CONTRACT FOR NASSAU-AMELIA UTILITIES (NAU) GENERATOR REPLACEMENT PROJECT

THIS AGREEMENT is dated as of the _____ day of _____ in the year 2021 by and between the **BOARD OF COUNTY COMMISSIONERS OF NASSAU COUNTY, FLORIDA**, a political subdivision of the State of Florida, hereinafter referred to as "Owner" and **COGBURN BROS., INC.**, located at 3300 Faye Road, Jacksonville, Florida 32226, hereinafter referred to as "Contractor".

Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 - WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows, but is not limited to:

This project consists of replacement of Nassau Amelia Utilities (NAU) generator. The Work to be performed is generally described as replacement of existing generator and includes, but is not limited to:

> Site furnishing of all equipment, labor, materials and supervision necessary for replacement of generator, including but not limited to, all demolition, proper disposal, electrical and mechanical demolition and replacement, associated site grading and restoration, all associated materials, labor and equipment, and all incidental work as called for in the Contract Documents complete and in place. Contractor shall furnish, install, test and place in operation the generator shown on the drawings and specified hereinafter. All applicable sections of Nassau County Standard Specifications and JEA 2019 Water and Wastewater Standards shall be considered part of this work. All references to Industry Standards (ASTM, ANSI, etc.) shall be to the latest revision unless otherwise stated. Only those materials included in the JEA Water and Wastewater Standards Manual, unless called out different within the Contract Documents, shall be installed. All materials shall be new unless specifically called for otherwise. All structures, generator and panels shall require a complete shop drawing submittal, as detailed in this specification for review and approval prior to the start of construction.

All Work shall be in accordance with the construction drawings, specifications, and Contract Documents.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Nassau Amelia Utilities (NAU) Generator Replacement
Bid Number NC 20-017
Nassau County, Florida

ARTICLE 3 - ENGINEER OF RECORD

3.01 The Project has been designed by GAI Consultants, Inc., who is to act as the Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer of Record in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 Time is of the Essence

A. All time limits for milestones, if any, Substantial Completion, and Completion and readiness for Final Payment as stated in the Contract Documents are of the essence of the Contract.

B. Contractor hereby agrees to commence Work under this Contract on a date to be specified in the written "Notice to Proceed" generated by Owner and to fully complete the project as specified in Section 4.02 of this Contract.

4.02 Days to Achieve Substantial Completion and Final Payment

The work will be substantially completed within 90 days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for Final Payment in accordance with Paragraph 14.07 of the General Conditions within 30 calendar days from the date of Substantial Completion. Total contract time shall be 120 calendar days; for everyday the Work goes beyond Substantial Completion, a day will be removed from Final Completion so the total days equal 120 calendar days.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence of this Contract and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner $1,000.00 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion and until

the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner $500.00 for each day that expires after the time specified in Paragraph 4.02 for completion and readiness for Final Payment until the Work is completed and ready for Final Payment.

ARTICLE 5 - CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents in current funds equal to the sum of the amounts determined pursuant to Article 14 "Payments to Contractor and Completion" of the General Conditions and Paragraphs 5.01A and 5.01B below:

A. For all Work, at the prices stated in the Contractor's Bid, attached hereto as an exhibit.

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in Contractor's Bid, attached hereto as an exhibit, for the Total of All Unit Prices of:

One Hundred Twenty Thousand Dollars **$120,000.00**

As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classification are to be made by Engineer of Record as provided in Paragraph 9.07 of the General Conditions. The Final Payment for all Unit Price Work shall be an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the actual completed and accepted quantity of each item. Unit Prices have been computed as provided in Paragraph 11.03 of the General Conditions.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Owner as provided in the General Conditions.

6.02 Progress Payments; Retainage

A. The County shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment once each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of

the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts as Engineer of Record may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:

   a. 90% percent of the Work completed (with the balance being retainage)

   b. 90% percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95% percent of the Contract Price (with the balance being retainage), less such amounts as Engineer of Record shall determine or Owner may withhold, for incomplete work and for other items in accordance with Paragraph 14.02 of the General Conditions.

6.03 Final Payment

A. Upon Final Completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer of Record as provided in said Paragraph 14.07.

B. Final Release of Retainage and acceptance of the project must be approved by Owner.

ARTICLE 7 - INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of zero (0) percent per annum.

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents, including the General Conditions, and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in Paragraph 4.06 of the General Conditions.

E. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Bidding Documents, and safety precautions and programs incident thereto.

F. Contractor does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. Contractor is aware of the general nature of Work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

H. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports, drawings and exhibits identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. Contractor has given Engineer of Record written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer of Record is acceptable to Contractor.

J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Contract
2. Addenda, if any
3. General Conditions (attached hereto and incorporated herein as Attachment "A")
4. Supplementary Conditions (attached hereto and incorporated herein as Attachment "B")
5. Technical Specifications (attached hereto and incorporated herein as Attachment "C")
6. Construction Drawings (attached hereto and incorporated herein as Attachment "D")
7. Contractor's Bid (attached hereto and incorporated herein as Attachment "E")
8. General Information and Minimum Insurance Requirements (attached hereto and incorporated herein as Attachment "F")
9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Notice to Proceed
    b. Work Change Directives
    c. Change Orders
    d. Certificate of Substantial Completion
    e. Certificate of Final Inspection
    f. Certificate of Engineer
    g. Certificate of Final Completion
    h. Contractor's release
    i. Drawings and plans
    j. Supplemental Agreements
    k. Contractor's Waiver of Lien (Partial)
    l. Contractor's Waiver of Lien (Final and Complete)
    m. Subcontractor/Vendor's Waiver of Lien (Final and Complete)

n. Consent of Surety to Final Payment
o. Instructions to Bidders

B. The documents listed in Paragraph 9.01.A are attached to this Contract (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Contract will have the meanings indicated in the General Conditions and the Supplementary Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns

A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part

thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 Other Provisions

A. Public Records Requirement:

Owner is a public agency subject to Chapter 119, Florida Statutes. IF CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT (904) 530-6010, RECORDS@NASSAUCOUNTYFL.COM, 96135 NASSAU PLACE, YULEE, FLORIDA 32097. Under this Contract, to the extent that Contractor is providing services to Owner, and pursuant to Section 119.0701, Florida Statutes, Contractor shall:

a. Keep and maintain public records required by the public agency to perform the service.
b. Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law.
c. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the Contract term and following completion of the Contract if Contractor does not transfer the records to the public agency.
d. Upon completion of the Contract, transfer, at no cost, to the public agency all public records in possession of Contractor or keep and maintain public records required by the public agency to perform the service. If Contractor transfers all public records to the public agency upon completion of the Contract, Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If Contractor keeps and maintains public records upon completion of the Contract, Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

IN WITNESS WHEREOF, Owner and Contractor have signed this Contract in triplicate. One counterpart each has been delivered to Owner, Contractor, and Engineer of Record. All portions of the Contract Documents have been signed or identified by Owner and Contractor or identified by Engineer of Record on their behalf.

This Contract will be effective on the date on which the Contract is signed and delivered by the last of the two parties to sign and deliver (which is the Effective Date of the Contract).

OWNER	CONTRACTOR
Nassau County Board of County Commissioners	_____
Signed: _____	Signed: _____
Title: _____	Title: _____
Date: _____	Date: _____
[CORPORATE SEAL]	[CORPORATE SEAL]
Attest: _____	Attest: _____
Title: _____	Title: _____
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
Phone: _____ FAX: _____	Phone: _____ FAX: _____
	License _____
	(Where applicable)

Approved as to form by County Attorney
Agent for service of process:

_____
Signature

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Owner-Contractor Agreement.)

(If Contractor is a corporation or a partnership, attach evidence of authority to sign.)

Attachment "A"

Standard General Conditions of the Construction Contract

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

ACEC
American Council of Engineering Companies

ASCE American Society of Civil Engineers

National Society of Professional Engineers
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

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A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by

CONSTRUCTION SPECIFICATIONS INSTITUTE

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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

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9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*—The individual or entity named as such in the Agreement.

20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*—Sections of Division 1 of the Specifications.

22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

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

30. *PCBs*—Polychlorinated biphenyls.

31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *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.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or

some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than

the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with

Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation , (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

    a. reviewing and checking all such information and data;

    b. locating all Underground Facilities shown or indicated in the Contract Documents;

    c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

    d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental

Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners,

employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to

issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

    a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

    b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

6. include completed operations coverage:

   a. Such insurance shall remain in effect for two years after final payment.

   b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

   1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

   2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

   3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

   4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of

payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or

replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor

shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and

3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

   a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

   b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

   c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

   d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

      1) shall certify that the proposed substitute item will:

         a) perform adequately the functions and achieve the results called for by the general design,

         b) be similar in substance to that specified, and

         c) be suited to the same use as that specified;

      2) will state:

         a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

         b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

         c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

      3) will identify:

         a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services; and

4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor

shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

   1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

   2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of

the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by

Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

    a. Submit number of Samples specified in the Specifications.

    b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

    a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

    b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

    c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

    d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any

Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other

submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee,

the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required

to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or

Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;

2. approve the Claim; or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation,

health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for

arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in

accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

    a. the Work has progressed to the point indicated;

    b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for

Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

   c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

   d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

   e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

   a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

   a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

   b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

   c. there are other items entitling Owner to a set-off against the amount recommended; or

   d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

   b. consent of the surety, if any, to final payment;

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

   d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and

Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the

Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and

acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Condition.

Attachment "B"

Supplementary Conditions

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition). All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract have the meanings assigned to them in the General Conditions.

ARTICLE 1 DEFINITIONS AND TERMINOLOGY

SC-1.01.A Amend the Defined Terms for "21, General Requirements" to "The General Requirements pertain to all Sections of the specifications".

SC-1.01.A Add the following sentence to "27. Notice of Award": "When requested by OWNER, the Notice of Award may be issued by the ENGINEER."

SC-1.01.A Add the following sentence to "28. Notice to Proceed": "When requested by OWNER, the Notice to Proceed may be issued by ENGINEER."

SC 1.01.A Add the following new Defined Terms:

52. SURETY – The person, firm, or corporation which is bound by the contract bonds with and for Contractor (Principal); and which is held and firmly bound unto Owner for the conditions of obligations set forth in said bonds.

53. ARCHITECT/ENGINEER – The person, firm or corporation named as the ENGINEER in the Agreement.

54. PROVIDE – As used in the Project Manual, means to furnish and install, complete and ready for intended use.

55. PRODUCT – As used in the Project Manual, includes materials, fabrications, systems and equipment.

ARTICLE 2 PRELIMINARY MATTERS

SC-2.02.A Amend the first sentence of paragraph 2.02.A of the General Conditions by changing "up to ten" to "five".

Add the following new subparagraphs to paragraph 2.05A:

SC-2.05.A Amend the first sentence of paragraph 2.05.A of the General Conditions by changing "Within 10 days after the Effective Date of the Agreement" to "At the Preconstruction Conference".

SC-2.05A.4 Contractor shall perform no portion of the Work at any time without Contract Documents or, where specified, approved Shop Drawings for such portion of the Work.

SC-2.05A.5 By executing the Contract, Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents.

Add the following new paragraph immediately after paragraph 2.05.A.5:

SC-2.05.B Before any Work at the Site is started, Contractor shall deliver to the Owner, certificates of insurance that Contractor is required to purchase and maintain in accordance with Article 5.

Add the following new paragraph immediately after paragraph 2.06.B:

SC-2.06.C Owner may issue Notice to Proceed at the Preconstruction Conference. Contractor shall begin the Work within twenty-four (24) hours of the date given in the Notice to Proceed. If the Contractor does not start the Work within fourteen (14) calendar days after this date, Owner may, at his discretion, terminate Contractor in accordance with paragraph 15.02.

Delete paragraph 2.07.A in its entirety and insert the following in its place:

SC-2.07.A All schedules as set forth in Article 2 shall be submitted and accepted by the Owner and Engineer within 30 days of NTP. Should any schedule not be accepted within 30 days of the NTP, it will be considered a breach of contract and reason for termination of the contract for cause in accordance with the General Conditions, Section 15.02.

ARTICLE 3 CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Add the following sentence to Paragraph 3.01B:

SC-3.01.B Contractor shall be responsible for the construction and coordination of the parts of the Project, and all systems provided shall be completely compatible and fully functional without additional cost to Owner.

Add the following new subparagraph to paragraph 3.02.A:

SC-3.02.A.3. Sections of Division 01 - General Requirements govern the execution of all sections of the Specifications.

ARTICLE 4 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRIONMENTAL CONDITIONS; REFERENCE POINTS

Add the following to the end of paragraph 4.01.C:

SC-4.01.C Contractor shall obtain said land rights at his own expense and without liability to the Owner. Contractor shall not enter upon private property without first obtaining written permission from the rightful property owner.

Amend the last sentence in paragraph 4.03.C.3 to read:

SC-4.03.C.3 However, Owner, Engineer and Engineer's Consultants shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

ARTICLE 5 BONDS AND INSURANCE

Delete paragraph 5.01.B in its entirety and insert the following in its place:

SC-5.01.B All Bonds shall be in the form prescribed by the Contract Documents or other form approved by Owner. All else notwithstanding, the terms of all Bonds shall be substantially in the form prescribed by Chapter 255, Florida Statutes. All Bonds shall be executed by Contractor and a corporate bonding company licensed to transact such business in the State of Florida and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. Contractor will cause the Bonds to be recorded with the Clerk of the Circuit Court in the county in which the Work is to be performed. Failure to execute bonds in the form prescribed may constitute non-responsiveness on the part of the Contractor. The expense for all Bonds shall be the Contractor's responsibility.

Add the following to the end of paragraph 5.02.A:

SC-5.02.A Certificates of insurance shall be issued by a company with a Best's rating of at least B+ authorized to do business in the State of Florida. Owner must approve non-rated insurers. If used, Owner shall be shown as Certificate Holder, Engineer as Additional Insured and provide a 30-day cancellation notice.

Delete paragraph 5.03.B in its entirety and insert the following in its place:

SC-5.03.B Insurance policies written on a "Claims Made" form is not acceptable without Owner's approval.

Add the following new paragraphs immediately after paragraph 5.03.E:

SC-5.03.F Umbrella Liability insurance is preferred, but an Excess Liability equivalent is acceptable. Whichever type of coverage is provided, it shall not be more restrictive than the underlying insurance policy coverages, including, but not limited to the coverage Trigger, defense, notice of occurrence/accident/circumstances, notice of claim and extended reporting period.

SC-5.03.G No work shall commence under this contract until the required Certificate(s) have been provided. Work shall not continue after expiration (or cancellation) until new Certificate(s) have been provided. Non-continuance of work after expiration (or cancellation) of Certificate(s) will not constitute a delay beyond Contractor's control as defined in paragraph 12.03.

SC-5.03.H Contractor shall arrange for its insurers' policies to include, or be endorsed to include, a severability or interest/cross liability provision, so that Owner will be treated as if a separate policy were in existence, but without increasing the policy limits.

SC-5.03.I Contractor's deductibles/self-insured retentions shall be disclosed to Owner and may be disapproved by the latter. They shall be reduced or eliminated at the option of Owner. Contractor is responsible for the amount of any deductible or self-insured retention.

SC-5.03.J These insurance requirements shall not relieve or limit the liability of Contractor. Owner does not in any way represent that these types or amounts of insurance are sufficient or adequate to protect Contractor's interests or liabilities, but are merely minimums.

SC-5.03.K Insurance required of Contractor or any other insurance of Contractor shall be considered primary, and insurance or self-insurance of Owner shall be considered excess, as may be applicable to claims that arise out of this contract.

SC-5.03.L Receipt of Certificates or other documentation of insurance or policies or copies of policies by Owner, or by any of its representatives, which indicate less coverage than required does not constitute a waiver of the Contractor's obligation to fulfill the insurance requirements herein.

SC-5.03.M The Contractor shall either (a) require each subcontractor to produce and maintain the same coverage as required of the Contractor, or (b) insure the activities of subcontractors in his own policy.

SC-5.03.N These insurance requirements are minimums and may not be adequate to cover Contractor exposures.

Add the following new paragraphs immediately after paragraph 5.04.B:

SC-5.04.C The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts shown in Exhibit 1 of the contract documents, or greater where required by Laws and Regulations:

Delete paragraphs 5.06 through 5.10 in their entirety except for paragraph 5.06.D and insert the following in place of 5.09.A:

SC-5.09.A If Owner has any objection to the coverage afforded by or other provisions of Bonds or insurance required to be purchased and maintained by Contractor in accordance with Article 5 on the basis of non-conformance with the Contract Documents, Owner shall so notify Contractor in writing within ten days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. Contractor shall provide to Owner such additional information in respect of insurance provided as Owner may reasonably request.

ARTICLE 6 CONTRACTOR'S RESPONSIBILITIES

Add the following to the end of paragraph 6.01.A:

SC-6.01.A Owner reserves the right to reject any means, methods, techniques, sequences or procedures proposed by Contractor which:

1. will constitute or create a hazard to the Work or to the persons or damage to property or existing utilities; or

2. will not produce finished work in accordance with the terms of the contract Documents.

Owner's failure to exercise his right to reject such means, methods, techniques, sequences or procedures shall not relieve the Contractor of his obligation to accomplish the result intended in the Contract Documents nor shall the exercise of such right create a cause of action for damages.

Add the following new paragraph immediately after paragraph 6.02.B:

SC-6.02.C Engineer shall record time and costs required by Engineer and Engineer's Consultants to provide inspection services due to Contractor's working beyond regular working hours as defined in the General Requirements. Owner's reimbursement for the charges shall be a deduction from Contractor's Partial Payment(s).

Add the following new paragraphs immediately after paragraph 6.05.A.2.d:

SC-6.05.A.2.e Each action mentioned above required for review of proposed substitute items of material or equipment shall be followed in the order given. Failure to do so shall be cause for rejection of the proposed substitution.

SC-6.05.A.2.f Contractor shall reimburse Owner for the charges of Engineer or Engineer's Consultants for evaluation of substitutions. Owner's reimbursement for the charges shall be a deduction from the Contractor's Partial Payment(s).

Add the following to the end of paragraph 6.06.A:

SC -6.06.A Contractor shall not subcontract part(s) or the work, the aggregate cost of which is greater than 50 percent of the contract price, without prior written approval by Owner. Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work that bind Subcontractors to Contractor by the terms of the Contract Documents insofar as applicable to the work of Subcontractors and to give Contractor the same power as regards terminating any subcontract that Owner may exercise over Contractor under any provision of the Contract Documents. Nothing contained in the subcontract shall create any contractual relationship between Subcontractor and Owner. Each Subcontractor shall discharge all duties and responsibilities of Contractor to Owner covered by his subcontract.

Add the following to the end of paragraph 6.06.B:

SC-6.06.B Subcontractors and Suppliers shall be identified on the form provided in the Bidding Requirements.

