit "RGS" shall be U.L. Approved, Schedule 40, mild steel pipe, zinc-coated on the inside and outside. Fittings shall be zinc-coated, U.L. Approved.

B. PVC Conduit – Underground PVC conduit shall be Schedule 40 or Schedule 80 unless otherwise noted, and shall be U.L. approved. PVC conduit shall be Schedule 80 when installed above ground.

C. Locations: – Conduit shall be used as follows:

1. All above ground grade exposed conduits shall be hot dipped galvanized rigid steel except otherwise noted on the Drawings.

2. All conduits penetrating rated fire walls or rated fire floors shall be installed with U.L. Approved devices to maintain the fire rating of the wall or floor penetrated.

2.02 WIRE AND CONNECTORS

A. Cable shall be rated for 600 volts and shall meet the requirements below:

1. Conductors shall be stranded.

2. All wire shall be brought to the job in unbroken packages and shall bear the date of manufacturing; not older than 12 months.

3. Type of wire shall be THWN or THHN rated 75 degrees C, suitable for wet locations except where otherwise required by the drawings.

4. No wire smaller than No. 12 AWG shall be used unless specifically indicated.

5. Conductor metal shall be copper.

6. All conductors shall be meggered after installation and insulation must be in

compliance with the Insulated Power Cable Engineers Association Minimum Values of Insulation Resistance.

2.03 BOXES

A. Boxes for wiring devices (switches and receptacles) installed outdoors or wet locations shall be weatherproof fiberglass with polycarbonate cover plates. Junction boxes shall be NEMA 4X construction. All boxes shall be securely mounted, plumb and level, in readily accessible locations.

B. Pull boxes in ground shall be Pencell HHPL 172012 with green lid marked "ELECTRIC".

2.04 GROUNDING

A. Grounding and Bonding – All Grounding and Bonding shall be in accordance with NFPA 70. Ground all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in raceways, and neutral conductor of wiring systems.

B. Grounding Conductor – Provide an insulated, green-colored equipment grounding conductor in all feeder and branch circuits. This conductor shall be separate from the electrical system neutral conductor. Conduits will not be approved as grounding conductor.

C. The CONTRACTOR shall install all ground rods, ground wires, and connectors as required for the complete grounding system.

D. All metal parts and grounding conductors in each manhole or pullbox shall be grounded to a local ground rod.

E. Resistance – Readings shall not be taken within 48 hours of a rainfall.

F. The CONTRACTOR shall provide a written report for all grounding test results to the ENGINEER. The test shall include all ground connections. The report shall be signed by the OWNER of the contracting firm and shall include: test date, time, weather conditions on test date, weather conditions 3 days prior to the test date, location, and results.

G. All raceways require grounding conductors; metallic raceways are not adequate grounding paths. Bonding conductors through the raceway systems shall be continuous from main switch ground buses to panel ground bars of panelboards, and from panel grounding bars of panelboards, and motor control centers to branch circuit outlets, motors, lights, etc. These ground conductors are required throughout the project regardless of whether conduit runs or the Cable and Conduit Schedule show ground conductors on the Drawings.

H. All connections made below grade shall be of the exothermic type.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION

A. General

1. Nylon pull cords shall be installed in all empty conduits. Wire shall not be

installed until all work of any nature that may cause damage is completed, including pouring of concrete. Mechanical means shall not be used in pulling in wires 8 AWG or smaller.

2. The use of running threads is prohibited and where some such device is necessary, split couplings, Erickson couplings, or equal shall be used. Where water-tight conduit installations are required, water-tight conduit unions shall be used.

3. All conduits shall be cleaned by pulling a brush swab through before installing cables.

4. All conduits shall be sealed at each end with electrical putty or Duct Seal. Special care shall be taken at all equipment where entrance of moisture could be detrimental to equipment.

B. Handling

1. Conduits subjected to rough handling or usage shall be removed from the premises.

2. Conduits must be kept dry and free of water or debris with approved pipe plugs or caps. Care shall be given that plugs or caps are installed before pouring of concrete. All spare conduits shall remain plugged or capped upon project completion.

C. Concrete and Masonry

1. Where conduits pass through exterior concrete walls or fittings below grade, the entrances shall be made watertight. This shall be done by providing pipe sleeves in the concrete with 1/2" minimum clearance around the conduits, and caulking with askum and sealant, or by means of conduit entrance seals.