Add the following to the end of paragraph 6.08.A:

SC-6.08.A Permits, licenses, and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by Owner, unless otherwise specified.

Add the following to the end of paragraph 6.09.A:

SC-6.09.A Contractor shall also cause all Subcontractors to comply with all federal, state, county, and municipal laws, ordinances, rules, and regulations bearing on the conduct of the Work.

Add the following to the end of paragraph 6.09.B:

SC-6.09.B If Contractor observes that the Contract Documents are at variance with said laws, ordinances, rates, or regulations, Contractor shall promptly notify Engineer of Record and the County in writing, and any necessary changes shall be adjusted as provided in the Contract Documents. Contractor shall not proceed with the Work until so instructed by Owner.

Add the following to the end of paragraph 6.12.A:

SC-6.12.A Annotations of record documents shall be legible, precise, and complete as determined by Engineer of Record and the County.

Add the following new paragraph after paragraph 6.13.F:

SC-6.13.G Contractor shall be responsible at all times for precautions to achieve the protection of all persons, including employees and property. Contractor shall make special effort to detect hazardous conditions and shall take prompt action where necessary to avoid accident, injury, or property damage. OSHA and all other applicable safety laws and ordinances shall be

followed as well as American National Standards Institute Safety Standards. All accidents, injuries, claims, or potential claims shall be reported promptly to Owner.

Add the following new paragraph immediately after paragraph 6.17.E.1:

SC-6.17.E.2 Contractor shall reimburse Owner for the charges of the County and the County's Consultants for costs generated as a result of more than two submittals of any one Shop Drawing or Sample being required for evaluation due to rejection for noncompliance of the original submittal or lack of information required by the Contract Documents. Owner's reimbursement for the charges shall be a deduction from Contractor's Partial Payment(s).

SC-6.20.A Amend the first paragraph of 6.20.A of the General Conditions by changing "(including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court: or arbitration or other dispute resolution costs)" to "(including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs)".

Add the following new paragraph immediately after paragraph 6.20.C:

SC-6.20.D Neither Contractor nor Owner shall sell, transfer, assign, or otherwise dispose of the contract or any portion thereof, or any right, title, or interest therein, or any obligations thereunder, without written consent of the other party.

ARTICLE 8 OWNER'S RESPONSIBILITIES

SC-8.02 Amend paragraph 8.02 of the General Conditions by striking out the following words: "to whom Contractor makes no reasonable objection."

ARTICLE 9 ENGINEER'S STATUS DURING CONSTRUCTION

Add the following new paragraph immediately after paragraph 9.05.A:

SC-9.05.B Contractor shall reimburse the Owner for the charges of Engineer and Engineer's Consultants for any additional field observations, engineering analysis, correspondence, meetings, or other work due to non-complying or defective construction, materials, or equipment performed or furnished by the Contractor, Subcontractors, or Suppliers. Owner's reimbursement for the charges shall be a deduction from the Contractor's Partial Payment(s).

ARTICLE 10 CHANGES IN THE WORK; CLAIMS

SC-10.05.B Amend the first sentence of paragraph 10.05.B of the General Conditions by changing "(but in no event later than 30 days)" to "(but in no event later than 15 days)".

ARTICLE 11 COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

Add the following new paragraphs immediately after paragraph 11.01.A.5.i:

SC-11.01.A.5.j The cost of specific consideration for the indemnifications set forth in paragraph 6.20.

SC-11.01.A.5.k The cost of compliance with current local, state and federal safety regulations.

Add the following new paragraphs immediately after paragraph 11.03.D:

SC-11.03.E If Owner objects to Contractor's quoted adjustment in Unit Price Work set forth in paragraph 11.03.D, Owner may assign such work to its own forces or another contractor.

SC-11.03.F Owner reserves the right to delete any Unit Price Work without financial penalty incurred from Contractor.

ARTICLE 12 CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

Add the following new paragraph immediately after paragraph 12.02.B:

SC-12.02.C On the 21st of each month, or the next following business day, the Contractor shall submit to the Owner and Engineer a request for weather days. Failure to submit the request forfeits the right to claim weather days for that period and any previous period. The Owner will grant time extensions, on a day for day basis, for delays caused by the effects of rains or other inclement weather conditions or related adverse soil conditions that prevent the Contractor from productively performing controlling items of work resulting in:

(1) The Contractor being unable to work at least 50% of the normal work day on pre-determined controlling work items due to adverse weather conditions.

No additional compensation will be made for delays caused by the effects of inclement weather.

ARTICLE 13 TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

Add the following to the end of paragraph 13.03.A:

SC-13.03.A Contractor shall reimburse Owner for the charges of Engineer and Engineer's Consultants for all costs due to work not being ready for tests and/or inspections when the Contractor has notified Engineer that work is ready for tests and/or inspections. Contractor shall reimburse Owner for all failed tests and subsequent retests. Reimbursement for the charges shall be a deduction from the Contractor's Partial Payment(s).

Delete paragraph 13.03.B of the General Conditions and add the following in its place:

SC-13.03.B The Contractor shall obtain and employ an independent testing laboratory to provide the services specified herein and shall include all costs for these services in the contract price. The Contractor shall submit for approval by the Owner and Engineer, the independent testing laboratory, including qualifications.

Copies of all testing agency invoices submitted to the Contractor for payment shall be forwarded with the Contractor's request for partial payment. Invoices shall be submitted routinely throughout the project and shall be pertinent to the partial payment period under consideration. Testing agency invoices in excess of sixty (60) days old shall not be considered for payment, Invoices shall clearly indicate type and amount of test performed, unit and total cost, and shall indicate if the invoiced testing cost is a result of retests required due to the Contractor's failure to achieve specified requirements. The cost of retesting due to test failure will be borne by the Contractor. Payment to the Contractor for testing shall not be made without the required itemized invoicing.

SC-13.08.A Amend the first sentence of 13.08.A by changing "(including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs)" to "(including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs)".

SC-13.09.C Amend the first sentence of 13.09.C by changing "(including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs)" to "(including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or other dispute resolution costs)".

ARTICLE 14 PAYMENTS TO CONTRACTOR AND COMPLETION

Delete paragraph 14.02.A.2 in its entirety and insert the following in its place:

SC-14.02.A.2 Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor certifying that Contractor has disbursed to all subcontractors and suppliers having an interest in the contract their pro rata shares of the payment out of previous progress payments received by Contractor for all work completed and materials furnished in the previous work period, less a retainage withheld by Contractor pursuant to an agreement with a subcontractor. Within 30 days of receipt for the final progress payment or any other payments received thereafter except the final payment, Contractor shall pay all subcontractors and suppliers having an interest in the contract their pro rata shares of the payment for all work completed and materials furnished.

Add the following words to the end of paragraph 14.02.B.1:

"or direct Engineer to present the Application to Owner with Engineer's recommendation of partial payment."

SC-14.02.B.2 After the word "schedules", add the words "and the Contract Documents".

Add the following new paragraph immediately after paragraph 14.02.B.2.c:

SC-14.02.B.2.d Contractor's other obligations under the Contract Documents have been fulfilled.

Delete paragraph 14.05.A.4 in its entirety.

Amend paragraph 14.09.A.1 to read:

SC-14.09.A.1 A waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein whenever said failure occurs or from Contractor's continuing obligations under the Contractor Documents; and

Add the following new paragraph immediately after paragraph 14.09.A.2:

SC-14.09.A.3 The acceptance of final payment by Contractor designated and identified by Engineer as final payment shall be and shall operate as a release to Owner of all claims and all liability to Contractor other than claims in stated amounts as may be specifically excepted by Contractor for all things done or finished in connection with the Work and for every act of Owner and others relating to or arising out of the Work. Any payment, however, final or otherwise, shall not release Contractor or Contractor's Surety(ies) from any obligations under the Contract Documents or Bonds.

ARTICLE 15 SUSPENSION OF WORK AND TERMINATION

SC-15.02.A. 1 After the word "Contractor's", add the words "start the work in accordance with the Notice to Proceed or Contractor's".

ARTICLE 16 DISPUTE RESOLUTION

Add the following new paragraph immediately after paragraph 16.01.C.3

SC-16.01.D Venue for any mediation shall be in Nassau County, Florida. Venue for any litigation shall be in state court in Nassau County, Florida.

GENERAL

REQUIREMENTS

PART 1 - GENERAL

1.01 QUALIFICATION

A. The Bidder shall be able to demonstrate that it possesses the necessary proficiency and experience, the Bidder's Firm shall have been regularly engaged in the construction of projects involving the installation of process equipment at municipal water/wastewater treatment facilities in Florida for at least the last five consecutive years and shall have completed at least five projects of similar size, value, and complexity within the last five years. The Bidder shall be a Florida state certified General Contractor. The Bidder shall perform at least 50% of the contract work with his/her own forces.

1.02 EXISTING UTILITIES AND STRUCTURES

A. The existing utilities and facilities shall be located from the Owner's and other records. Guaranty is not made that all existing facilities are shown/located or that those shown/located are entirely accurate. The Contractor shall assure themselves of any utilities, structures or facilities prior to performing any Work. Prior to the start of Work, the Contractor shall request the Owner to advise him of the location of their facilities in the vicinity. The Owner and the Engineer will assume no liability for damages sustained or costs incurred because of the Contractor's operations in the vicinity of existing utilities or structures. The Contractor shall notify the Engineer of any deviation between existing conditions and the information provided by the Engineer or Owner.

1.03 PRESERVING WATER QUALITY

A. The Contractor shall exercise extreme care to minimize degradation of water quality at the site. All necessary provisions shall be taken to insure compliance with the water quality standards of the State of Florida.

B. The Contractor shall take steps to collect and dispose of all sewage that leaks and/or spills during the performance of this contract. Any leakage or spillage shall be cleaned up to the satisfaction of the Nassau County Health Department.

1.04 PROTECTION OF EXISTING AND ADJACENT PROPERTIES

A. Unless indicated otherwise, all shrubbery, paved streets and walks, fences and walls, adjacent structures and equipment shall be fully protected against damage during each stage of the project. Any damage by the Contractor shall be fully restored to its condition at the start of construction.

1.05 RESTORATION OF DAMAGED SURFACES, STRUCTURES, AND PROPERTY

A. Where pavement, trees, shrubbery, fences or other property or surface 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 will 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.

1.06 SUBSTITUTIONS (NOT USED)

1.07 WATER

A. The Contractor shall provide water for their use for construction purposes. The Contractor shall be responsible for the installation of an Owner water meter at a location approved by the Engineer. The Contractor shall install and maintain necessary supply connections and piping for same.

1.08 SANITARY FACILITIES

A. The Contractor shall provide temporary restroom facilities for field crews as permitted by the Nassau County Health Department. Existing Owner facilities are not available for use by the Contractor.

1.09 WORKING HOURS

A. Work under this contract shall not be performed on County, State and/or national holidays or during such events as the Fernandina Beach Shrimp Festival, Nassau County School System FCAT (as identified at the pre-bid conference), except in time of emergency, and then only under written permission from the County who shall be the sole judge as to the urgency of that situation. Available workdays to perform work will not include night time work, weekend work, or work before 8:00 am or after 5:00 pm (40 hours per work week).

Should the Contractor deem it necessary to work on Sundays, holidays, or beyond daylight hours in order to comply with his construction schedule or because of an emergency, the Contractor shall request permission of the County. If, in the opinion of the County, the need is bona fide, the County will authorize the Contractor to

work such hours as may be necessary.

B. Should the County approve work time beyond regular hours, the following hourly rates shall be applied as the County's reimbursement of Engineer of Record's fee to be paid by Contractor for expenses defined in Supplemental Conditions SC-6.02.C, SC-6.05.A.2.f, SC-6.17.E., SC-9.05.B and SC-13.03.A.

1. Engineer	$202.69
2. Project Engineer	$115.49
3. Construction Administrator	$134.92
4. Inspector	$96.07
5. Administrative Assistant	$53.21
6. Consultant Construction Engineering Inspection (CEI)	$69.35

1.10 ASSEMBLIES OR UNITS

A. Where the Contractor is required to furnish and install an assembly or unit, the Contractor shall furnish all component parts as required by the manufacturer of the unit.

1.11 ACCESS TO THE WORK SITE

A. The Contractor may use only the roads and/or easements designated by the Owner for access to the work locations. The Contractor shall be responsible for maintaining, protecting and restoring the routes to the satisfaction of the Owner and Engineer.

1.12 BARRICADES AND LIGHTS

A. The Contractor shall furnish and erect such barricades, fences, lights, and danger signals and shall provide such other precautionary measures for the protection of persons or property and of the work as necessary. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain at least one light at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any work under construction.

B. The Contractor will be held responsible for all damage to the work due to failure of barricades, signs, and lights to protect it and whenever evidence is found of such damage, the Contractor shall immediately remove the damaged portion and replace it at his cost and expense. The Contractor's responsibility for the maintenance of barricades, signs, and lights shall not cease until the project has been accepted by the Owner.

1.13 SECURITY

A. The Contractor shall be fully responsible for the safety and security of the work area. Any temporary measures required to maintain the security of the area shall be the Contractor's responsibility.

1.14 TRENCH SAFETY ACT

A. All work shall conform to the Trench Safety Act. Contractor shall include in his price the cost of conforming to the Trench Safety Act.

1.15 PROJECT SCHEDULE

A. The Contractor shall develop and submit to the Engineer and Owner for approval an initial progress schedule and a construction phasing plan demonstrating complete fulfillment of all contract requirements including all activities of subcontractors, equipment vendors and suppliers. An updated schedule shall be submitted with each pay request.

1.16 TEST OR OPERATION

A. Upon completion of work, it shall be the Contractor's responsibility to turn the installation over to the Owner in good operating condition. This shall be demonstrated by a test run of the system by the Contractor in the presence of the Owner and/or Engineer.

1.17 REMOVAL OF ALL TEMPORARY FACILITIES & RESTORATION OF SITE

A. Upon completion of the work, it shall be the responsibility of the Contractor to remove all temporary facilities including but not limited to pumps, fences, signs, temporary power, materials or other debris. The site, adjacent properties and Owner facilities, shall be restored to condition equal to that before Work began.

1.18 RECORD DOCUMENTS

A. The Contractor shall maintain on site one set of the following record documents for use to record actual revision to the Work:

1. Exhibits

2. Specifications

3. Addenda

4. Change Orders and other modifications to the Contract

5. Approved Shop Drawings, product data, and samples

B. The Contractor shall provide As Built Redline Drawings for partial releases and final release submittals. With each submittal provide survey data, signed and sealed by the Contractor's Florida Licensed Surveyor, to support elevation information depicted or the record drawings.

The final record drawings shall correctly and accurately show all the new installation reflecting surveyed information performed, signed and sealed by a professional land surveyor and mapper registered in the State of Florida. The drawings shall be neat and legible. All elevations shall be based on State Plane Coordinates NAVD-88 Datum. Record drawings shall comply with Nassau County Engineering Services As-Builts Requirement Checklist.

C. Upon completion of the project, final record drawings will be provided to the Owner on CD-Rom, Autocad DWG format, along with one set of PDF (24"x36") along with a complete set of all survey data, signed and sealed by a professional Land Surveyor and Mapper in the State of Florida.

D. Engineer-of-Record\Owner reserves the right to review Contractor's As-Built drawings during course of construction.

E. Final pay and connections to any existing utility main will not be approved until Record Drawings are approved and accepted by Engineer-of-Record\Owner.

1.19 PROVISION FOR THE CONTROL OF DUST

A. The Contractor shall take the necessary steps to prevent objectionable blowing or drifting of dust, sand, and other debris where the construction occurs in residential, commercial, or other developed areas.

B. Extreme precautions shall be taken during construction to minimize the amount of dust created. Wetting the site or other means as directed by the Owner, may be required for control of dirt.

1.20 OBSTRUCTION

A. The attention of the Contractor is drawn to the fact that during construction at the project site, the Contractor will encounter electrical lines. The Contractor shall exercise extreme care before and during construction to locate and flag these lines so as to avoid damage to the existing lines. Should damage occur to an existing line, the Contractor shall repair the line at no cost to the Owner.

B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of construction, are

temporarily stayed in position while the work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such construction activities by the Contractor.

1.21 CLEAN-UP

A. The Contractor shall maintain the site of the work in a neat condition. The Contractor shall remove all excess materials, excess excavated materials and all debris resulting from his operations within a time frame approved by the Engineer.

1.22 DESIGN PROFESSIONALS REPRESENTING OWNER

A. Various Design Professionals (i.e. Civil, Mechanical, Electrical, etc.) as consultants to the Owner prepared the specifications for the project. The Owner may have the various Design Professionals provide services to the Owner during construction phase of the project. The Design Professionals will be representatives of the Owner and visits to the site by the Design Professionals will be on the basis of paragraph 1.22 of this section. Also paragraph 1.23 of this section includes the various Design Professionals for this project.

1.23 VISITS TO SITE BY OWNER'S REPRESENTATIVE

A. The Owner's representative will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed work and to determine, in general, if the work is proceeding in accordance with the Contract Documents.

B. The Owner's representative's efforts will be directed toward providing for the Owner a greater degree of confidence that the completed work will conform to these specifications. On the basis of such visits and on-site observations, the Owner's representative will keep the Owner informed of the progress of the work and will endeavor to guard the Owner against defects and deficiencies in the work.

1.24 LIMITATIONS ON OWNER'S REPRESENTATIVE RESPONSIBILITIES

A. Neither the Owner's representative's authority to act under these specifications or elsewhere in other documents nor any decision made by the Owner's representative in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of the Owner's representative to the Contractor, any sub-Contractor, any manufacturer, fabricator, supplier or distributor, or any of their agents or employees or any other person performing any of the work.

B. The Owner's representative shall not be responsible to the Contractor's means, methods, techniques, sequences or procedures of construction, or safety precautions and programs incident thereto, and the Owner's representative shall not be responsible for the Contractor's failure to perform the work in accordance with these specifications.

C. The Owner's representative shall not be responsible for the acts or omissions of the Contractor or of any sub-Contractors, or of any other persons at the site or otherwise performing any of the work.

1.25 WARRANTY

A. The Contractor shall be responsible for defects in materials (including latent defects) or workmanship for a period of two years after the date of final acceptance of the project by the Owner. Such defects include, but not limited to, any settlement noted in backfill, fill, or in structures built over the backfill or fill during the warranty period in accordance with the General Conditions will be considered to be caused by improper compaction methods and shall be corrected by the Contractor at no cost to the Owner. Structures damaged by settlement shall be restored to their original condition by the Contractor at no cost to the Owner.