2. Where embedded conduits cross expansion joints, furnish and install offset expansion joints or sliding expansion joints. Sliding expansion joints shall be made with straps and clamps.

D. Panelboards and Boxes

1. Conduits entering panelboards, pull boxes, or outlet boxes shall be secured in place by galvanized locknuts and bushings, one locknut outside and one locknut inside of box with bushing on conduit end. The locknuts shall be tightened against the box without deforming the box. Bushings shall be of the insulating type.

E. Bending

1. Field conduit bends shall be made with standard tools and equipment manufactured especially for conduit bending.

F. Mounting and Concealing

1. Conduit runs shall always be concealed in finished spaces and may be exposed in industrial spaces except where indicated on the Drawings.

2. Exposed runs of conduits shall be installed with runs parallel or

perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of symmetrical bends or pull boxes as indicated on the Drawings. Bends and offsets shall be avoided where possible.

3. Where conduits are run individually, they shall be supported by approved pipe straps, secured by means of: 1) toggle bolts or hollow masonry; 2) expansion shields and machine screws or standard preset inserts on concrete or solid masonry; 3)machine screws or bolts on metal surfaces, and wood screws on wood construction. The use of perforated straps or wires will not be permitted.

4. Concrete inserts and pipe straps installed shall be stainless steel unless otherwise noted on the Drawings. All bolts, nuts, washers, and screws shall be stainless steel. Individual hangers, trapeze hanger, and rods shall be prime-coated and painted. Conduit support clamps shall be the two-piece type.

5. Conduit support struts, clamps, bolts, nuts and washers installed outdoors and in corrosive atmosphere indoors or on floors shall be stainless steel.

6. In furred ceilings, conduit runs shall be supported from structure, not furring.

3.02 TERMINATIONS AND SPLICES

A. Terminations of power cable shall be by means of U.L. approved connectors. All connectors shall meet U.L. 486B and shall be compatible with the conductor material.

B. Splicing of power, control, or instrumentation wiring will not be allowed except by written approval of the ENGINEER. Where splicing is allowed, splices shall be made waterproof regardless of location.

3.03 GROUNDING

A. General – Grounding shall be as indicated, and as required by NFPA 70 and ANSI-C2.

B. Grounding Connections – Grounding connections which are buried or otherwise normally inaccessible, and excepting specifically those connections for which access for periodic testing is required, shall be made by exothermic weld. Exothermic welds shall be made strictly in accordance with the weld manufacturer's written recommendations. Welds which have "puffed up" or which show convex surfaces, indicating improper cleaning, are not acceptable. No mechanical connector is required at exothermic weldments.

C. Grounding Grid System – Conductors shall be buried a minimum of 24 inches in the ground. All cable crossings shall be securely bonded and the system connected to the ground system as well as to all equipment and structural steel work, and to all water piping.

D. Grounding Conductors – Conductors shall be insulated copper wire and sized as required by National Electrical Code.

3.04 FIELD TESTS

A. As an exception to requirements that may be stated elsewhere in the Contract, the

ENGINEER shall be given five working days notice prior to each test. The CONTRACTOR shall demonstrate that all circuits and devices are in good operating conditions.

B. Test on 600 volt wiring – Verify all 600 volt wiring has no short circuits or accidental grounds. Perform insulation resistance tests on all wiring using an instrument which applies a voltage of approximately 500 volts to provide a direct reading of resistance. Minimum resistance shall be 1 megohm. The conductor loop resistance of each pair shall also be measured. The mutual capacitance between conductors of each pair shall also be measured. Provide written results for approval.

3.05 WIRE AND CABLE INSTALLATION

A. Conductors shall not be pulled into raceway until:

1. Raceway system has been inspected and approved by the ENGINEER.
2. Plastering and concrete have been completed in affected areas.
3. Raceway system has been freed of moisture and debris.

B. Conductors of No. 8 size and smaller shall be hand pulled. Larger conductors may be installed using power winches. Wire pulling lubricant, where needed, shall be U.L. approved. Wire in panels, cabinets, and gutter shall be neatly grouped, using nylon tie straps, and fanned out to terminals.

C. Building wire conductors THHN / THWN installed below grade, or in concrete slabs on grade, shall have type RHW-USE insulation, 600 volt. Building wire shall be stranded.

D. Each cable or wire in panels, pull boxes, manholes, or troughs shall have a permanent identification, with numbers and letters indicated on the conduit and cable schedule. For underground cable identification tag, see drawing.

E. Lubricants – Lubricants for assisting in the pulling of cables shall be those specifically recommended by the cable manufacturer. The lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings, and shall be U.L. approved. Use Polywater J or equal.

F. Cable Pulling Tensions – Shall not exceed the maximum pulling tension recommended by the cable manufacturer.

3.06 MOUNTING AND SUPPORTING ELECTRIC EQUIPMENT

A. Furnish and install all supports, hangers, and inserts required to mount fixtures, conduits, cables, pull boxes, and other equipment furnished under this section or furnished for installation under this section.

B. All items shall be supported from the structural portion of the building and studs, except standard ceiling-mounted lighting fixtures and small devices, that may be supported from ceiling system where permitted by the ENGINEER. However, no sagging of the ceiling will be permitted. Supports and hangers shall be of types approved by Underwriter's Laboratories.

C. Perforated straps and wire are not permitted for supporting electrical devices. Anchors shall be of approved types.

D. All supports, hangers, hardware, etc. used outdoors, shall be stainless steel and in corrosive atmosphere, or in hazardous areas shall be nonferrous, corrosion resistant, or stainless steel. Supports shall be selected to avoid galvanic reactions. Support devices shall be submitted for approval.

3.07 UNDERGROUND WORK

A. Excavation for Electrical Work
Excavation or drilling, backfill and repair of paving and grassing is to be in the bid of the electrical contractor. The actual work need not be performed by electrical trades. However, the electrical contractor is responsible for all excavation, drilling, dewatering, backfilling, tamping, and repair of pavements and grassing required in support of electrical work. All areas disturbed by electrical work shall be repaired to their original conditions, or as indicated on the Drawings.

B. Coordination
The electrical contractor must check for existing utilities before commencing any excavation or drilling. Contract Drawings and other trades are to be consulted to avoid interference with other utilities on this project. In the event of damage to existing utilities, the OWNER and ENGINEER shall be immediately notified, and the damage shall be immediately repaired at no cost to the Owner.

C. Precautions
The electrical contractor must take every reasonable precaution to avoid interferences. In the vicinity of a suspected interference, excavations shall be dug by hand.

D. Excavating, Drilling and Backfilling

1. Materials for backfill shall be as specified in Specification 02222 - Excavation and Backfill for Utility Systems, Section 2.02.

2. Locate and protect existing utilities and other underground work in a manner which will insure that no damage or service interruption will result from excavating and backfilling.

3. Protect property from damage which might result from excavating and backfilling.

4. Protect persons from injury at excavations, by shoring up, and using barricades, warnings and illumination.

5. Coordinate excavations with weather conditions, to minimize the possibility of washouts, settlements, and other damages and hazards.

6. Dewater excavations as necessary. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations; protect excavations from major inflow of ground water by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations and below grade property from being damaged by water, sediment, or erosion from or through the electrical work excavations.

7. No organic material is permitted in backfill. All vegetation, peat, sod or other organic matter shall be removed from the premises.

8. Except under roadways, backfill material shall be clean sand or shell rock. No debris or trash may be used as backfill.

9. Under roadways, backfill material shall be the same as comprising the road bed.

10. Backfill excavations using 8-inch high courses of backfill material, uniformly compacted to 95 percent density per ASTM Standard D1557, using power-driven, hand-operated compaction equipment. Watering the backfill for compaction is not an acceptable method.

11. Backfill to elevations matching adjacent grades. Where subsidence is measurable or observable at electrical work excavations during the warranty period, remove the surface (pavement, lawn or other finish) add backfill material, compact, and replace the surface treatment. Restore the appearance, quality, and condition of the surface or finish to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

12. Where excavation and backfill for electrical work passes through or occurs in a landscaped area, repair or replace the landscape work to match the original condition and quality of work.

13. Where excavation and backfill for electrical work passes through or occurs in an area of paving or flooring, replace and restore the construction and finish of the paving or flooring to match the original condition and quality of the work.

E. Underground

1. Underground conduits not under concrete slabs, shall be buried at least two feet below finished grade for circuits rated 600 volts or less, except under traffic areas, conduits shall be buried at least three feet below finished grade.