B. The Contractor shall furnish factory warranty on all equipment furnished for the performance and completion of the project against defects in materials and/or workmanship. The factory warranty shall become effective for a period of two years after the date of final acceptance of the project by the Owner. Should any defects in materials or workmanship be brought to the attention of the Contractor within the factory warranty period, the Contractor shall replace at no cost to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

Attachment "C"

Technical Specifications

SUMMARY OF WORK

PART 1 – GENERAL

1.01 LOCATION OF WORK: The project site is at the following locations in Nassau County, Florida:

A. 5390 First Coast Highway, Fernandina Beach, FL 32034.

1.02 DESCRIPTION OF WORK:

This project consists of replacement of Generator for Nassau Amelia Utilities. The work to be performed is generally described as demolition of the existing generator. Installation of a new generator with integral fuel storage tank and appurtenances, associated electrical, instrumentation, and controls.

Site furnishing of all equipment, labor, materials and supervision necessary for replacement of generator, including but not limited to all demolition, proper disposal, electrical and mechanical demolition and replacement, associated site grading and restoration, all associated materials, labor and equipment, and all incidental work as called for in the Contract Documents complete and in place. The Contractor shall furnish, install, test and place in operation the generator shown on the drawings and specified hereinafter. All applicable sections of Nassau County Standard Specifications and JEA 2019 Water and Wastewater Standards shall be considered part of this work. All references to Industry Standards (ASTM, ANSI, etc.) shall be to the latest revision unless otherwise stated. Only those materials included in the JEA Water and Wastewater Standards Manual, unless called out different within the Contract Documents, shall be installed. All materials shall be new unless specifically called for otherwise. All structures, pumps and panels shall require a complete shop drawing submittal, as detailed in this specification for review and approval prior to the start of construction.

All work shall be in accordance with the construction specifications, and contract documents.

1.03 CONTRACTOR'S DUTIES: Except as specifically noted, the Contractor shall provide and pay for the following:

A. All labor, materials and equipment.

B. Tools, construction equipment and machinery.

C. Utilities required for construction.

D. Other services and facilities necessary for the proper execution of work completion including incidental items not detailed or called for, but which are required for the proper completion of the project.

E. All legally required sales, consumer and use taxes.

F. All applicable permits, government fees and licenses.

G. Survey services for construction layout including equipment, piping, fitting, valve laying schedule and record drawings shall comply with Nassau County Engineering Services As-Builts Requirement Checklist.

H. All required testing and clearances for placing in service.

I. Restore all sites and structures that are damaged by the Contractor during the execution of this contract at no additional cost to the Owner.

1.04 CONTRACTOR SHALL ALSO BE REQUIRED TO PERFORM THE FOLLOWING:

A. Comply with all codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on the performance of work.

B. Promptly submit written notice to the Engineer of observed variances of Contract Documents from legal requirements; it is not the Contractor's responsibility to make certain drawings and specifications comply with codes and regulations.

C. Enforce strict discipline and good order among employees. Do not employ unfit persons or those not skilled in assigned tasks.

1.05 WORK SEQUENCE:

A. Coordinate with Owner.

B. Contractors construction schedule will be subject to approval by the Engineer and updated on a monthly basis.

C. Notify Engineer and Owner 96 hours (minimum) in advance of removing any facility from service, permanently or temporarily. Removal from service of any facility shall be preapproved by Owner.

1.06 CONTRACTORS USE OF PREMISES:

A. Do not unreasonably encumber sites with materials or equipment.

B. Assume full responsibility for protection and safekeeping of products stored on premises.

C. Move any stored products interfering with operation of Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

SEQUENCE OF CONSTRUCTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. In performing the work shown and specified, the Contractor shall plan and schedule his work in accordance with Section 01 31 13 - Construction Schedule. The work is being performed on active utility facilities which must be maintained in operation throughout construction.

1.02 CONSTRUCTION SCHEDULE

A. The Construction Schedule shall be submitted by the Contractor in accordance with Section 01 31 13 - Construction Schedule and Section 02 41 13 – Demolition.

B. Proposed Construction Sequence:

1. See drawing E-6 for step 1 work. Includes
   - Installation of new generator.
   - Connection of new generator to the existing ATS
2. See drawing E-7 for step 2 work.
   - Reconnect new generator to the new ATS.
   - Connect the existing MCC to the new ATS.
3. See drawing E-8 for the step 3 work.
   - Remove old generator and ancillary items.

C. Contractor may propose an alternate construction sequence for review and approval by the Owner.

1.03 CONSTRUCTION PLAN

A. A plan of construction and operation shall be submitted by the Contractor ten (10) days prior to conducting the Work, showing the proposed sequence, equipment, etc. for review.

B. The plan should include the following items:

1. Continuous operation of the Utilities is of critical importance. A plan to schedule and conduct actives to enable existing facilities to operate continuously.

2. The sequence shall outline the proposed schedule and duration of each activity required to complete the project.

C. Coordination with the Utilities personnel is essential. Any requested plant shutdowns shall be submitted in writing no later than 5 days prior to the requested shutdown. Any work that will require disconnecting or taking any equipment out of service shall be cleared with the NAU prior to the work being performed.

1.04 USE OF FACILITIES BEFORE COMPLETION

A. The Owner reserves the right to enter and use any portion of the constructed facilities before substantial completion of the whole work to be done under this Contract.

1.05 CONNECTION OF EXISTING SYSTEMS

A. All connections to existing systems shall be performed in such a manner that no damage and minimal interruption is caused to the existing installation. On completion of his installation, the Contractor shall remove the plug or blind flange. All areas of work shall be completed and brought on line without disturbing ongoing operations of the facility. Any damage caused to existing installations shall be repaired or replaced by the Contractor at no additional cost to the Owner.

1.06 COORDINATION WITH PERSONNEL

A. Before commencing work involving removing or placing in operation existing or new facilities, the Contractor shall notify the Owner at least twenty (20) days in advance in writing. The Contractor is hereby notified that the Water and Wastewater Plants are active plants and that their operation shall not be interrupted at any time for any reason during the contract period.

B. Only the Owner's appointed representative can authorize the shutdown of portions of the facilities. The Contractor shall, under no circumstances, interfere with any facility component without the Owner's authorization, in writing, and without supervision by the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COORDINATION WITH EXISTING UTILITIES AND OTHER AGENCIES

A. In the event that the Work involves existing utilities owned by the Owner or other agencies, the Contractor shall notify all utilities in writing with a copy to the Owner and the Engineer before construction is started and shall coordinate his activities

with them. The Contractor shall cooperate with the owners of utility lines that may require temporary interruption of service in order to minimize the interruption. The Contractor shall call SUNSHINE a minimum of 72 hours prior to any excavation for location of existing underground facilities.

3.02 COOPERATION

A. The Contractor shall allow the Owner or his agents, and other project contractors or their agents, to enter facilities being constructed under this Contract for the purpose of constructing, installing, operating, maintaining, removing, repairing, altering or replacing such equipment, pipes, sewers, conduits, manholes, wires, or other structures and appliances which may be required to be installed at or in the Work. The Contractor shall cooperate with all the aforesaid parties and shall allow reasonable provisions for the prosecution of any other work by the Owner, or others, to be done in connection with his work, or in connection with normal use of the facilities.

SCHEDULE OF

VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Submit to the Engineer a Schedule of Values allocated to the various lump sum portions of the Work, at the Pre-Construction Conference, and as otherwise specified or requested to be submitted earlier as evidence of the Apparent Low Bidder's qualifications.

2. Upon request of the Engineer support the values with data which will substantiate their correctness. The data shall include, but not be limited to quantity of materials, all sub-elements of the activity, and their units of measure.

3. The Schedule of Values shall establish the actual value for each activity of the Work to be completed taken from the Construction Schedule, and shall be used as the basis for the Contractor's Applications for Payment.

B. Related Requirements Described Elsewhere:

1. Section 01 29 76 Application for Payment

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Type schedule on 8-1/2 inch x 11 inch white paper. Contractor's standard forms and computer printouts may be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of project and location.

2. Owner and purchase order number.

3. Engineer and project number.

4. Name and address of Contractor.

5. Contract designation.

6. Date of submission.

B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing item prices for progress payments during construction.

C. Identify each line item with the number and the title of the respective section of the Specifications.

D. For each major item of the Work, list sub-values of major products or operations under the major item.

E. For the various portions of the Work:

1. The amount for each item shall reflect a total installed cost including a directly proportional amount of the Contractor's overhead and profit.

2. For items on which progress payments will be requested for stored materials, break down the value into:

a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials. Payment for materials shall be limited to the invoiced amount only.

b. The total installed value.

F. Round off figures to nearest dollar amount.

G. The sum of the costs of all items listed in the schedule shall equal the total Contract Price.

H. For each item which has an installed value of more than $15,000, provide a breakdown of costs to list major products or operations under each item.

1.03 SUBSCHEDULE OF UNIT MATERIAL VALUES

A. Submit a separate schedule of unit prices for materials to be stored on site and for those materials incorporated into the Work for which progress payments will be requested.

B. The unit values for the materials shall be broken down into:

1. Cost of the material, delivered and unloaded at the site, with taxes paid.

2. Copies of paid invoices for component material shall be included with the payment request in which the material first appears.

C. Only materials unique to the project may be billed when stored on site. Materials of standard use such as conduit, wire, small-diameter pipe, steel, etc., shall not be accepted for payment.

D. The installed unit value multiplied by the quantity listed shall equal the percentage of the cost of that item in the Schedule of Values.

1.04 REVIEW AND RESUBMITTAL

A. After review by Engineer, revise and resubmit Schedule of Values and Schedule of Unit Material Values as required.

B. Resubmit revised schedules in same manner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

APPLICATIONS FOR

PAYMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Administrative and procedural requirements governing the Contractor's Applications for Payment.

1.02 SCHEDULE OF VALUES:

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

a. Contractor's Construction Schedule.

b. Application for Payment forms, including Continuation Sheets.

c. List of subcontractors.

d. Schedule of allowances.

e. Schedule of alternates.

f. List of products.

g. List of principal suppliers and fabricators.

h. Schedule of submittals.

2. Submit the Schedule of Values to the Engineer at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.

3. Subschedules: Where Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.

   b. Name of the Engineer.

   c. Project number.

   d. Contractor's name and address.

   e. Date of submittal.

2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.

   b. Description of Work.

   c. Name of subcontractor.

   d. Name of manufacturer or fabricator.

   e. Name of supplier.

   f. Change Orders (numbers) that affect value.

   g. Dollar value of both labor and materials.

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Break principal subcontract amounts down into several line items.

4. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.

5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.

Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.

6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.

8. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.03 APPLICATIONS FOR PAYMENT:

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Engineer and paid for by the Owner. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment-Application Times: The date for each progress payment is the 15th day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period and ends 15 days prior to the date for each progress payment.

C. Payment-Application Forms: Use forms provided by the Owner for Applications for Payment. Same copies are included in Section 00 62 76 - Application and Certificate for Progress Payment.

D. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Engineer will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to NAU by a method ensuring receipt within 24 hours. One copy shall be complete, including waivers of lien and similar attachments, when required.

F. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers for the construction period covered by the previous application.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.

2. When an application shows completion of an item, submit final or full waivers for such items.

3. Waiver Forms: Submit waivers of lien on forms provided herein, and executed as indicated.

4. Waiver Forms: Submit waivers of lien on forms which comply with State statutes, and executed in a manner, acceptable to the Owner.

G. Initial Application for Payment: Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment, include the following:

1. List of subcontractors.

2. List of principal suppliers and fabricators.

3. Schedule of Values.

4. Contractor's Construction Schedule (preliminary if not final).

5. Schedule of principal products.

6. Schedule of unit prices.

7. Submittal Schedule (preliminary if not final).

8. List of Contractor's staff assignments.

9. List of Contractor's principal consultants.

10. Copies of building permits.

11. Copies of authorizations and licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of preconstruction meeting.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire the Owner's insurance.
17. Initial settlement survey and damage report, if required.

H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
2. Administrative actions and submittals that shall precede or coincide with this application include:
    a. Occupancy permits and similar approvals.
    b. Warranties (guarantees) and maintenance agreements.
    c. Test/adjust/balance records.
    d. Maintenance instructions.
    e. Meter readings.
    f. Startup performance reports.
    g. Changeover information related to Owner's occupancy, use, operation, and maintenance.
    h. Final cleaning.
    i. Application for reduction of retainage and consent of surety.
    j. Advice on shifting insurance coverages.
    k. Final progress photographs.

l. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

I. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:

1. Completion of Project closeout requirements.

2. Completion of items specified for completion after Substantial Completion.

3. Ensure that unsettled claims will be settled.

4. Ensure that incomplete Work is not accepted and will be completed without undue delay.

5. Transmittal of required Project construction records to the Owner.

6. Certified property survey.

7. Proof that taxes, fees, and similar obligations were paid.

8. Removal of temporary facilities and services.

9. Removal of surplus materials, rubbish, and similar elements.

10. Change of door locks to Owner's access.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

CONSTRUCTION

SCHEDULE

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Within ten (10) days after the Notice to Proceed, prepare and submit to the Engineer an estimated initial construction progress schedule for the work.

B. Submit revised progress schedules on a monthly basis or as necessary.

C. No partial payments shall be approved by the Engineer until there is an approved 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 REQUIREMENTS

A. Section 01 11 00: Summary of Work

B. Section 01 31 19: Project Meetings

1.03 FORM OF SCHEDULES

A. Prepare schedules in the form of a horizontal bar chart.

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: allow space for notations and future revisions.

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

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. Specifically list, but not limited to (shown in no particular order):

a. Permits and Shop Drawing Submittals

b. Ordering and Receiving of Materials and Equipment

c. Inspection of Existing Systems

d. Major Work Items including Installation of Equipment and Appurtenances

e. Testing

f. Restoration

g. Startup

h. As-built Drawings

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

4. Show projected manhour requirements for each month of construction.

B. Submittals Schedule for Shop Drawings. 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. Allow no less than twenty-one (21) calendar days for review and approval of shop drawings and samples by the Engineer. No less than thirty (30) calendar days will be required for major equipment that requires review by more than one engineering discipline.

C. A list of all long lead items (equipment, materials, etc.).

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission by shading a portion of the bar and showing percentage of completion. Show actual percentage of completion for each item as of the 20th day of each month during construction.

B. Show changes occurring since previous submission of schedule:

1. Major approved 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 subcontractors if applicable.

1.06 SUBMISSIONS

A. Submit an initial schedule to the Engineer within ten (10) days after the Notice to Proceed.

1. The Engineer will review schedules and return review copy within 15 days after receipt.

2. If required, resubmit within five (5) days after return of review copy.

B. Submit four (4) copies of revised monthly progress schedules with that month's application for payment.

1.07 DISTRIBUTION

A. Distribute copies of the reviewed schedules to:

1. Engineer.

2. Job site file.

3. Subcontractors.

4. Other concerned parties.

5. Owner (two copies).

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

1.08 CHANGE ORDERS

A. Upon approval of a change order, the approved changes shall be reflected in the next scheduled revision or update submittal by Contractor.

1.09 SCHEDULE MONITORING

A. At not less than monthly intervals or when specifically requested by Engineer, Contractor shall submit to the Engineer of an updated schedule for those activities that remain to be completed.

B. The updated schedule shall be submitted in the form, sequence, and number of copies requested for the initial schedule.

1.10 PROGRESS MEETINGS

A. For the monthly progress meeting, Contractor shall submit a three (3) week look-ahead schedule showing all activities in progress, uncompleted or scheduled to be worked during the three weeks. The three (3) weeks include the current week plus the next two (2) weeks. All activities shall be from the approved schedule and must be as shown on the schedule unless behind or ahead of schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PROJECT

MEETINGS

PART 1- GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. The Contractor shall cooperate and coordinate with NAU to schedule and administer the preconstruction meeting, periodic progress meetings, and specifically called meetings throughout the progress of the Work. The Contractor shall:

a. Prepare agenda for meetings.

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

3. The Owner will attend meetings to ascertain that the Work is expedited consistent with Contract Documents and construction schedules.

4. The Engineer shall provide meeting minutes of the preconstruction meeting and each progress meeting in its entirety.

B. Related Requirements Described Elsewhere:

1. Construction Schedules: Section 01 31 13.

1.02 PRE-CONSTRUCTION

A. A preconstruction conference will be scheduled after award of contract and prior to beginning work. This meeting shall be attended by Engineer of Record, the County, and an authorized representative of Contractor.

B. Meeting will consider matters of contract administration and initial construction operations.

C. Contractor shall submit proposed construction schedule prior to or at preconstruction conference; see Section 01 33 23.

1.03 PROGRESS MEETINGS

A. Periodic progress meetings will be held at a time and place mutually agreed upon at preconstruction conference. A responsible representative of Contractor who can bind Contractor/subcontractor to decisions shall attend. A responsible representative of other subcontractors working on site shall also attend.

B. Meetings will be held to coordinate and expedite progress of work and shall be conducted by Contractor. Contractor and each subcontractor on site shall submit a written report at each meeting indicating:

1. Work progress since last meeting.

2. Upcoming work sequences and schedules.

3. Requests for information.

C. Contractor shall record meeting minutes and shall distribute a written summary of items discussed to all parties involved in the project within 48 hours of each meeting. The written summary shall document all issues discussed and decisions reached at progress meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Administrative and procedural requirements for submittals required for performance of the Work, including the following:

1. Contractor's construction schedule.

2. Shop Drawings.

3. Product Data.

4. Samples.

5. Quality assurance submittals.

1.02 DEFINITIONS:

A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.

B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.

C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.03 SUBMITTAL PROCEDURES:

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.

   a. Allow 15 working days for initial review. Allow additional time if the Engineer must delay processing to permit coordination with subsequent submittals.

   b. If an intermediate submittal is necessary, process the same as the initial submittal.

   c. Allow 15 working days for reprocessing each submittal.

   d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4 by 5 inches (100 by 125 mm) on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.

   a. Project name.

   b. Date.

   c. Name and address of the Engineer.

   d. Name and address of the Contractor.

   e. Name and address of the subcontractor.

   f. Name and address of the supplier.

g. Name of the manufacturer.

h. Number and title of appropriate Specification Section.

i. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Engineer using a transmittal form. The Engineer will not accept submittals received from sources other than the Contractor without Contractor's review and approval markings and the action taken.

D. Provide required Product Code Certification with Shop Drawings. Submittals that do not have Product Code Certification included will be returned for resubmission.

1.04 SHOP DRAWINGS:

A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents.

1. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings.

2. Standard information prepared without specific reference to the Project is not a Shop Drawing.

B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:

1. Dimensions.

2. Identification of products and materials included by sheet and detail number.

3. Compliance with specified standards.

4. Notation of coordination requirements.

5. Notation of dimensions established by field measurement.

6. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

C. Submittals: Submit one reproducible and one blue- or black line print; the reproducible will be returned.

1.05 PRODUCT DATA:

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Product Data not so marked will be returned without review. Include the following information:

a. Manufacturer's printed recommendations.

b. Compliance with trade association standards.

c. Compliance with recognized testing agency standards.

d. Application of testing agency labels and seals.

e. Notation of dimensions verified by field measurement.

f. Notation of coordination requirements.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

B. Submittals: Submit 2 copies of each required submittal; submit 4 copies where required for maintenance manuals. Submit additional copies as required by the Contractor for distribution. The Engineer will retain one and will return the others marked with action taken and corrections or modifications required.

C. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities.

1.06 SAMPLES:

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

1. Mount or display Samples in the manner to facilitate review of qualities indicated. Prepare Samples to match the Engineer's sample. Include the following:

   a. Specification Section number and reference.

   b. Generic description of the Sample.

   c. Sample source.

   d. Product name or name of the manufacturer.

   e. Compliance with recognized standards.

   f. Availability and delivery time.

2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the submittal and the actual component as delivered and installed.

   a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.

   b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

3. Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices. The Architect will review and return preliminary submittals with the Architect's notation, indicating selection and other action.

4. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

1.07 QUALITY ASSURANCE SUBMITTALS:

A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.

C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 01 Section "Quality Control."

1.08 ENGINEER'S ACTION:

A. Except for submittals for the record or information, where action and return is required, the Engineer will review each submittal, mark to indicate action taken, and return promptly. Compliance with specified characteristics is the Contractor's responsibility regardless of action indicated.

B. Action Stamp: The Engineer will stamp each submittal with a uniform, action stamp. The Engineer will mark the stamp appropriately to indicate the action taken. Do not use, or allow others to use, submittals marked "Not Approved, Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.

C. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Engineer will return the submittal marked "Action Not Required."

D. Unsolicited Submittals: The Engineer will return unsolicited submittals to the sender without action.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PERMITS AND FEES

PART 1 - GENERAL

1.01 DESCIPTION:

A. County Responsibilities: The County already obtained the FDEP construction permit.

B. Contractor responsibilities: Obtain and pay for all other permits and licenses required by authorities having jurisdiction, including but not limited to: land clearing permit, NPDES Notice of Intent and dewatering permit.

C. Contractor shall be responsible to adhere to all provisions, requirements, and cost contained in all permits applicable to this project.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

QUALITY

CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Administrative and procedural requirements for quality control services and testing and inspection laboratory services.

1.02 GENERAL:

A. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.

B. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

C. Requirements for the Contractor to provide quality control services required by the Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.03 CONTRACTOR RESPONSIBILITIES:

A. Provide inspections, tests and similar quality control services specified in individual Specification Sections as the Contractor's responsibility and as required by governing authorities; these services include those specified to be performed by an independent agency and not by the Contractor. Include costs for these services in the Contract Sum.

B. Provide and pay for costs of retesting and other related costs when:

1. Results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.

2. Construction is revised or replaced by the Contractor, where tests were required on original construction.

3. Additional testing is needed or required by the Contractor.
4. Additional trips to the project are necessary by an agency when scheduled times for tests and inspections are cancelled and the agency is not notified sufficiently in advance of cancellation to avoid the trip.

C. Cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested.

1. Notify the agency sufficiently in advance of operations to permit assignment of personnel.

2. Provide access to the Work and furnish incidental labor and facilities necessary to facilitate inspections and tests.

3. Take adequate quantities of representative samples of materials that require testing and assist the agency in taking samples.

4. Provide facilities for storage and curing of test samples.

5. Provide the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.

6. Secure and protect samples and test equipment at the Project site.

D. Coordinate the sequence of activities to accommodate required services with a minimum of delay and coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

E. Schedule times for inspections, tests, taking samples and similar activities.

1.04 OWNER RESPONSIBILITIES:

A. Provide inspections, tests and similar quality control services specified, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity.

1. Costs for these services are not included in the Contract Sum.

2. The Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform the services required.

3. The Owner reserves the right to contract an independent agency to conduct testing on any portion of the work.

1.05 TESTING AGENCIES RESPONSIBILITIES:

A. Cooperate with the Engineer and Contractor in performance of their duties; provide qualified personnel to perform required inspections and tests.

B. Notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of their services.

C. Agencies are not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

D. Agencies shall not perform any duties of the Contractor.

1.06 SUBMITTALS:

A. Independent testing agencies shall submit 2 copies of certified written reports of each inspection, test or similar service to the Engineer and to the Contractor.

B. Report Data: Written reports of each inspection, test or similar service shall include:

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 the inspection or test.

6. Designation of the Work and test method.

7. Identification of product and Specification Section.

8. Complete inspection or test data.

9. Test results and interpretations of test results.

10. Ambient conditions at the time of sample-taking and testing.

11. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.

12. Name and signature of laboratory inspector.

13. Recommendations on retesting.

1.07 QUALIFICATION OF SERVICE AGENCIES:

A. Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

B. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

C. Inspection and testing agencies engaged by the Contractor shall be acceptable to Engineer and Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION:

A. Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes

B. Protect construction exposed by or for quality control service activities, and protect repaired construction.

C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION: The following criteria shall govern the furnishing of and paying for temporary construction and service items. Such items shall be instituted at the beginning and maintained for the life of the work or until removal or termination is approved by the Engineer.

1.02 TEMPORARY FACILITIES:

A. Drinking Water: The Contractor shall provide cool water with dispensing utilities.

B. Construction Water: The Contractor shall provide temporary water for construction at the project site. The Contractor shall provide proper back flow devices in order to comply with regulations concerning back flow & cross connection.

C. It shall be the Contractor's responsibility to provide temporary electrical power for construction purposes.

D. Toilet Facilities: The Contractor shall furnish a portable, job-site toilet enclosure facility through a local company specializing and licensed in this business. The toilet enclosure shall be located on the project site at a point approved by the Owner. It shall be maintained daily by the supplying company and removed from the project site upon completion of the project.

1.03 SECURITY:

A. General: The Contractor shall provide security, as necessary or required, to protect work and property at all times.

B. Rodents and Other Pests: The Contractor, through debris removal, etc., shall control the creation of rodent or pest problems. Should such develop, the Contractor shall secure services of exterminator to control.

C. Debris Control: Keep premises clean and free from accumulation of debris and rubbish. Provide trash and debris receptacles and require use. Remove from site at least weekly.

D. Cleaning: As work is completed by trades, areas of work shall be cleaned in preparation for next trade, inspections or general safety of property and person.

E. Project Safety: The Contractor shall comply with all applicable governmental and insuring company requirements relative to construction and project safety. Either the superintendent or another company representative on the site during all working hours, shall be trained in project safety and designated as Contractor's Safety Director.

1.04 QUALITY ASSURANCE:

A. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:

1. Building Code Requirements

2. Health and Safety Regulations

3. Utility Company Regulations

4. Police, Fire Department and Rescue Squad Rules

5. Environmental Protection Regulations

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

TRAFFIC

REGULATION

Part 1 - GENERAL

1.01 DESCRIPTION

A. This section covers procedures for developing and implementing traffic control and regulation measures and maintenance of traffic in and around the construction area to provide for safe and efficient protection and movement of vehicular and pedestrian traffic/through and adjacent to the construction area.

1.02 RELATED REQUIREMENTS

A. All applicable Sections of the Specifications.

B. Conditions of the Contract.

C. Nassau County Road Closure Policy.

1.03 SUBMITTALS

A. Before closing or restricting traffic flow through any thoroughfare, the Contractor will give written notice to and, if necessary, obtain a permit or permits from the duly constituted public authority having jurisdiction over the thoroughfare. Contractor will also notify the applicable law enforcement, fire, and emergency services having jurisdiction in the area. Notice will be given no less than 72 hours in advance of the time when it may be necessary in the process of construction to close or restrict traffic to such thoroughfare, or as may be otherwise required by the governing authority.

1.04 SITE CONDITIONS

A. The Contractor will plan construction operations such that existing local traffic access and traffic within the Facility can be maintained and will maintain during the construction such barricades, lights, flagmen, and other protective devices as appropriate, whether specified for the project or required by the local governing authority. Traffic control devices used for maintenance of traffic will comply with the FDOT Manual.

B. The Contractor will conduct his work in such manner as not to unduly or unnecessarily restrict or impede normal traffic through the streets of the community and within the Facility. Insofar as it is practicable, excavated material

and spoil banks will not be located in such manner as to obstruct traffic. The traveled way of all streets, roads, alleys, reclamation facility's roads and driveways will be kept clear and unobstructed insofar as is possible and will not be used for the storage of construction materials, equipment, supplies, or excavated earth, except when and where necessary if approved by the governing authority. If required by duly constituted public authority, the Contractor will, at his own expense, construct bridges or other temporary crossing structures over trenches so as not to unduly restrict traffic. Such structures will be of adequate strength and proper construction and will be maintained by the Contractor in such manner as not to constitute an undue traffic hazard. Private driveways will not be closed except when and where necessary, and then only upon due advance notice to the Owner and for the shortest practicable period of time consistent with efficient and expeditious construction. The Contractor will be liable for any damages to persons or property resulting from his work.

C. The Contractor will make provisions at cross streets for the free passage of vehicles and foot passengers, either by bridging or otherwise, and will not obstruct the sidewalks, gutters, or streets, nor prevent in any manner the flow of water in the latter, but will use all proper and necessary means to permit the free passage of surface water along the gutters. The Contractor will immediately cart away all offensive matter, exercising such precaution as may be directed by the Owner.

D. Unless otherwise required by the governing authority, maintenance of traffic in and around the construction zone will conform to Section 102 of the FDOT Specification, and Index Nos. 600, 620, 621, 622, 623, and 624 of the FDOT Standards.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

Dust Control

Part 1 - GENERAL

1.01 DESCRIPTION

Limit blowing dust caused by construction operations by applying water or employing other appropriate means or methods to maintain dust control.

1.02 PROTECTION OF ADJACENT PROPERTY

A. The bidders shall visit the site and note the buildings, landscaping, roads, parking areas and other facilities near the work site that may be damaged by their operations. The Contractor shall make adequate provision to fully protect the surrounding area and will be held fully responsible for all damages resulting from his operations.

B. Dust, Fumes, Spray, or Spills:

Protect all existing facilities (indoors or out) from damage by the above hazards (indoors or out);

Protect motors, bearings, electrical gear, instrumentation, and building or other surfaces from dirt, dust, welding fumes, paint spray, spills or droppings causing wear, corrosion, malfunction, failure or defacement by enclosure, sprinkling or other dust palliatives, masking and covering, exhausting or containment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the Work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's instructions.

B. Schedule delivery to reduce long term onsite storage 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.

C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

F. Provide necessary equipment and personnel to unload all items delivered to the site. Delivery shall not be accepted by Owner's personnel.

G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other contractors), notify Engineer verbally, and in writing, of any problems.

1.03 STORAGE AND PROTECTION

A. Store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor. Instructions shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

B. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

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

D. Mechanical, electrical equipment and instruments are subject to corrosive damage by the atmosphere if stored outdoors, even when covered by canvas. Such materials shall be stored in a weather-tight building to prevent corrosive or other heat and moisture related damage. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturers of the equipment to be stored.

1. 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 guaranty 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.

1.04 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. Materials shall not be shipped until approved by the Engineer. The intent of this requirement is to avoid unnecessary delivery of unapproved materials and to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall major equipment or finish products be delivered to the site more than one month prior to installation without written authorization from the Engineer. Materials shipped to the site, or temporarily stored off-site in approved locations, shall be stored in accordance with Paragraph 1.04, herein.

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 the 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 startup, 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 equivalent 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.

1.05 SPARE PARTS

A. Spare parts for certain equipment provided under Divisions 33: Utilities has 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.

1.06 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 require lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied.

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 (3) weeks of operation. This shall be completed prior to release of retainage.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PROJECT

CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Administrative and procedural requirements for project closeout.

1. Inspection procedures.

2. Project record document submittal.

3. Final cleaning.

1.02 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 - refer to Section 01 78 36 Warranties and Bonds.

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.

7. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

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 5 days 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 or other requirements 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.

1.03 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.

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, and 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, reinspection process will be repeated.

1.04 RECORD DOCUMENT SUBMITTALS:

A. Maintain at the site one complete set of record documents; protect from deterioration and loss in a secure, fire-resistive location.

1. Provide access to record documents for the Engineer's reference during normal working hours.

2. Label each document "PROJECT RECORD" in 2 inch high printed letters.

3. Do not use for construction purposes.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation. 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 Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

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

3. Show horizontal control dimensions in two directions at right angles for

each underground fitting, valve, and appurtenance. Horizontal control dimensions shall be tied to a permanent above ground marker such as a building or tank slab. Show elevations of storm sewers, gravity sewers including laterals, electric cables, television cables, telephone cables, force mains, water mains crossed, and any other underground utilities and structures. Information shall be obtained by surveying by a professional engineer or land surveyor registered in the State of Florida.

4. Note related Change Order numbers where applicable.

5. 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.

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.

D. Record Product Data: 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. Record Survey: Provide as-built survey prepared in accordance with the minimum technical standards for surveying as set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 61G17-6 Florida Administrative Code, pursuant to Section 472.027 Florida Statutes.

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

H. At Contract close-out, deliver one copy of Record Documents to Engineer for Owner. Accompany submittal with transmittal letter in duplicate containing the following information:

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

3.01 FINAL CLEANING:

A. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program.

B. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion and maintain until final completion, except in areas occupied or designated by Owner.

1. Remove labels that are not permanent labels.

2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and

other damaged transparent materials.

3 Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition.

4. Leave concrete floors broom clean.

5. Vacuum carpeted surfaces.

6. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances.

7. Clean plumbing fixtures to a sanitary condition.

8. Clean light fixtures and lamps.

9. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances.

10. Sweep paved areas broom clean; remove stains, spills and other foreign deposits.

11. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

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

D. 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.

E. 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.

OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

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

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

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

B. Related Requirements Described Elsewhere:

1. Project Closeout: Section 01 77 19

1.02 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:

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

2. Familiar with requirements of this Section.

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

4. Skilled as draftsman competent to prepare required drawings.

1.03 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.
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 14 inches x 17 inches.
5. Provide fly-leaf for each separate product, or each piece of operating equipment.
    a. Provide typed description of projects and major component parts of equipment.
    b. Provide identification tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
    a. Title of Project.
    b. Identity of separate structure as applicable.
    c. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality , three D-ring type binders with durable and cleanable white plastic covers. Binders shall be presentation type with clear vinyl covers on front, back and spine. Binders shall include two sheet lifters and two, horizontal inside pockets.
2. Maximum D-ring width: 2 inches.
3. When multiple binders are used, correlate the data into related consistent groupings.

D. In addition to standard operation and maintenance manuals, all manufacturers supplying equipment specified in Division 33 shall submit their operation and maintenance manuals on magnetic media/floppy disks in Microsoft Word, WordPerfect or text, ".txt" formats. All graphic files shall be in BMP, PCS, CDR, JPEG, DWG, DXF or PDF formats.

1.04 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, manufacturer and installer name, addresses and telephone numbers.

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

c. Identify area of responsibility of each.

d. Local source of supply for parts and replacement equipment including name, address and telephone number.

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

B. Product Data:

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

2. Annotate each sheet to:

a. Clearly identify specific product or part installed.

b. Clearly identify data applicable to installation.

c. Delete references to inapplicable information.

3. Operation and maintenance information as herein specified.

4. Record shop drawings as submitted and approved with all corrections made for each product.

C. Drawings:

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

a. Relations of component parts of equipment and systems.

b. Control and flow diagrams.

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

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

D. Written test, as required to supplement product data for the particular installation:

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

2. Provide logical sequence of instruction 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.

1.05 MANUAL FOR MATERIALS AND FINISHES

A. Submit six (6) 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 reordering special manufacturing 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.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit six (6) 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.

d. Summary of information listed on equipment and motor data plates.

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 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 life 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.

13. Approved record shop drawings with all corrections made, and a copy of the warranty statement, checkout memo, demonstration test procedures and demonstration test certification.

C. Content, for each electric and electronic systems, 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 and panel boards.

a. Electrical service.

b. Controls.

c. Communications.

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.

1.07 SUBMITTAL SCHEDULE

A. Submit two (2) copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within 90 days after Notice to Proceed.

B. Submit two (2) copies of completed data in preliminary form no later than 20 days following Engineer's review of the last shop drawing of a product and/or other submittal specified under Section 01 33 23, but no later than delivery of equipment. One (1) copy will be returned with comments to be incorporated into the final copies and the other copy will be retained on-site for use in any early training.

C. Submit six (6) copies of approved manual in final form directly to the offices of the Engineer, GAI Consultants, Inc., within 10 days after the reviewed copy or last item of the reviewed copy is returned.

D. Provide six (6) copies of addenda to the operation and maintenance manuals as applicable and certificates as specified within 30 days after final inspection.

1.08 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to demonstration test, 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. Review contents of manual with Owner's operating and maintenance personnel in full detail to explain all aspects of operations and maintenance.

C. Instructors shall be fully qualified personnel as outlined within the individual equipment specifications. If no specific training specifications are listed with the

equipment, the Contractor shall provide the instruction with qualified Contractor personnel.

D. The Contractor shall provide a list to the Owner indicating the date, time and instructors that will be present for all training sessions.

E. The instructors shall provide for and prepare lesson scopes and handouts for up to five individuals designated by the Owner that outline the items to be covered. Separate sessions for operation and maintenance instruction shall be provided consecutively. Handouts shall be submitted to the Owner with at least one week's notice prior to the training sessions.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

WARRANTIES AND

BONDS

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS:

A. General provisions of Contract, including General and Supplementary Conditions.

B. Warranties and certificates for specific products - Respective Specification Sections.

C. Project Closeout - Section 01 77 19.

1.02 SECTION INCLUDES:

A. Administrative and procedural requirements for warranties, bonds, and certifications required by the Contract Documents, including Owner's Standard Maintenance Warranty Bond, manufacturers' standard warranties on products and special warranties.

1.03 WARRANTY REQUIREMENTS:

A. Contractor shall warrant all work covered under this Agreement to be free from defects for a period of 2-years after the date of Substantial Completion.

B. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work or abandon in-place if acceptable to Owner in a manner that is acceptable to Owner.

C. When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

D. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

E. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

F. The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

G. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.04 SUBMITTALS:

A. Submit written warranties to the Owner before requesting inspection for Substantial Completion. If the Owner's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Owner.

B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner for approval prior to final execution.

D. Provide written certifications of compliance and other commitments and agreements for continuing services in a form which includes all pertinent information including:

1. Quantities and dates of shipments.

2. Attestment that materials incorporated into the Work comply with specified requirements. Certification shall not be construed as relieving the Contractor from furnishing satisfactory materials, if the material is later found to not meet specified requirements.

3. Signature of officer of company.

4. Laboratory test reports submitted with certificates of compliance shall show dates of testing, specification requirements under which testing was performed, and results of tests.

E. Refer to individual Sections of Divisions 02 through 33 for specific content requirements, and particular requirements for submittal of special warranties.