2. Where steel conduit penetrates ground or concrete, the conduit shall be painted with two coats of asphaltic base paint one foot on each side of penetration.

3. Transition from PVC to RGS shall be made prior to elbow below grade. Paint RGS with bitumastic, 12 inches above and below grade.

3.08 CONCRETE MANHOLES AND PULL BOXES

A. Provide precast concrete manholes and pull boxes as indicated on the drawings. Manholes and pull boxes shall be installed on firmly compacted ground level and plumb at the elevations indicated on the drawings. Manholes and pull boxes shall be equipped with pulling-in irons opposite and below each ductway entrance. Manholes and pull boxes shall have cable supports so that each cable is supported at a minimum of 3 foot intervals within the manhole or pull box. Cable supports shall be fastened with galvanized bolts and shall be fabricated of fiberglass or galvanized steel.

Make provision for drainage and grounding. Install grounding rods at each manhole.

B. Traffic Covers – H-2-044 traffic rated covers shall be provided for manholes and pull boxes with identification as follows:

ELECTRIC" where voltages within are 600 volts and less.

"SIGNAL" for instrumentation, telephone, and control.

C. Covers and frames shall be cast iron or hot dip galvanized.

End bells shall be cast in boxes by precast manhole manufacturer for all conduit entrances indicated on the drawings.

D. Every manhole shall be equipped with 24" x 24" concrete knockouts for future conduit installation on two opposing walls.

3.09 CONDUIT INSTALLATION

A. General – Conduits in structural slabs shall be placed between the upper and the lower layers of reinforcing steel, requiring careful bending of conduits. Conduits embedded in concrete slabs shall be spaced not less than eight inches on centers or as widely spaced as possible where they converge at panels or junction boxes. Conduits running parallel to slab supports, such as beams, columns and structural walls, shall be installed not less than 12 inches from such supporting elements. To prevent displacement during concrete pour, saddle supports for conduit, outlet boxes, junction boxes, inserts, etc., shall be secured.

3.10 WIRE AND CABLE INSTALLATION

A. Installation of Cables in Manholes, Handholes, and Vaults. Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Form all cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators. In existing manholes, handholes and vaults where new ducts are to be terminated, or where new cables are to be installed, the existing installation of cables, cable supports, and grounding shall be modified as required for a neat and workmanlike installation, with all cables properly arranged and supported. Support cable splices in underground structures by racks on each side of the splice. If splicing is approved, locate splices to prevent cyclic bending in the spliced sheath and out of the water. Install cables at middle and bottom of cable racks, leaving top space opening for future cables, except as otherwise indicated. Provide one spare three-insulator rack arm for each cable rack in each underground structure.

B. Cable Markers (or tags) in Manholes and Handholes – Provide cable markers or tags for each cable or wire passing through or leaving manholes or handholes and at each terminal. Tags shall be stainless steel, bronze, lead strap, or copper strip, approximately 1/16 inch thick, or hard plastic 1/8 inch thick, suitable for immersion in salt water, and of sufficient length for imprinting the legend on one line, using raised letters not less than 1/4 inch in size, and shall be permanently marked or stamped with the identification as indicated. Use of two color laminated plastic is acceptable. Plastic markers shall be dark in color, and markings shall be light in color to provide contrast so that identification can be easily read. Fastening material shall be of a type that will not deteriorate when exposed to water with a high saline content.

C. All supports, hangers, hardware, etc. used outdoors, shall be stainless steel. In corrosive atmosphere, or in hazardous areas, shall be non-ferrous, corrosion resistant, or stainless steel. Supports shall be selected to avoid galvanic reactions.

Support devices shall be submitted for approval.

D. Spare conduits shall be on top or accessible sides and identified uniquely at each location and active conduits shall be located on the bottom unless noted otherwise.

END OF SECTION

SECTION 16160

PANELBOARDS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Basic Materials and Methods

B. Section 16180 – Circuit Breakers, Switches & Fuses

C. Starters

D. Contactors

1.02 APPLICABLE DOCUMENTS

A.	NEMA PB-1, 1957	-	Panelboards
B.	F.S. W-P-115a	-	Panelboards
C.	NFPA-70	-	Articles 110, 240, 384

1.03 SUBMITTALS

A. Submit Shop Drawings for review on each panelboard indicating cabinet dimensions, component arrangements, characteristics, and sizes.