F. Form of Submittal:

1. Compile 3 copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer.

2. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

3. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 in. by 11 in. paper.

4. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

5. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the Project title or name, and the name of the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

START-UP AND DEMONSTRATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Demonstrate to Owner and Engineer that the Work functions as a complete and operable system under normal and emergency operating conditions.

B. Contractor shall provide all materials, personnel, equipment and expendables as needed and as specified to perform the required start-up and demonstration tests.

PART 2 - PRODUCTS

2.01 START-UP PLAN

A. Submit for approval by the Engineer a detailed start-up plan outlining the schedule and sequence of all tests and start-up activities, including submittal of checkout forms, submittal of demonstration test procedures, start-up, demonstration and testing, submittal of certification of completed demonstration and training. Start-up and commissioning may not begin until the plan is approved by the Engineer.

PART 3 - EXECUTION

3.01 COMPONENT TEST AND CHECK-OUT

A. Start-up Certification: Prior to system start-up, successfully complete all the testing required of the individual components of the Work. Submit six (6) copies of CHECK-OUT MEMO'S for each individual component or piece of equipment, signed by the Contractor or the subcontractor and the manufacturer's representative. All copies of the Operation and Maintenance Manuals must be provided before start-up may begin. These forms shall be completed and submitted before Instruction in Operation to Owner or a request for initiating any final inspections. Insert one (1) copy of this form into the applicable section of each Operation and Maintenance Manual.

B. Demonstrate to the Engineer and the Owner's representative, that all temporary jumpers and/or bypasses have been removed and that all of the components are operating under their own controls as designated.

C. Coordinate start-up activities with the Owner's operating personnel at the treatment plant site and with the Engineer prior to commencing system start-up.

3.02 START-UP

A. Confirm that all equipment is properly energized, that the valves are set to their normal operating condition and that the flow path through the new Work is unobstructed.

B. Slowly fill each hydrostatic structure in the process flow stream with water.

C. Initiate start-up and training in accordance with and with the use of the plant operation and maintenance manuals.

D. Observe the component operation and make adjustments as necessary to optimize the performance of the Work.

E. Coordinate with Owner for any adjustments desired or operational problems requiring debugging.

F. Make adjustments as necessary.

3.03 START-UP DEMONSTRATION AND TESTING

A. After all Work components have been constructed, field tested, and started up in accordance with the individual Specifications and manufacturer requirements, and after all Check-Out Forms have been completed and submitted, perform the Start-Up Demonstration and Testing. The demonstration period shall be held upon completion of all systems at a starting date to be agreed upon in writing by the Owner or his representative. Prior to beginning the start-up demonstration testing, the Contractor shall submit a detailed schedule of operational circumstances for approval by the Engineer. The schedule of operational circumstances shall describe, in detail, the proposed test procedures for each piece of equipment. Provide similar test procedure forms for each piece of equipment or section of the Work to include all particular aspects and features of that equipment or section of the Work and as specified in the Technical Sections of the Specifications.

B. The Start-Up Demonstration Testing will be conducted for five (5) consecutive days. The Work must operate successfully during the five (5) day testing period in the manner intended. If the Work does not operate successfully, or if the start-up is interrupted due to other contracts, the problems will be corrected and the test will start over from day one. The party causing the interruption will be subject to the assessment of actual damages due to delay.

C. During the start-up demonstration period, operate the Work, instruct designated

plant operating personnel in the function and operation of the Work, and cause various operational circumstances to occur. As a minimum, these circumstances will include average and peak daily flows, random equipment or process failures, tank overflows, surcharges, interlocks and bypasses. Demonstrate the essential features of the equipment and its relationship to other equipment. The approved schedule of operational circumstances and Demonstration Test Procedures Forms will be used as the agenda during the Start-Up Demonstration Testing period for all equipment and sections of the Work. Coordination of the demonstration test schedule will be accomplished through the Engineer.

D. Acceptability of the Work's performance will be based on the Work performing as specified under these actual and simulated operating conditions, to provide water treatment facilities functioning as intended and as defined in the Contract Documents. The intent of the start-up demonstration and testing is for the Contractor to demonstrate to the Owner and the Engineer that the Work will function as a complete and operable system under normal, as well as emergency operating conditions, and is ready for final acceptance.

E. Demonstrate the essential features of all the mechanical systems including, but not limited to, the following as they apply to the Work. Each system shall be demonstrated once only, after completion of satisfactory testing.

F. Demonstrate the essential features of all electrical and instrumentation systems including, but not limited to, the following as they apply to the work:

1. Electrical systems controls and equipment.

2. Supervisory control and data acquisition system.

3. Communications systems.

4. Lighting fixtures (including relamping and replacing lenses).

    a. Exit and safety fixtures.

    b. Fixtures, indoor and outdoor.

    c. Floodlighting.

5. Panelboards.

    a. Distribution panels.

    b. Lighting panels.

c. Main panels, power panels.

d. Switchboard.

6. Generator Transfer Switch (automatic).
7. Wiring devices.

a. Face plates.

b. Low-voltage controls.

c. Outlets: convenience, special purpose.

d. Switches: regular, time.

G. Upon successful completion of the Start-up, Demonstration and Testing, the Owner's personnel will receive the specified training for each system. Training of the Owner's personnel will not be considered valid unless it takes place using a system that has successfully passed the Start-up, Demonstration and Testing.

H. Upon completion of all specified operator training, the Contractor shall submit to the Engineer six (6) copies of the Certificate of Completed Demonstration Form, for each item of equipment or system in the Work, signed by the Contractor, Subcontractor, Engineer, and the Owner. Insert one (1) copy of this form in the applicable section of each Operation and Maintenance Manual. A sample Certificate of Completed Demonstration Form is attached.

CERTIFICATE OF COMPLETED DEMONSTRATION FORM

[] OWNER	_____	No. Copies	____	CERTIFICATE
[] ENGINEER:	_____	No. Copies	____	OF COMPLETED
[] ARCHITECT:	_____	No. Copies	____	DEMONSTRATION
[] CONTRACTOR:	_____	No. Copies	____	MEMO NO. _____
[] FIELD:	_____	No. Copies	____	
[] OTHER:	_____	No. Copies	____	

PROJECT DATA

NAME: NAU WWTF
LOCATION: _____
OWNER: _____
OTHER: _____

CONTRACT DATA

NUMBER: _____
DATE: _____
DRAWING NO: _____
SPECIFICATION SECTION: _____

NOTE TO CONTRACTOR:

Submit five (5) copies of all information listed below for checking at least one (1) week before scheduled demonstration of the Work. After all information has been approved by the Engineer, give the Owner a Demonstration of Completed Systems as specified and have the Owner sign five (5) copies of this form. After this has been done, a written request for a final inspection of the system shall be made.

MEMORANDUM:

This memo is for the information of all concerned that the Owner has been given a Demonstration of Completed Systems on the work covered under this Specification Section. This conference consisted of the system operation, a tour on which all major items of equipment were explained and demonstrated, and the following items were given to the Owner:

(a) Owner's copy of Operation and Maintenance Manual for equipment or systems specified under this Section containing approved submittal sheets on all items, including the following:

(1) Maintenance information published by manufacturer on equipment items.

(2) Printed warranties by manufacturers of equipment items.

(3) Performance verification information as recorded by the Contractor.

(4) Check-Out Memo on equipment by manufacturer's representative.

(5) Written operating instructions on any specialized items.

(6) Explanation of guarantees and warranties on the system.

(b) Prints showing actual "As-Built" conditions.

(c) A demonstration of the system in operation and of the maintenance procedures which will be required.

_____
(Name of General Contractor)

By: _____
(Authorized Signature, Title and Date

_____
(Name of Subcontractor)

By: _____
(Authorized Signature, Title and Date)

Operation and Maintenance Manuals, Instruction Prints, Demonstration and Instruction in Operation Received:

_____
(Name of Owner)

By: _____
(Authorized Signature/Title/Date)

DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. This Section includes furnishing all labor, materials, equipment and incidentals required for demolition of various existing features as shown on the Drawings and specified herein.

2. This Section provides for the complete or partial removal and disposal of specified existing structures, foundations, slabs, piping, mechanical equipment, electrical systems, and miscellaneous appurtenances encountered during demolition operations.

3. The Contractor shall be responsible for:

   a. Removal and disposal of list items required, e.g., structures, piping, and equipment as designated on the Drawings.

   b. Termination of electric facilities in accordance with local codes and the NEC.

   c. Termination and plugging of potable water piping.

   d. Final grading and site restoration.

4. The Contractor shall examine the various drawings regarding the proposed site, visit the proposed site and determine the extent of the work, the extent of work affected therein and all conditions under which he is required to perform the various operations.

1.02 PERMITS AND NOTICES

A. Permits and Licenses: Contractor shall obtain all necessary permits and licenses for performing the demolition work and shall furnish a copy of same to the Engineer prior to commencing the work. The Contractor shall comply with the requirements of the permits.

B. Notices: Contractor shall issue written notices of planned demolition to companies or local authorities owning utility conduit, wires or pipes running to or through the project site. Copies of said notices shall be furnished to the Engineer.

C. Utility Services: Contractor shall notify in writing utility companies or local authorities furnishing gas, water, electrical, telephone or sewer service to remove any equipment owned by them in structures to be demolished and to remove, disconnect, cap or plug their services to facilitate demolition. Copies of notices shall be furnished to the Engineer.

1.03 CONDITIONS OF STRUCTURES

A. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable. However, variation among the structures may occur prior to the start of demolition work.

1.04 RULES AND REGULATIONS

A. The Standard Building Code shall control the demolition, modification or alteration of the existing buildings or structures.

B. No blasting shall be done on site. The Contractor shall not bring or store any explosives on site.

C. Disposal of wastewater contents, disinfection and disposal of demolished plant components shall be in accordance with FDEP rules and regulations.

D. Comply with the current provisions of the following Codes and Standards:

1. ASTM - American Society for Testing and Materials.

2. Standard Specifications B Agency Specified

3. Uniform Building Code

1.05 DISPOSAL OF MATERIAL

A. Salvageable material shall become the property of the Owner, if the Owner so requests. The Contractor shall dismantle all materials to such a size that it can be readily handled, and deliver any of this salvageable material requested by the Owner to a storage area designated by the Owner.

B. Delivery and Storage: Do not deliver to the job site nor store thereon demolition equipment and materials prior to receiving written notice to proceed. Confine storage to areas approved by the Owner.

C. Disposal: Legally dispose of off site products of demolition during or at end of each day's work. Contractor shall pay all disposal costs associated with the project

D. The following materials are examples of the type that the Owner desires to keep:

1. Pipes and valves greater than 6 inches in diameter (exclusive of buried items).

2. All machinery and equipment.

3. All electric panels.

4. Scrap aluminum or other valuable recyclable metals.

E. All components are formally in contact with sewage is to be washed by the Contractor with a solution consisting hypochlorite and 50% water. The washwater is to be disposed of into the onsite sanitary system by the Contractor.

F. Any materials that the Owner rejects shall become the Contractor's property and must be removed from the site.

G. Waste Concrete and masonry shall be hauled to a legal disposal site by the Contractor.

H. All other waste metal, wood and other material shall be hauled to a waste disposal site by the Contractor.

I. The storage of or sale of removed items on the site shall not be allowed.

J. The Contractor shall dispose of sludge, and grit at the NAU approved location.

1.06 SUBMITTALS

A. The Contractor shall submit to the Engineers for approval, the proposed demolition and removal plan for the structures and modifications as specified herein prior to the start of work. The Contractor shall include in the schedule the coordination of shutoff, capping and continuation of utility service as required. The demolition and removal plan shall include as a minimum, the following:

1. A detailed sequence of demolition and removal work to ensure the uninterrupted progress of the WWTF operations and the expeditious completion of the work.

2. Written evidence of approval by the Owner's lead operator of the work plan.

3. Sequencing and coordination of the work with inspections and subsequent repairs.

B. Before commencing work, all modifications necessary to bypass the structure to be demolished shall be completed. Contractor shall coordinate with the Owner's personnel to determine the locations of the relevant valves and fittings.

1.07 TRAFFIC AND ACCESS

A. The Contractor shall conduct demolition and modification operations, and the removal of equipment and debris to ensure minimum interference with roads, streets and walks, both on-site and off-site, and to ensure minimum interference with occupied or used facilities.

B. The Contractor shall at all time maintain safe and convenient access to the existing site.

C. Do not close or obstruct streets or walks without permission from the Owner and Engineer. Provide alternate traffic routes around closed or obstructed access ways.

D. Special attention is directed towards maintaining safe and convenient access to the existing facilities remaining in service by plant personnel and plant associated vehicles. Relocation of the Contractor's materials or equipment due to uncoordinated interruption will be at the Contractor's expense.

1.08 EXISTING UTILITIES

A. The Contractor shall cooperate with the Owner and utility companies to shut off utilities serving structures of the existing facilities as required by demolition operations.

B. The Contractor shall be solely responsible for making all necessary arrangements and for performing any necessary work involved in connection with the discontinuance or interruption of all public and private utilities or services under the jurisdiction of the County or utility companies.

1.09 POLLUTION CONTROL

A. The Contractor shall use water sprinkling, temporary enclosures, and/or other suitable methods as necessary to limit the amount of dust rising and scattering in the air to the lowest level practical. The Contractor shall comply with the governing regulations governing such nuisances.

B. The Contractor shall clean up all dust, dirt and debris caused by demolition operations. The Contractor shall return all plant and adjacent areas to conditions existing prior to the start of work.

1.07 PROTECTION:

A. Protection of Existing Site Improvements

1. References: Verify and maintain benchmarks, monuments and other reference points.

2. Replace if disturbed or destroyed.

3. Protection: Protect existing improvements noted to remain within designated limit(s) of work. Supply shoring, bracing, reinforcing and barricades as required.

4. Utilities: Keep in operation existing utility circuits and piping to remain except at the direction of the Owner.

5. Repair: If damage to site improvements to remain occurs during the course of the work, restore to the satisfaction of the Owner at no additional cost.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 SEQUENCE OF WORK

A. The sequence of demolition and renovation of existing facilities shall proceed in accordance with the approved demolition and removal plan specified in Section 01 12 16 Sequence of Construction.

3.02 REMOVAL OF EXISTING PROCESS EQUIPMENT, PIPING AND APPURTENANCES

A. Existing equipment, non-buried valving and piping, and appurtenances shall be removed or abandoned in-place as shown or indicated on the Drawings, and as specified herein.

B. All equipment, piping and appurtenances shall be cleaned, flushed and drained. Equipment to be retained by the Owner as specified in Paragraph 1.05, above, shall be dismantled sufficiently to permit thorough cleaning and draining. All valves shall be left open. All abandoned piping shall be capped and sleeves and openings remaining after removal of the existing equipment, piping, and appurtenances shall be plugged and sealed.

3.03 ELECTRICAL REMOVALS

A. Electrical removals shall consist of the removal of existing transformers, distribution switchboards, control panels, motors, conduits and wires, poles and overhead wiring, panelboards, lighting fixtures, and miscellaneous electrical equipment all as shown, specified, or required to perform the Work.

All existing electrical equipment and fixtures to be removed shall be removed with such care as may be required to prevent unnecessary damage, to keep existing systems in operation and to keep the integrity of the grounding systems.

3.04 ALTERNATIONS AND CLOSURES

A. Alterations shall conform to the Contract Documents.

B. Where alterations require cutting or drilling into existing floors, walls, and roofs, the holes shall be repaired in a manner acceptable to the Engineer. Contractor shall repair such openings with the same or matching materials as the existing floor, wall, or roof or as otherwise approved by the Engineer. All repairs shall be smoothly finished, unless otherwise approved by the Engineer.

C. Openings in existing concrete slabs, ceilings, masonry walls, floors and partitions shall be closed and sealed as shown or otherwise directed by the Engineer. The Work shall be keyed into the existing work in a manner acceptable to the engineer. Reinforcing steel shall be welded to the existing reinforcing. Welding shall conform to AWS D12.1, Reinforcing Steel Welding Code. In general, use the same or matching materials as the existing adjacent surface. The finished closure shall be a smooth, tight, sealed, permanent closure acceptable to the Engineer.

3.05 QUALITY CONTROL

A. The Contractor shall protect all existing materials and equipment to be salvaged or reused from damage.

B. The Contractor shall cap or plug all lines to be abandoned. The Contractor shall place covers and label all junction boxes, conduits and wire as abandoned.

C. The Contractor shall promptly repair any and all damage caused to remaining facilities at no cost to the Owner.

D. Regulatory Requirements: Demolish existing site improvements as specified herein, in an orderly and careful manner. Comply with all local codes and ordinances.

E. Equipment: Use equipment specifically designed for the demolition of each type of material.

F. Labor: Employ workmen skilled in the use of the equipment being utilized for demolition.

3.06 REHABILITATION

A. Certain areas of existing structures, piping, conduits, and the like will be affected by Work necessary to complete modifications under this Contract. The Contractor shall be responsible to rehabilitate those areas affected by its construction activities.

B. Pipes, castings, or conduits shall be grouted in place by pouring in grout under a head of at least 4 inches. The grout shall be poured or rammed or vibrated into place to fill completely the space between the pipes, castings, or conduits, and the sides of the openings so as to obtain the same water tightness as through the wall itself. The grouted casings shall then be water cured.

C. In locations where the surface of the grout will be exposed to view, the non-shrink grout shall be recessed approximately 1/2-inch and the recessed area filled with cement mortar grout.

D. When new piping is to be connected to existing piping, the existing piping shall be cut square and ends properly prepared for the connection. Any damage to the lining and coating of the existing piping shall be repaired. Dielectric insulating joints shall be installed at interconnections between new and existing piping.

E. Where existing piping, supports, and associated appurtenances are removed, the Contractor shall rehabilitate the affected area such that little or no evidence of the previous installation remains.

F. The area of concrete to be rehabilitated shall be scored by saw cutting clean, straight lines to a minimum depth of 1-1/2 inches, and concrete within the scored lines removed to a depth of 1-1/2 inches (or the depth of cover over reinforcing steel, whichever is less). The area within the scored lines shall be patched with non-shrink grout to match the adjacent grade and finish.

3.07 DISPOSAL

A. Demolition and removal of debris shall minimize interference with roads, streets, walks, and other adjacent occupied or used facilities that shall not be closed or obstructed without permission from the Owner. Alternate routes shall be provided around closed or obstructed traffic ways.

B. Site debris, rubbish, and other materials resulting from reconstruction operations shall be legally removed and disposed of. Structures and equipment to be demolished shall be cleaned prior to demolition and the wash water properly disposed of. No trace of these structures shall remain prior to placing of backfill in the areas from which structures were removed.

C. Refuse, debris, and waste materials resulting from demolition and clearing operations shall not be burned.

3.08 CLEANING

A. During and upon completion of work, the Contractor shall promptly remove tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by Work in a clean, approved condition.

B. Adjacent structures shall be cleaned of dust, dirt, and debris caused by reconstruction, as requested by the Engineer or directed by governing authorities, and adjacent areas shall be returned to condition existing prior to start of Work.

CONCRETE

WORK

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. The scope of work under this section includes all materials, equipment and labor, and performing all operations for constructing the concrete work as shown on the drawings, called for herein, or necessary for the proper completion of the work. The work shall be performed in accordance with these specifications and to the lines, notes, and dimensions indicated on the drawings or specified herein. All references to industry standards (ASTM, ANSI, etc.) shall be to the latest revision unless otherwise stated.

1.02 SUBMITTALS

A. Submit to the Engineer, in accordance with Division 01 – General Requirements and Section 01 33 23 – Submittals.

1.03 REFERENCE STANDARDS

A. Design, manufacturing and assembly of elements of the products herein specified shall be in accordance with, but not limited to, published standards of the following as applicable:

1. American Concrete Institute (ACI)

    a. ACI 301 – Specifications for structural concrete for buildings

    b. ACI 311 – Recommended Practice for Concrete Inspection

    c. ACI 318 – Building code requirements for reinforced concrete

    d. ACI 304 – Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

    e. ACI 347 – Formwork for concrete

2. American Plywood Association (APA)

    a. Material grades and designations as specified

B. Where reference is made to standards of one of the above, or other originations, the version of the standard in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

A. The form liner manufacturer's representative shall be on site during the initial installation of the form liner to instruct the Contractor on the proper methods of application and use of the liner. He/she shall be available to answer any questions on the liner that the Engineer may have.

PART 2 - PRODUCTS

2.01 GENERAL

A. All concrete shall be proportioned, mixed, placed, finished and cured in accordance with the requirements of Standard Specifications of the American Concrete Institute, ACI 301-66, as modified herein, except that concrete for pavement replacement, including sidewalks, driveways and curb and gutter, shall be placed, finished and cured in accordance with ACI 617-58.

2.02 CEMENT

A. Cement shall be a single brand of Portland Cement conforming to the ASTM Standard Specifications for Portland Cement, Designation C150, for type I cement, type II cement, or type III (high-early-strength) cement.

B. Air entraining cement shall not be used.

C. When no Type cement is specified, Type I shall be used.

D. Type III (high-early-strength) cement may be used only with the written permission of the Engineer, but no additional payment will be made to the Contractor for the use thereof.

E. In addition to the requirements of the above mentioned specifications, cement to be used in exposed concrete shall exhibit no efflorescence when tested in accordance with the ASTM Standard Methods of Sampling and Testing Brick, Designation C-67, but employing 2 inch x 7 inch x 1/2 inch mortar slabs, comprising a 1:3 mixture by weight of the cement in question and Ottawa Sand, mixed with local tap water to a flow of 100 percent and aged one week before test.

F. All cement to be used in the work shall be subject to testing to determine whether it conforms to the requirements of these specifications. The 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 conditions of this project. Cement which is partially set or which is lumpy or caked shall not be used, and the entire contents of the sack

of cement or the container of bulk cement which contains damages, partially set, or lumps of caked cement will be rejected for use.

G. If required, the Contractor shall furnish sworn certificates of mill tests of cement, in triplicate, at least 7 days before the cement will be used. NAU reserves the right to make such independent tests as he may deem necessary at any time.

2.03 AGGREGATES

A. Fine aggregate shall be washed sand, clean, sound, sharp, screened and well-graded with no grain larger than will pass a No. 4 sieve. No less than 15 percent are more than 30 percent by weight shall pass a No. 50 sieve. No fine aggregate shall be used if it contains more than 2 percent of silt or which shows a color darker than Plate 2 when tested according to the ASTM Standard Method of Test for Organic Impurities in Sands for Concrete, Designation C40.

B. Coarse aggregate shall be washed, hard, tough and durable screened gravel or crushed stone having not more than 5% by weight of deleterious substances and soft fragments. Aggregate shall be well graded from the largest which shall pass a 1 inch mesh to the smallest which shall pass a 3/8 inch mesh and be retained by a ¼ inch mesh. No coarse aggregate shall be used if it contains more than 1 percent of silt or which shows a color darker than Plate I when tested as above specified for fine aggregate.

C. Both fine and coarse aggregate shall conform to the requirements of ASTM Standard Specification C33. The Contractor shall submit clearly labeled samples of aggregates to the Engineer when requested.

2.04 ADMIXTURES

A. Admixtures causing accelerated setting of cement in concrete shall NOT be used.

B. The particular admixture to be used shall meet with the approval of the Engineer.

C. Recognized and approved admixtures are:

1. Vinsol Resin: Manufactured by the Hercules Powder Company of Wilmington, Delaware: This product requires preparation on the job by dissolving in a solution of sodium hydroxide according to the manufacturer's directions.

2. Darex AEA: Manufactured by the Dewey and Almy Chemical Company, Cambridge, Mass: This product is furnished in liquid form ready for use.

3. Pozzolith: Manufactured by the Master Builders Company, Cleveland,

Ohio: This product is furnished in Powder form ready for use. The use of pozzolith shall be contingent on its entraining the specified amount of air with not more than one pound of the admixture per bag of cement.

4. Aerocrete: Manufactured by L. Sonneborn Sons, Inc., 80 Eighth Avenue, New York, New York, 10011: This product is furnished in liquid form ready for use.

2.05 WATER

The water for concrete shall be clean, fresh, and free from injurious amounts of oil, acid alkali, organic matter, or other deleterious substances.

2.06 CONCRETE PROPORTIONING

A. Materials shall be proportioned in accordance with ACI-613.

B. Air content, determined in accordance with ASTM C173, shall be 5% (± 1%) by volume.

C. SLUMP SHALL BE AS LISTED BELOW:

1. Class A 2 ½ ± 1 inch

2. Class B 3 ± 1 inch

3. Class C 3 ½ ± 1 ½ inch

D. Concrete shall be of plastic consistency such that it can be worked readily into all parts of the forms and around embedded work without segregation of constituent materials or collection of free water on the surface. Cement, fine aggregate, coarse aggregate, and water for concrete shall be measured separately and with accuracy.

2.07 PLANT APPROVAL

The Engineer shall have the right to inspect the plant of the manufacturer and the proportioning and mixing of the concrete. The materials method of proportioning, mixing, and delivering are to be satisfactory and in accordance with the above specifications. The manufacturer shall furnish, from an independent testing laboratory and through the Contractor, appropriate certificates of tests, materials, proportions, mixing and strengths if requested by the engineer.

2.08 MIXING AND DELIVERY

A. The quantity of concrete to be mixed or delivered in any one batch shall not exceed the rated capacity of the mixer or agitator as stated on the nameplate for the type of mixer in use.

B. Attention is directed 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. Concrete shall be discharged into forms within 1½ hours after water was first added to the mix, and shall be mixed at least 5 minutes after all water has been added.

2.09 QUALITY

Concrete for slabs on grade (not tank bottoms) shall have a compressive strength of not less than 3,000 psi at 28 days; concrete for fill shall have compressive strength of not less than 2,500 psi at 28 days; concrete for all other work shall have compressive strength of not less than 4,000 psi at 28 days. Concrete of 4,000 psi strength shall be designated Class "A", 3,000 psi concrete shall be designated Class "B", and 2,500 psi concrete shall be designated Class "C".

2.10 REINFORCING STEEL

A. Concrete reinforcement in sizes No. 3 (3/8 inch) and larger shall be deformed steel bars of the shapes and sizes indicated on the drawings.

1. Deformations shall conform to ASTM Tentative Specifications for Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement, Designation A305.

2. The steel shall be newly rolled stock, substantially free from mill scale, rust, dirt, grease, or other foreign matter. Bars shall be domestic billet steel or rail steel.

3. Billet steel bars shall be intermediate grade conforming to the ASTM Tentative Specifications for Concrete Reinforcement, Designation A615.

4. Rail steel bars, if used, shall conform to ASTM Tentative Specifications for Rail Steel Bars for Concrete Reinforcement, Designation A16.

5. In the case of rail steel bars, the bars shall be re-rolled by an approved mill. If requested by the engineer, the Contractor shall submit at his expense certified copies of tests of rail steel bars furnished. The tests shall be as specified in the appropriate ASTM Specifications above referred to, and shall be made by an approved laboratory. To be accepted for use, the bars shall show an elongation of at least 8 inches as

required by the ASTM Specifications, but not less than 10.5 %.

B. If requested by the engineer, the Contractor shall submit for approval shop drawing submittals for cutting and bending drawings and schedules for all reinforcement to be furnished by him.

C. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than two times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness except for bars larger than 1 inch in which case the bends shall be made around a pin of eight bar diameters. All bars shall be bent cold. Bars shall be shipped to the project site fastened in bundles of the same size and shape, with identification tags, giving size and mark, securely attached thereto.

D. Before being placed in a position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings, including ice, that reduce or destroy bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be re-inspected and cleaned when necessary.

1. Reinforcement shall be accurately positioned as indicated on the drawings, and secured against displacement by using annealed iron wire ties or suitable clips at intersections. Bar splices, laps, etc., shall be as called for on the drawings, or if not called for, laps shall be not less than 24 times the nominal diameter of the bar. Wire mesh sheets shall have a side lap of not less than 2 inches and an end lap of not less than 6 inches. Concrete blocks having a minimum bearing area of 2 inches by 2 inches and equal in quality to that specified for the slab shall be used for supporting spacers, or hangers may be used. Wood blocks, stones, brick chips, etc., shall not be used to support reinforcement.

2. Reinforcement which is to be exposed to the atmosphere for a considerable length of time after having been placed shall be painted with a heavy coat of cement grout if required by the Engineer.

2.11 FORMS

A. Forms shall be securely braced, substantial and unyielding, and of sufficient strength to hold the concrete without bulging between supports, or without other deviation from the neat lines as shown on the plans. Forms shall be mortar-tight and shall be constructed of dressed lumber of uniform thickness, with or without a form liner.

B. The spacing of joints and wales shall be such as to prevent warp and bulging and to produce true and accurate surfaces. All lumber shall be free from knot holes, loose knots, cracks, splits, warps, or other defects affecting its strength or the

appearance of the finished concrete surface. Fiberboard or other artificial lumber, approved by the Engineer, may be used as a lining for forms.

C. The interior surfaces of forms shall be adequately oiled, greased or soaped, to prevent adhesion of mortar. Form oil for exposed work shall be non-staining. Before placing of concrete, the forms shall be cleaned of all dirt, saw dust, shavings or other debris, and the surfaces shall be dampened.

D. Special care shall be exercised to secure smooth and tight-fitting forms which can be rigidly held to line and grade and removed without injury to the concrete. All corners in the finished work shall be true, sharp and clean-cut. Alignment of forms and grade of top chamfer strips shall be checked immediately after the placing of concrete in the forms.

E. Forms shall not be removed until the product of the elapsed number of days after placement and the average daily air temperature at the surface of the concrete equals 100 for walls and vertical surfaces and 500 for slabs.

F. Shores under beams and slabs shall not be removed until the concrete has attained at least 60 percent of the specified cylinder strength and also sufficient strength to support safely its own weight and the CONSTRUCTION LIVE LOADS upon it. Shores under cantilevers shall remain in place at least 14 days after concrete is placed.

2.12 EMBEDDED ITEMS

A. All sleeves, inserts, hangers, anchor bolts, dowels, nailing strips, or other embedded items, shall be accurately set, and firmly held in place while the concrete is deposited. Anchors and ties for masonry shall be provided as shown on the drawings or called for in the masonry specifications.

B. Pipes, conduits and other items embedded in the concrete shall be so placed and held that they do not misplace the reinforcing or weaken the concrete at points of maximum stress or where the concrete section is not sufficient to permit the reduction of area caused by the embedment.

2.13 WATER STOPS

Water stops shall be furnished where shown on the drawings and shall be furnished in the longest lengths possible. They shall be rigidly supported and accurately positioned with the center at the joint interface. All water stops shall be approved 5 inch polyvinyl chloride at the dumb-bell, or ribbed type, and a minimum of 3/16 inch thick. They shall be continuous along the concrete joint. Ends and corners shall be spliced to provide water tightness.

PART 3 - EXECUTION

3.0.1 PLACING CONCRETE

A. All concrete shall be placed during daylight hours allowing sufficient time for adequately finishing the concrete surfaces during daylight hours unless approved by NAU representative for night time construction. No concrete shall be placed until the forms have been approved by the Engineer and until all the reinforcement is in place and has been inspected and approved by the Engineer. No concrete shall be placed in water, and forms shall be free from water, dirt, debris, or any foreign matter when concrete is placed. Normal weather limitations for placing concrete shall be adhered to and no concrete shall be exposed to the action of water before final setting.

B. The method and manner of placing concrete shall be such as to avoid the possibility of segregation or separation of the aggregates. If the quality of concrete as it reaches its final position is unsatisfactory, the concrete as placed shall be discontinued or adjusted until the quality of the concrete as placed is satisfactory. Open troughs or chutes shall be of metal or metal-lined. Where steep slopes are required the chutes shall be equipped with baffles or shall be in short lengths that reverse the direction of movement. Where placing operations would involve dropping the concrete freely more than five feet, it shall be deposited through pipes, sheet metal or other approved material. Troughs, chutes or pipes with a combined length of more than 30 feet shall be used only on written authority from the Engineer. All troughs, chutes and pipes shall be kept clean and free from coatings or hardened concrete by being thoroughly flushed with water after each run, or in its final position. Depositing a large quantity at any point and running or working it along the forms shall not be done. Special care shall be taken to fill each part of the forms and to work the coarse aggregate back from the face and to force the concrete under and around the reinforcing bars without displacing them. The concrete consistency as measured by slump shall be as specified above.

C. Concrete shall be compacted by continuous working with a suitable tool in an acceptable manner and by vibrating. Vibration shall be done by experienced operators under close supervision and the duration shall be held to a minimum necessary to produce thorough compaction without segregation. Where vibrators are not used all thin section work shall be thoroughly worked with a steel slicing rod. All faces shall be well spaded and the mortar flushed to the surface by continuous working with a concrete spading implement.

D. In all cases where, on account of the obstructions produced by reinforcing metal, shapes or forms, or any other uncontrollable condition, difficulty is encountered in puddling the concrete adjacent to the forms, the mortar content of the mix shall be brought into proper contact with the interior surfaces by vibrating the forms. The vibrations shall be produced by striking the outside surfaces of the forms with wooden mallets or by other means satisfactory to the Engineer.

3.0.2 TEST SPECIMENS

If required by NAU, for each class of concrete, one set of three cylinders shall be made by the Testing Laboratory selected by NAU for each day's placement of concrete but not less than one specimen for each 150 cu. yd. One of these cylinders shall be tested at the age of 7 days, and one at the age of 28 days, to determine the quality of concrete obtained. The costs for performing such tests will be paid for by NAU when the test results are in conformity with these specifications. However, those which show no conformity or a failure will be paid for by the contractor. It shall be the responsibility of the contractor to properly inform the Testing Laboratory as to when concrete will be placed into the forms.

3.0.3 CURING & PROTECTION

A. All concrete work shall be protected against damage from the elements and defacement of any nature during construction operations.

B. Water shall not be permitted to rise on concrete within 2 hours after it is placed, nor shall running water be allowed to flow over completed concrete within 4 days after it has been placed.

C. All concrete, particularly slabs and including finished surfaces, shall be treated immediately after concreting or cement finishing is completed to provide continuous moist curing for at least 7 days, regardless of the adjacent air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or kept moist by other approved means. Horizontal surfaces, slabs, etc., shall be ponded to a depth of 1/2 inch wherever practicable, or kept continuously saturated wet by the use of lawn sprinklers, a complete covering of continuously saturated burlap, or by other approved means. Except on surfaces to which additional coatings or materials are to be bonded, the Contractor may, at his option, use an approved membrane curing compound in lieu of water curing of concrete. The compound shall be delivered to the job in the manufacturer's containers and shall be applied in strict accordance with the manufacturer's printed instructions.

D. Curing compound for exposed surfaces shall be non-staining.

E. For at least 7 days after having been placed, all concrete shall be so protected that the temperature at the surface will not fall below 50 degrees F.

F. No manure, salt, or other chemicals shall be used for protection.

G. The above mentioned 7 day period may be reduced to 3 days in each case if high-early- strength cement is used in the concrete.

H. Wherever practical, finished slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

I. When the temperature is below 40 degrees Fahrenheit, or predicted to go below 36 degrees in the next 24 hours, or predicted to go below 32 degrees in the next 72 hours, no concrete shall be poured without the express permission of the Engineer. Permission so granted shall be for the day and location only and must again be requested on subsequent days when temperatures are as stated above. The use of chemicals in the concrete mix to reduce temperature of freezing will not be permitted.

3.0.4 FINISHING

A. Strike off concrete surfaces to elevations and profiles indicated, and finish with wood or cork float as hereinafter specified, even and true, free from cracks, pockets, or other imperfections. Discontinue as soon as water appears on surface. Finished concrete, except at warped surfaces, shall be such that irregularities shall not exceed 1/4 inch as measured by a 10 foot straight edge.

B. Following removal of forms, thoroughly wet all surfaces to remain exposed. Fill all honeycombs, tie rod holes and areas damaged in form removal with grout composed of one part Portland cement to two parts sand, with water as required, and rub with abrasive stones to a smooth, uniform surface.

C. Any work not formed as indicated on drawings or that is out of alignment or level or shows a defective surface shall be corrected in a manner satisfactory to the Engineer.

D. It is expected that forms, concrete and workmanship shall be such that the quantity of trimming and repair work is kept to a minimum.

3.0.5 BONDING AGENT

Where new concrete is to be placed against existing concrete, the existing concrete surface shall be coated with a bonding agent prior to placing new concrete. Application shall be in strict accordance with manufacturer's recommendations.

CONCRETE

REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The work in this Section consists of providing all labor, materials, equipment and incidentals required to install all steel bars, steel wire and wire fabric required for the reinforcement of concrete, as shown on the Contract Drawings, and as specified herein.

B. Related Work:

1. Division 01: General Requirements

2. Section 03 11 00: Concrete Formwork

3. Section 03262: Concrete Joints and Waterstops

4. Section 03 31 00: Cast-in-Place Concrete

1.02 QUALITY ASSURANCE

A. Standards: Unless otherwise indicated, all materials, workmanship and practices shall conform to the following standards:

1. American Concrete Institute (ACI)

a. ACI 117 - Standard Tolerance for Concrete Construction and Materials.

b. ACI 301 - Specifications for Structural Concrete.

c. ACI 318 - Building Code Requirements for Reinforced Concrete.

d. ACI 350 - Environmental Engineering Concrete Structures.

e. ACI 315 - ACI Detailing Manual.