PART 2 - PRODUCTS

2.01 PANELBOARDS

A. Panelboards shall conform to Federal Specification W-P=115a, complete with cabinets and locks. Fronts shall be finished to resist corrosion with not less than one priming coat and one pearl gray finishing coat. Components shall be arranged approximately as indicated. Bus shall be copper.

B. Circuits shall be numbered serially from top to bottom with odd numbers on the left. Adjacent poles of single pole devices shall be of opposite polarity with split-phase bussing.

C. Provide keys, each of which will operate all the panelboard cabinet locks. Provide a typewritten directory with a transparent protective cover on the inside of the panelboard cover. Panels shall be factory assembled and tested. Circuit breaker panelboards shall be Type I, Class 1, bolt-on type.

D. Panelboards shall be as manufactured by Square “D”, Siemens, or Eaton Corporation.

E. Panelboard bus shall be copper.

PART 3 - EXECUTION

3.01 GENERAL

A. Mount all panels with tops at 6’ above the floor, except as noted or approved

otherwise. Mount grouped equipment on backboards. Identify all panels and all devices. Nipple all adjacent panels together using minimum 1-1/2" conduit. Clean all debris out of cabinets prior to installing covers. Provide a minimum of two empty conduit stubs from flush mounted panels to ceiling spaces above and below.

END OF SECTION

SECTION 16180

SAFETY SWITCHES, CIRCUIT BREAKERS & FUSES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

Panelboards - Section 16160

Appplicable Documents:

NEMA AB-1	-	Molded Case Circuit Breakers
NEMA IC-1	-	Industrial Control
F.S. W-S-865c	-	Enclosed Switches
F.S. W-C-375a	-	Circuit Breakers
U.L.-198	-	Fuses
NEMA FU-1	-	Fuses

1.02 SUBMITTALS:

Submit Shop Drawings for review including catalog cuts showing sizes, types and characteristics of all products.

PART 2 - PRODUCTS

2.01 SAFETY SWITCHES/CIRCUIT BREAKER DISCONNECTS:

A. Safety switches shall conform to Federal Specifications W-S-865c, heavy duty type HD, fusible or non-fusible, with the poles, ampere, voltage and horsepower ratings indicated and shall have solid neutrals and Class R clips. Lugs shall be U.L. listed for copper-aluminum.

B. Enclosures for safety switches shall be NEMA-1, general purpose, except that switches indicated (WP) weatherproof, shall be NEMA-3R unless marked NEMA-4. Provide hubs as required for NEMA-3R enclosures with suitable gaskets and bonding means.

C. Switches and disconnects shall be as manufactured by Square 'D', General Electric, Siemens, or Eaton.

D. Circuit breaker disconnects may be used in lieu of safety switches providing they comply with the safety switch requirements and are applied within their ratings and a schedule is submitted for approval.

2.02 CIRCUIT BREAKERS, MOLDED CASE:

A. Circuit breakers shall conform to Fed. Spec. W-C-375a and NEMA Standard AB-1 unless indicated otherwise. Circuit breakers shall be of the ampere rating, voltage rating, number of poles and class or interrupting capacity (I.C.) as indicated. Interrupting ratings are given in root mean square (RMS), symmetrical amperes based on NEMA test procedures. Lugs and terminals shall be U.L. listed for copper-aluminum. Accessories shall be 120 volt.

B. Each circuit breaker shall have a trip unit for each pole with elements providing inverse time delay under overload conditions and instantaneous magnetic trip for short circuit protection unless indicated as non automatic. Trip elements shall operate a common trip bar to open all elements.

2.03 FUSES:

A. Provide rejection fuses for all fusible equipment regardless of which section has furnished such equipment.

B. Fuses shall be of the ratings shown on the drawings, U.L. listed and shall be Bussman Manufacturing Co., Gould-Shawmut Company, CEFCO or approved equal.

C. All fuses shall be current limiting and have an interrupting capacity of at least 200,000 amperes RMS symmetrical.

D. The time-current characteristics and ratings shall be such that positive selective coordination is assured.

E. Fuses, 600 amperes and lower, where applied to general feeder and branch circuit protection, shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN-RK-SP LPS-RK-SP, "Low Peak". Gould-Shawmut dual element "Amp-Trap."