2. American Society for Testing and Materials (ASTM)

a. ASTM A82 - Specification for Steel Wire, Plain, for Concrete Reinforcement.

b. ASTM A184 - Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

c. ASTM A185 - Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

d. ASTM A496 - Specification for Steel Wire Deformed, for Concrete Reinforcement.

e. ASTM A497 - Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

f. ASTM A615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

g. ASTM A767 - Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

h. ASTM A775 - Specification for Epoxy-Coated Reinforcing Steel Bars.

i. ASTM A884 - Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.

3. American Welding Society (AWS)

a. AWS D1.4 Structural Welding Code - Reinforcing Steel.

4. Concrete Reinforcing Steel Institute (CRSI)

a. CRSI Manual of Standard Practices.

5 Building Codes

a. Florida Building Code.

b. Local codes and regulations.

1.03 SUBMITTALS

A. Materials and Shop Drawings:

1. Submit mill test certificates identifying chemical and physical analyses for each load of reinforcing steel delivered.

B. Submit shop drawings for review in accordance with Division 01 – General Requirements and Section 01 33 2301340 - Shop Drawings, Working Drawings, and Samples. Submit reinforcing bending lists and placing drawings for all reinforcing. Placing drawings shall include wall elevations, plan views, and sections to clearly show the reinforcing placing procedures. Placing drawings shall indicate all openings (mechanical, electrical, equipment), including additional reinforcing at openings and intersecting wall, beam and footing arrangements as indicated on the structural drawings and specified herein. Placing drawings shall be coordinated with the concrete placing schedule. Each bending list and placing drawing submitted shall be complete for each major element of a structure (grade slabs, footings, walls, floor or beams), including all dowels and other bars as required. Furnishing such lists shall not be construed that the list will be reviewed for accuracy. The Contractor shall be wholly and completely responsible for the accuracy of the lists and for furnishing and placing reinforcing steel in accordance with the details shown on the plans and as specified.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Reinforcement shall be shipped to the work with bars of the same size and shape fastened in bundles with metal identification tags with waterproof markings giving size and mark securely wired on. The identification tags shall be labeled with the same designation as shown on the submitted bar lists and shop drawings.

B. All bars shall be stored off the ground and shall be protected from moisture and be kept free from dirt, oil, or injurious contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete reinforcement in sizes No. 3 (3/8 inch) and larger shall be deformed steel bars of the same sizes and shapes indicated on the Contract Drawings. The steel shall be newly rolled stock of domestic manufacture, substantially free from mill scale, rust, dirt, grease, or other foreign matter. Bars shall be of intermediate grade, deformed billet steel conforming to ASTM Specification A615, Grade 60, including all supplementary requirements.

B. Rail-steel bars will not be allowed in the work.

C. Reinforcement shall be accurately fabricated to the dimensions indicated on the Contract Drawings. Particular care shall be exercised not to have stirrups oversized in order to maintain proper coverage of concrete. Stirrups and tie bars

shall be made around a pin having a diameter not less than two (2) times the maximum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than five (5) times the minimum thickness of the bar except for bars larger than 1 inch, in which case the bends shall be made around a pin of eight (8) bar diameters. All bars shall be bent cold. Bars reduced in section or with kinks or bends not shown on the Contract Drawings will not be accepted.

D. Wire fabric shall conform to ASTM Specification A185, galvanized for Welded Steel Wire Fabric for Concrete Reinforcement. Welded wire fabric shall be furnished in flat sheets, rolled WWF is not permitted.

E. Wire tie shall be 16-gauge minimum, zinc coated annealed, conforming to ASTM Specification A82.

F. Bar supports in beams and slabs exposed to view after for stripping shall be galvanized or plastic coated. Use concrete supports for reinforcing in concrete placed on grade.

G. Coupler Splice Devices: Tension couplers capable of developing the ultimate strength of the bar as manufactured by Erico Products Inc., Solon, Ohio, or equal and where approved by the Engineer.

H. Reinforcing Steel Accessories

1. Plastic Protected Bar Supports: CRSI Bar Support Specifications, Class 1 - Maximum Protection.

2. Stainless Steel Protected Bar Supports: CRSI Bar Support Specifications, Class 2 - Moderate Protection.

3. Precast Concrete Block Bar Supports: CRSI Bar Support Specifications, Precast Blocks.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Surface condition, bending, spacing, and tolerances of placement of reinforcement shall comply with the CRSI. The Contractor shall be solely responsible for providing an adequate number of bars and maintaining the spacing and clearances shown on the Contract Drawings.

B. Except as otherwise indicated on the Contract Drawings, the minimum concrete cover of reinforcement shall be as follows:

1. Concrete cast against and permanently exposed to earth: 3-in.

2. Concrete exposed to soil, water, sewage, or weather: 2-in.

3. Concrete not exposed to soil, water, sewage, or weather:

   a. Slabs (top and bottom cover), walls and joists: 3/4 in.

   b. Beams and columns (principal reinforcement, ties, spirals, and stirrups) 1-1/2 inch.

C. Reinforcement which will be exposed for a considerable length of time after being placed shall be coated with a heavy coat of neat cement slurry.

D. No reinforcing steel bars shall be welded either during fabrication or erection unless specifically shown on the Contract Drawings or specified, or unless prior written approval has been obtained from the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is approved or called for, it shall comply with AWS D1.4.

E. Reinforcing steel interfering with the location of other reinforcing steel, conduits or embedded items, may be moved within the specified tolerances or one bar diameter, whichever is greater. Greater displacement of bars to avoid interference shall only be made with the approval of the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior approval of the Engineer.

F. Securely support and tie reinforcing steel to prevent movement during concrete placement by using zinc coated wire ties of not less than No. 16 gauge or suitable clips at intersections. Secure dowels in place before placing concrete.

G. Do not press dowels into the concrete after the concrete has been placed.

H. Flat sheet wire mesh shall be placed as follows. Support and tie mesh to prevent movement during concrete placement. Support welded wire fabric by high chairs or bolster with baseplates, all plastic supports, and concrete blocks. It is not permissible to place the WWF on the subbase and pulling it up or laying the WWF on top of the concrete and walking it into the concrete. Extend fabric to within 2 inches or the edges of the slab and lap splices at least 1-1/2 courses of the fabric and a minimum of 6 inches. Tie laps and splices securely at ends and at least every 24 inches with 16 gauge annealed steel wire.

I. Reinforcing steel bars shall not be field bent except where shown on the Contract Drawings or specifically authorized in writing by the Engineer. If authorized, bars shall be cold-bent around the standard diameter spool specified in the CRSI. Do not heat bars. Closely inspect the reinforcing steel for breaks. If the

reinforcing steel is damaged, replace, Cadweld or otherwise repair as approved by the Engineer. Do not bend reinforcement after it is embedded in concrete unless specifically shown otherwise on the Contract Drawings.

J.

3.02 REINFORCEMENT AROUND OPENINGS

A. Unless specific additional reinforcement around openings is shown on the Contract Drawings, provide additional reinforcing steel on each side of the opening equivalent to one half of the cross-sectional area of the reinforcing steel interrupted by an opening. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.

3.03 SPLICING OF REINFORCEMENT

A Splices designated as compression splices on the Contract Drawings, unless otherwise noted, shall be 30 bar diameters, but not less than 12-in. The lap splice length for column vertical bars shall be based on the bar size in the column above.

B. Tension lap splices shall be provided at all laps in compliance with the applicable tables in the ACI 315. Splices in adjacent bars shall be staggered. Class A splices shall be used when 50 percent or less of the bars are splices within the required lap length. Class B splices shall be used at all other locations.

C. Except as otherwise indicated on the Contract Drawings, splices in circumferential reinforcement in circular walls shall be Class B tension splices and shall be staggered. Adjacent bars shall not be spliced within the required lap length.

D. Install wire fabric in as long lengths as practicable. Splices in welded wire fabric (WWF) shall be lapped in accordance with the requirements of ACI 318 but not less than 12-in. The splices fabrics shall be tied together with wire ties spaced not more than 24-in on center and laced with wire of the same diameter as the welded wire fabric. Do not position laps midway between supporting beams, or directly over beams of continuous structures. Offset splices in adjacent widths to prevent continuous splices.

3.04 ACCESSORIES

A. The Contractor shall be solely responsible for determining, providing and installing accessories such as chairs, chair bars, and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.

B. Use precast concrete blocks where the reinforcing steel is to be supported over soil.

C. Stainless steel bar supports or steel chairs with stainless steel tips shall be used where the chairs are set on forms for a concrete surface that will be exposed to weather, high humidity, or liquid (including bottom of slabs over liquid containing areas). Use of galvanized or plastic tipped metal chairs is permissible in all other locations unless otherwise noted on the Contract Drawings or specified.

D. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if approved by the Engineer.

3.05 INSPECTION

A. In no case shall any reinforcing steel be covered with concrete until the installation of the reinforcement, including the size, spacing and position of the reinforcement has been observed by the Engineer and the Engineer's release to proceed with the concreting has been obtained. The Engineer shall be given at least 24 hours advance notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer has finished his observations of the reinforcing steel.

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The Contractor shall furnish all labor and materials required and install cast-in-place concrete complete as shown on the Contract Drawings or removed or damaged by the Contractor and as specified herein.

B. Related Work:

1. Division 01: General Requirements

2. Section 03 11 00: Concrete Formwork

1.02 QUALITY ASSURANCE

A. Standards: Unless otherwise indicated, all materials, workmanship and practices shall conform to the requirements of the following standards:

1. American Concrete Institute (ACI)

a. ACI 301 - Specifications for Structural Concrete.

b. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

c. ACI 305 - Hot Weather Concreting.

d. ACI 306 - Cold Weather Concreting.

e. ACI 308 - Standard Practice for Curing Concrete.

f. ACI 309 - Standard Practice for Consolidation of Concrete.

g. ACI 318 - Building Code Requirements for Reinforced Concrete.

h. ACI 347 - Guide to Concrete Formwork.

i. ACI 350 - Environmental Engineering Concrete Structures.

2. American Society for Testing and Materials (ASTM)

a. ASTM C31 - Standard Practice Making and Curing Concrete Test Specimens in the Field.

b. ASTM C33 - Standard Specification for Concrete Aggregates.

c. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

d. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

e. ASTM C94 - Standard Specification for Ready-mix Concrete.

f. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.

g. ASTM C150 - Standard Specification for Portland Cement.

h. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

i. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

j. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

k. ASTM C260 - Specification for Air-Entraining Admixtures for Concrete.

l. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

m. ASTM C494 - Chemical Admixtures for Concrete.

n. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

3. Building Codes

a. Standard Building Code (SBCCI).

b. Local Codes and Regulations.

B. Plant Qualification: Plant equipment and facilities shall meet all requirements of the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association and ASTM C94.

C. Evaluation and Acceptance of Concrete: Evaluation and acceptance of concrete will be in accordance with ACI 318, Chapter 4.

1. Watertightness

All structures to contain wastewater or water shall be watertight and shall be free from any perceptible leakage, as determined by the Engineer.

1.03 SUBMITTALS

A. Materials and Shop Drawings: The following information shall be submitted for approval in accordance with Division 01 – General Requirements and Section 01 33 23 – Submittals. No concrete shall be furnished until submittal has been approved.

1. Plant Qualification: Satisfactory evidence shall be submitted indicating compliance with the specified qualification requirements.

2. Materials: Satisfactory evidence shall be submitted indicating that materials to be used, including cement, aggregates and admixtures meet the specified requirements. Provide catalog data, chemical and mechanical analysis, and conformance with ASTM requirements.

a. Sources of cement, pozzolan and aggregates.

b. Air-entraining admixture.

c. Water reducing admixture.

d. High range water-reducing admixture (plasticizer).

e. Sheet curing material.

f. Liquid curing compound.

3. Design Mix: The design mix to be used shall be prepared by qualified persons and submitted for approval. The design of the mix is the responsibility of the Contractor subject to the limitations of the Specifications. Approval of this submission will be required only as minimum requirements of the Specifications have been met. Such approval will in no way alter the responsibility of the Contractor to furnish concrete meeting the requirements of the Specifications relative to strength and slump.

4. Ready Mix Concrete: Provide delivery tickets or weighmasters certificate per ASTM C94, including weights of cement and each size aggregate, amount of water in the aggregate, and amount of water added at the plant. Write in the amount of water added on the job.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement

1. Cement for all concrete shall be domestic Portland cement that conforms to the requirements of ASTM Designation C150 Type I, Type II or Type III. All sanitary sewer manholes, wet wells, pumping stations, and structures exposed to wastewater shall be constructed with Type II cement. Type III cement for high early strength concrete shall be used only for special locations and only with the approval of the Engineer. Type I cement may be used for buildings and tremie concrete.

2. Only one (1) brand of cement shall be used in any individual structure unless approved by the Engineer. Cement which has become damaged, partially set, lumpy or caked shall not be used and the entire contents of the sack or container which contains such cement will be rejected. No salvaged or reclaimed cement shall be used.

B. Pozzolan

1. Fly ash shall be Class C or F conforming to the requirements of ASTM C618, including the requirements of Table 1 except the loss of ignition, LOI, shall be limited to 3% maximum. Fly ash shall not exceed 20% of the cementitious content of the mix.

C. Aggregates

1. Coarse aggregates shall be size No. 67 (3/4 inch). Block cell fill shall be size #8, conforming to the requirements of ASTM C33.

2. In addition to requirements of ASTM C33 for structures exposed to wastewater the following shall apply:

a. Soft particles: 3.0 percent (3%).

a. Chert as a soft impurity (defined in Table 3 of ASTM C33): 2.0 percent (2%).

b. Total of soft particles and chert as a soft impurity: 5.0 percent (5%).

c. Flat and elongated particles (long dimension greater than 5 times short dimension): 15.0 percent (15%).

D. Water: Clean and free from injurious amounts of deleterious materials.

E. Air Entraining Admixture: ASTM C260.

F. Water Reducing and Retarding Admixtures:

1. For concrete without superplasticizer: ASTM C494, Type D, and shall contain no calcium chloride by weight of cement.

2. For concrete with superplasticizer

a. ASTM C494, Type F or G. The admixture shall be a second generation type, free of chlorides and alkalis (except for those attributable to water) and composed of a synthesized sulfonated complex polymer. The concrete shall be capable of maintaining its rheoplastic state in excess of two (2) hours if necessary. Superplasticizers admix shall be induced at the batch plant only, job site redosage shall not be permitted without prior approval from the Engineer.

b. Approved Materials:

(1)

Rheobuil

d 716 as manufactured by Rheobuild 716 as manufactured by Master Builders Technologies or "Kurez-DR", as manufactured by Euclic Chemical Co.

(2) Daracem 100 as manufactured by W.R. Grace & Co. Construction Products Division, Pompano Beach, Florida.

c. Manufacturer's job site representation: A competent field service representative from the manufacturer of each of the admixtures (superplasticizer) selected for use shall be available at the job site to provide advice and consultation on the use of the admixture materials, including the effect on the concrete in place. The representative shall be available on short call at any time requested by the Owner, Contractor, or concrete producer.

d. Manufacturer's representative will be responsible to recommend maximum discharge time for superplasticizer and to recommend method and procedure to induce superplasticizer into mixer.

e. Manufacturer's representative will be responsible to recommend quantities of admixtures to be used if variations are required because of temperature/humidity, wind, or other environmental considerations.

f. Concrete with super plasticizer shall be used for all cast-in place walls of structures.

G. Curing Compound: ASTM C309, Type 1. The compound shall contain no ingredient which will adversely affect the bond of coatings or toppings. Curing compound shall be approved for use in contact with potable water after 30 days.

1. Curing compound for exposed concrete not to receive special finishes, protective coatings and/or concrete toppings shall be "Super Rez-Seal", as manufactured by Euclid Chemical Co., Cleveland, Ohio or equal.

2. Curing compound for exposed concrete to receive special finishes, protective coatings and/or concrete toppings shall be "Kurez-DR", as manufactured by Euclic Chemical Co., Cleveland, Ohio or equal.

H. Mortar for Repair of Concrete: Mortar used for repair of concrete shall be made of the same materials as used for concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one (1) part cement to two and one-half (2-1/2) parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing.

I. Burlap Mats: Conform to AASHTO Specification M-182.

J. Epoxy Bonding Agent: Sikadur 32 Hi Mod, or equal.

2.02 MIXES

A. General Requirements:

1. Mix Design: Proportioning shall be on the basis of field experience and/or trial mixtures as specified in ACI 318, Section 4.3. Data on consecutive compression tests and standard deviation shall be submitted. Proportioning for small structures may be by the water/cement ratio under special approval by the Engineer. Concrete mix design shall comply with the Standard Building Code requirements.

2. Air Content: Range 3.5 to 6% for Class A and B.

3. Slump: 4 inches plus or minus 1 inch for Class A and B without superplasticizer.

8 inches plus or minus 1 inch for concrete with superplastizer.

6 inches plus or minus 1 inch for tremie concrete.

4. Water cement ratio =0.45
(Class A Concrete) without superplasticizer.

=
0.55
(Class B Concrete) without superplasticizer.

= 0.37 Concrete with superplasticizer.

5. Minimum Compressive Strength at 28 days:

a. Class A, 4,000 psi: Wastewater structures inclusive of mat foundations, footings, tanks, ditches, pumping station, tremie concrete and other structures in contact with treated waters.

b. Class B, 3,000 psi: Slab on grade, masonry fillcell grout, encasements, thrust blocks, and pipe supports, concrete curbs, fills and sidewalks, etc. not in contact with treated waters.

c. Slab on grade shall include all slabs 10 inches thick or less and requires Class B 3000 psi concrete. Exception: Sludge Loading Station, 10-inch Slab Drawing S-39 shall be Class A 4000 psi.

B. Production of Concrete:

1. General: Concrete shall be ready mixed and shall be batched, mixed and transported in accordance with ASTM C94, except as otherwise indicated.
2. Air Entraining Admixture: Air entraining admixture shall be charged into the mixture as a solution and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water.

3. Water Reducing and Retarding Admixture: Water reducing and retarding admixture shall be added and measured as recommended by the manufacturer. The addition of the admixture shall be separate from the air entraining admixture. The addition of the admixture shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Admixtures shall be stored, handled and batched in accordance with the recommendation of ASTM C94.

C. Delivery Tickets: In addition to the information required by ASTM C94, delivery tickets shall indicate the cement content and the water/cement ratio.

D. Temperatures: The temperature of the concrete upon delivery from the truck shall not exceed 95 degrees Fahrenheit (°F), otherwise ice shall be used to reduce the temperature of the concrete as recommended by ACI.

E. Modifications To The Mix: No modifications to the mix shall be made in the plant or on the job which will decrease the cement content or increase the water-cement ratio beyond that specified. No modifications of any kind shall be made except by a qualified and responsible representative of the concrete producer.

1. Any addition of water must be approved by the Engineer. Added water shall be incorporated by additional mixing of at least 35 revolutions. All added water shall be metered and the amount of water added shall be shown on each delivery ticket. Addition of water shall follow procedures of ASTM C94 for slump adjustment.