F. Fuses, where required for circuit breaker protection shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN-RK-SP or LPS-RK-SP "Low Peak", or Gould-Shawmut Class RK1 "Amp-Trap."

G. Coordination and current limitations or the protection of each part of the electrical system must be designed around the type and class and manufacturer selected for that type and class.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Mount grouped switches, disconnects and controls on backboards or unistrut. Provide labels on or in all fusible equipment indicating the type and size replacement fuse required.

B. Generally, mount switches and disconnects between 4' and 5' A.F.F., readily accessible.

3.02 FUSES:

A. Install all fuses as required where indicated on the drawings and where required by the National Electrical Code, special attention shall be given to air conditioning equipment.

B. Provide 10% spares (minimum of three) of each size and type of fuses furnished. Spare fuses shall be placed in a wall mounted cabinet equal to: Bussmann SFC which shall be located in the switchgear room.

END OF SECTION

SECTION 16195

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes equipment identification labels.

1.03 SUBMITTALS

A. Product Data – For each electrical identification product indicated.

B. Identification Schedule – An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.04 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 - PRODUCTS

2.01 UNDERGROUND-LINE WARNING TAPE

A. Tape

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical, controls and I&C raceways.

2. Printing on tape shall be permanent and shall not be damaged by burial

operations.

3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing

1. Comply with ANSI Z535.1 through ANSI Z 535.5.

2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, LOW VOLTAGE.

3. Inscriptions for Orange-Colored Tapes: I&C CABLE, OPTICAL FIBER CABLE.

2.02 EQUIPMENT IDENTIFICATION LABELS

A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label – Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify identification of each item before installing identification products.

B. Location – Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to services that require finish after completing finish work.

D. Self-Adhesive Identification Products – Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Underground-Line Warning Tape – During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

3.02 IDENTIFICATION SCHEDULE

A. Locations of Underground Lines – Identify with underground-line warning tape for electrical, controls and I&C wiring and optical fiber cable.

B. Equipment Identification Labels – On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the 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 requiring labels include power, lighting, control, and I&C unless equipment is provided with its own identification.

1. Labeling Instructions

a. Indoor Equipment – Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of

text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inches high. Utilize white lettering on black background.

b. Outdoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inches high. Utilize white lettering on black background.

2. Equipment to Be Labeled

a. Enclosures and electrical cabinets

b. Motor Control Centers

c. Enclosed switches

d. Variable Frequency Drives

e. Monitoring and control equipment

END OF SECTION

SECTION 16450

GROUNDING

PART 1 - GENERAL

1.01 SCOPE

This Section includes basic materials and methods for all Division 16 and related electrical work.

1.02 APPLICABLE REQUIREMENTS

NEC Article 250

PART 2 - PRODUCTS

2.01 GROUND RODS

Ground rods shall be a minimum of 5/8" diameter by 20' length & copper-clad, unless otherwise specified. Grounding accessories shall be as manufactured by Burndy, Erico or Thompson.

PART 3 - EXECUTION

3.01 INSTALLATION

A. End to end fixtures shall be continuously bonded. Grounding contact of receptacles shall be connected to a solidly grounded conduit system or to a system grounding conductor (not the system neutral) by a stranded copper wire not smaller than 12 AWG or shall be grounded in some other approved manner.

B. Bond all metal parts. Make equipment and bus connections with suitable lugs or clamps. Cadweld all wire-to-ground rod joints. Cadweld all wire-to-wire joints size 1/0 AWG and over.

C. Bond all conduits stubbing under switchboards, transformers and similar locations using bonding bushings. Bond each conduit separately.

D. Provide a bonding wire from grounding bushings on all conduit terminated at panels, boxes, wireways, panels, etc.

E. Provide a bond wire in all flexible metal conduits and connect to the boxes at each end in an approved manner.

F. Use PVC for sleeving grounding conductors, except that where sleeves are subject to extreme injury use rigid metal conduit bonded at both ends.

G. Ground all separately derived sources such as transformers to adjacent cold water pipe or building steel in accordance with NEC.

H. Grounding of all equipment should be accomplished with lugs equal to T & B "Locktite" one bolt hole tongue #31003 or equal.

I. All conduit to Service entrance equipment and Transfer Switch along with Load Center shall have Grounding Bushing on all conduit and ground to box, cabinet, etc. This will give an added protection in grounding all the electrical systems.

END OF SECTION

Attachment J