PART 3 - EXECUTION

3.01 PREPARATION

A. Preparations Before Placing: No concrete shall be placed until the approval of the Engineer has been received. Approval will not be granted until forms are thoroughly clean and reinforcing and all other items required to be set in concrete have been placed and thoroughly secured. The Engineer shall be notified a minimum of 24 hours before concrete is placed.

B. Conveying:

1. General: Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients to maintain the quality of the concrete. No concrete shall be placed more than 90 minutes after mixing has begun for that particular batch.

2. Buckets and Hoppers: Buckets and hoppers shall have discharge gates with a clear opening equal to no less than one-third of the maximum interior horizontal area, or five (5) times the maximum aggregate size being used. Side slopes shall be no less than 60 degrees. Controls on gates shall permit opening and closing during the discharge cycle. It is suggested the Contractor provide one (1) standby bucket and hopper for use in case of equipment failure.

3. Runways: Extreme care shall be exercised to avoid displacement of reinforcing during the placing of concrete.

4. Elephant Trunks: Hoppers and elephant trunks shall be used to prevent the free fall of concrete for more than 6 feet.

5. Chutes: Chutes shall be metal or metal lined, and shall have a slope not exceeding one vertical to two horizontal, and not less than one vertical to three horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements, may be used only if they discharge into a hopper before distribution.

6. Pumping Equipment: Pumping equipment and procedures, if used, shall conform to the recommendations contained in the report of ACI Committee 304 on "Placing Concrete by Pumping Methods", ACI 304.2R. The specified slump shall be measured at the point of discharge. The loss of slump in pumping shall not exceed 1-1/2 inches.

7. Conveying Equipment Construction: Aluminum or aluminum alloy pipe for tremies or pump lines and chutes, except for short lengths at the truck mixer shall not be permitted.

8. Cleaning: Conveying equipment shall be cleaned at the end of each concrete operation.

3.02 APPLICATION

A. Placing:

1. General: Concrete shall be deposited continuously, or in layer of such thickness (not exceeding 2 feet in depth) that no concrete will be deposited

on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness.

2. Supported Elements: At least 2 hours shall elapse after depositing concrete in columns or walls before depositing in beams, girders, or slabs supported thereon.

3. Segregation: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to procedures which will cause segregation.

4. Concrete Under Water: All concrete, except that indicated on the Drawings as Tremie concrete, shall be placed in the dry.

5. Concrete Fill and Tank Bottom Slab: Concrete fill for the tank bottoms, where shown on Drawings, shall be placed within the tolerances described in this Section and as per equipment manufacturer's recommendations

B. Seals and Tremie Concrete:

1. General:

a. Wherever practicable, all foundation excavations shall be dewatered and the concrete deposited in the dry. Where conditions are encountered which render it impracticable to dewater the foundation before placing concrete, a concrete foundation seal shall be placed. The foundation shall then be dewatered, and the balance of the concrete placed in the dry.

b. When seal concrete is required to be placed, the satisfactory performance of the seal in providing a watertight excavation for placing structural concrete shall be the responsibility of the Contractor. Seal concrete placed by the Contractor, which subsequently fails to perform properly, shall be repaired as necessary to perform its required function, at the expense of the Contractor.

2. Method of Placing: Concrete deposited under water shall be carefully placed in the space in which it is to remain by means of a tremie, a closed-bottom dump bucket of not less than one cubic yard capacity, or other approved method, and shall not be disturbed after it is deposited. All seal concrete shall be deposited in one (1) continuous pour. No concrete shall be placed in running water. All form work designed to retain concrete under water shall be watertight, and the design of the form work and excavation sheeting shall be by a Professional Engineer, registered in the State of Florida.

3. Use of Tremie: The tremie shall consist of a tube having a minimum inside diameter of 10 inches, and shall be constructed in sections having tight joints. No aluminum parts which have contact with the concrete will be permitted. The discharge end shall be entirely seated at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper the tremie shall be slightly raised (but not out of the concrete at the bottom) until the batch discharges to the bottom of the hopper, after which the flow shall be stopped by lowering the tremie. The means of supporting the tremie shall be such as to permit the free movement of the discharge end over the entire top surface of the work, and shall permit it being lowered rapidly when necessary to choke off or retard the flow. The flow shall preferably be continuous and in no case shall be interrupted until the work is completed. Special care shall be exercised to maintain still water at the point of deposit.

4. Use of Bottom-dump Bucket: When the concrete is placed by means of a bottom-dump bucket, the bucket shall be lowered gradually and carefully until it rests upon the concrete already placed. The bucket shall then be raised very slowly during the discharge travel; the intent being to maintain, as nearly as possible, still water at the point of discharge and to avoid agitating the mixture. Aluminum buckets will not be permitted.

5. Time of Beginning Pumping: Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure, and in no case earlier than 72 hours after placement of the concrete.

C. Consolidating Concrete:

1. General: Concrete, with the exception of slabs less than 8 inches thick, shall be consolidated by means of internal vibrators operated by competent workmen.

    a. Concrete Slabs: Concrete for slabs less than 8 inches shall b consolidate with vibrating screeds: slabs 8-inches to 12-inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds. Vibrators shall always be placed into concrete vertically and shall not be laid horizontally or laid over.

2. Vibrators: Vibrators shall have a minimum head diameter of at least 2 inches, a minimum centrifugal force of 700 and a minimum frequency of 8,000 vibrations per minute.

3. Vibrators for Confined Areas: In confined areas, the specified vibrators shall be supplemented by others having a minimum head diameter of 1-1/2

inches, a minimum centrifugal force of 300 pounds and a minimum frequency of 9,000 vibrations per minute.

4. Spare Vibrator: One (1) spare vibrator for each three (3) in use shall be kept on the site during all concrete placing operations.

5. Use of Vibrators: Vibrators shall be inserted and withdrawn at points approximately 18 inches apart. The duration of each insertion shall be from 5 to 15 seconds. Concrete shall not be transported in the forms by means of vibrators.

D. Protection: Rainwater shall not be allowed to increase the mixing water, nor to damage the surface finish. Concrete shall be protected from construction overloads. Design loads shall not be applied until the specified strength has been attained.

E. Construction Joints: Except as otherwise indicated on the Drawings, horizontal construction joints shall be provided at top of foundation members and slabs on grade and at the soffit of supported slabs and beams. Other horizontal and vertical construction joints shall be located as indicated on the Drawings. Joints will not be permitted except in the locations shown, unless recommended by the Contractor and approved by the Engineer.

F. Bonding: Before depositing new concrete on or against concrete that has set, the surfaces of the set concrete shall be thoroughly cleaned so as to expose the coarse aggregate and be free of laitance, coating, foreign matter and loose particles. Forms shall be retightened. The hardened concrete of joints shall be dampened, but not saturated, and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least 1/2 inches thick on horizontal surfaces. The fresh concrete shall be placed before the grout has attained its initial set.

G. Embedded Items: In addition to steel reinforcement, pipes, inserts and other metal objects as shown, specified or ordered shall be built into, set in or attached to the concrete. All necessary precautions shall be taken to prevent these objects from being displaced, broken or deformed. Before concrete is placed, care shall be taken to determine that all embedded parts are firmly and securely fastened in place as indicated. They shall be thoroughly clean and free from paint or other coating, rust, scale, oil, or any foreign matter. No wood shall be embedded in concrete. The concrete shall be packed tightly around pipes and other metal work to prevent leakage and to secure proper adhesion. Drains shall be adequately protected from intrusion of concrete.

H. Concrete Finishes: Complete concrete surfaces in accordance with the following schedule:

1. Finish Designation Area Applied

F-1 Exterior walls below grade not exposed to water. Repair defective concrete, fill depressions deeper than 1/2 inch and fill tie holes.

F-2 Exterior and interior walls of all structures. Repair defective concrete, remove fins, fill depressions and fill tie holes.

F-3 Walls of all structures or buildings exposed to public view and the underside of formed floors or slabs that will not be finish coated or sealed. In addition to Finish F-2, fill depressions and airholes with mortar. Dampen surfaces and then spread a slurry within 72 hours of removing forms consisting of one part cement and one and one-half parts sand by volume on the surface with clean burlap pads or sponge rubber floats. Remove any surplus by scraping and then rubbing with clean burlap.

F-4 Walls of all structures and buildings exposed to public view and the underside of formed floors or slabs that will be finish coated in accordance with Section 09 96 00 Painting and Coating. In addition to Finish F-2, surfaces shall be sand blasted and holes patched and depressions and airholes filled with a patching compound consisting of sand, portland cement and a liquid, acrylic-polymer bonding additive. Refer to Section 09 96 00 Painting and Coating, for concrete surface preparation requirements.

S-1 Slabs and floors not water bearing. Smooth steel trowel finish.

S-2 Slabs and floors which are water bearings. Slab Surfaces on which mechanical equipment moves. Steel trowel finish free from trowel marks and all irregularities.

S-3 Slabs and floors of structures or building exposed to view. Steel trowel finish without local depressions or high points and apply a light hair-broom finish. Do not use stiff bristle brooms or brushes. Leave hair-broom lines parallel to the direction of slab drainage.

S-4 Slabs and floors at slopes greater than 10 percent. Steel trowel finish without local depressions or high points. Apply a stiff bristle broom finish. Leave broom lines perpendicular to the direction of slope drainage.

E-1 Exposed edges of slabs, floors and tops of walls. Finish with a 1/4 inch radius edge if a chamfer is not indicated.

E-2 Tops of walls, beams and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of formed surfaces.

2. General: As soon as forms can safely be removed, all irregular projections shall be chipped off flush with the concrete surfaces. All voids produced by spacers or any honeycombing shall be pointed up with grout and troweled flush with the concrete surface immediately after removal of forms and water cured to prevent shrinkage. Honeycombing shall be cut out to expose a sound concrete surface prior to pointing. The use of mortar pointing or patching shall be confined to the repair of small defects in relatively green concrete. Where in the opinion of the Engineer substantial repairs are required, the defective concrete shall be cut out to sound concrete and repaired with gunite or the concrete shall be removed and reconstructed as directed.

3. All concrete slabs to be troweled shall receive a floated finish. After floating, all concrete slabs except as otherwise indicated and in areas to receive roofing, insulation, tile or topping shall be troweled and immediately light broom finished. Stair treads shall receive a light broomed finish.

4. Floated Finish: After concrete has been placed. Consolidated, struck off and leveled, it shall not be worked further until water sheen has disappeared and the surface has hardened sufficiently to permit floating, the planeness of the slab shall be checked with a 10 foot straightedge

applied at no less than two (2) angles. All high spots shall be cut down and all low spots shall be filled to produce a surface having a Class B Tolerance throughout. The slab shall then be refloated to a uniform sandy texture.

5. Light Broomed Finish: After floating, slabs to receive a light broomed finish shall be power troweled and finished struck with a soft broom rag. The troweling shall produce a smooth surface, relatively free of defects and a Class B Tolerance. Before the surface sets, the soft broom drag shall be passed over the surface to produce a surface uniform in texture and appearance.

6. Troweled Finish: After floating, slabs to receive a troweled finish shall be power troweled and finally hand troweled. The first troweling after power floating shall produce a smooth surface, relatively free of defects. Surfaces shall be hand troweled after the surface has hardened sufficiently. The final troweling shall be done by hand when a ringing sound is produced as the trowel is moved over the surfaces. Hand troweling shall produce a surface which is thoroughly consolidated, free from trowel marks, uniform in texture and appearance and plane to a Class B tolerance.

7. Finishing Tolerance: Surfaces shall be true planes within the following limits:

    a. Class B: 1/4 inch in 10 feet is determined by a 10 foot straightedge placed anywhere on the slab in any direction.

I. Saw cut Joints: Joints that are to be saw cut shall be cut not sooner than 2 hours after the concrete is poured and not later than 8 hours after the pour.

3.03 PROTECTING

A. Curing:

1. All exposed surfaces, including slabs, walls, beams and columns shall receive a spray coat of curing compound applied in accordance with the manufacturer's recommendations. Exposed steel keyways and other embedded items shall be protected from the curing compound. Concrete surfaces to be exposed to wastewater and are to be coated with an epoxy system, shall be cured by the wet burlap method. Curing compounds shall not be used on surfaces to be coated and exposed to sewage or wastewater.

2. Curing compound shall be uniformly applied to the surfaces to be cured, in a single coat, continuous film by a mechanical sprayer. Application shall be in compliance with the manufacturer's recommendations.

3. Curing compound shall be applied in accordance with manufacturer's instructions. Should the film become damaged from any cause within the repaired curing period, the damaged portions shall be required immediately with additional compound. Upon removal of forms, the newly exposed surfaces shall immediately be coated to provide a curing treatment equal to that provided for the surface.

B. Wet Burlap Curing Method: All concrete for wastewater/water retaining structures to be cured by the wet burlap method. All concrete shall be covered with a double thickness of burlap, cotton mats, or other approved material kept thoroughly saturated with water. The forms shall be kept wet until removed and upon removal, the curing specified herein shall be started immediately. Concrete shall be cured for a period of 7 days for normal Portland cement or 4 days for high early strength cement. Concrete poured in the dry shall not be submerged until it has attained sufficient strength to adequately sustain the stress involved nor shall it be subjected to flowing water across its surface until it has cured 4 days. Curing the gunite shall be started as soon as possible without damaging surface and not later than 2 hours after placing. Begin wet cure as soon as concrete attains an initial set and maintain wet cure 24 hours a day.

C. Sheet Material Curing: Cover entire surface with sheet material. Securely anchor sheeting to prevent wind and air from lifting the sheeting or entrapping air under the sheet. Place and secure sheet as soon as initial concrete set occurs.

3.04 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 70 percent of the 28 day compressive strength prescribed by the design, nor before reaching the following number of day-degrees of curing (whichever is the longer):

Degree Days	Forms for
500	Beams and slabs
100	Walls and vertical surfaces

B. Shores shall not be removed until the concrete has attained at least 60 percent of the specified strength and also sufficient strength to support safely its own weight and the construction live loads upon it.

3.05 TESTING

A. An independent testing laboratory employed by the Contractor will make such tests required.

B. Standard laboratory compressive test cylinders will be obtained by the laboratory when concrete is discharged at the point placing (i.e., discharge end of pumping equipment), and cylinders will be made and cured in accordance with the requirements of ASTM Designation C31. A set of five (5) cylinders will be obtained for each 50 cubic yards, or fraction thereof placed each day, nor less than once for each 5,000 sq. ft. or surface area of slabs or walls for each type of concrete. The cylinders will be cured under laboratory conditions and will be tested in two groups of two (2) at 7 and 28 days of age, with one (1) group held until released by the Engineer in accordance with the requirements of ASTM Designation C39.

C. The laboratory will conduct tests of Class A and Class B concrete as it is discharged from the mixer at the point of placing. Slump tests will be made for each truckload of concrete. Slump tests may be made on any batch, and failure to meet specified slump requirements will be sufficient cause for rejection of the batch. If water is added after initial test then the "load" shall be tested.

D. Air content of the concrete mixture will be tested on every other truck in accordance with ASTM C173 or ASTM C231.

E. Historical strength/break data may be submitted with mix design and may be used in the approval process provided the mix design is otherwise acceptable. If the mix design required modifications, a test batch may still be required.

3.06 FIELD CONTROL

A. The Contractor shall advise the Engineer of his readiness to proceed at least twenty four (24) working hours 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.

1. The Contractor's Superintendent shall submit a certification that indicates preparedness to place concrete and is in accord with contract drawings and specifications. This certification shall be submitted on forms provided by 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 test 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. The work of cutting and testing the cores will be at the expense of the Owner.

3.07 FAILURE TO MEET REQUIREMENTS

A. Should the strengths shown by the test specimens made and testing in compliance with the previous provisions fall below the values given in Section 2.02.A.5, the Engineer shall have the right to require changes in proportions outlined to apply on 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 shall 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 cases of failure to meet strength requirements the Contractor shall adjust the concrete mix to meet contract requirements.

B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In case of failure of the core, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Test need not be made until concrete has aged 60 days.

C. Should the strength of test cylinders fall below 85 percent of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced.

3.08 PATCHING

A. 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 shall be filled, and surface defect 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.

B. Immediately after removal of forms remove plugs and break off metal ties as required by Section 03 11 00-Concrete Formwork. 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 hole with a 1 to 1.5 mixture of cement and concrete sand

mixed slightly damp to the touch. Compact the grout into the hole until dense and an excess of paste appears on the surface. Trowel smooth with heavy pressure. Avoid burnishing.

C. When patching exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine Carborundum stone at an age of one to five days if necessary to bring the surface down to the adjacent concrete. Exercise care to avoid damaging or staining the surrounding concrete. Wash thoroughly to remove all rubbed matter.

3.09 REPAIRS

A. It is the intent of these Specifications to require quality work including adequate forming, proper mixture and placement of concrete and curing so completed concrete surfaces will not require patching.

B. Defective concrete and honeycombed areas as determined by the Engineer shall be repaired as specified.

1. General: Surface defects, including tie holes shall be repaired immediately after form removal. The areas to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. The Engineer shall be notified prior to commencing operations.

2. Removal of Defective Concrete: All honeycombed and other defective concrete shall be removed down to sound concrete. Edges shall be cut perpendicular to the surface or slightly under cut. Sand blast surfaces to receive repair.

3. Bonding Grout: Surfaces to be patched shall be thoroughly dampened and shall receive a coat of bonding grout brushed into the surface. Grout shall consist of one part cement to one part fine sand passing a No. 30 sieve. Grout shall be the consistency of thick cream.

4. Placing Patching Mortar: After the bonding grout begins to lose its water sheen, a premixed patching mortar shall be applied. Patching mortar shall be thoroughly consolidated into place and stuck off so as to leave the patch slightly higher than the surrounding surface. It shall be left undisturbed for one hour to permit initial shrinkage and then finally finished.

5. Tie Holes: After being cleaned and thoroughly dampened, the tie holes shall be filled solid with patching mortar.

3.10 MISCELLANEOUS WORK

A. All bolts, anchors, miscellaneous metals or other sleeves and steel work required to be set in the concrete forms for attachment of masonry, structural, and mechanical equipment shall be set or installed under this Section. The Contractor shall be fully responsible for the setting of such materials in the forms and shall correct all such not installed in a proper location or manner at his own expense. Contractor shall coordinate the activities of other trades for installation of these items.

B. Electric conduits shall be installed in the concrete as required by the Drawings and specified elsewhere in these Specifications. Outlet boxes and fixtures shall be located in reference to the final floor, wall or ceiling finish and shall be as secured that they will not be displaced by concrete placing.

C. Pipes or conduits for embedment, other than those merely passing through shall not be larger in outside diameter than one-third the thickness of the slab, wall, or beam in which they are embedded, unless indicated on the Drawings, nor shall they be spaced closer than three (3) diameters on center, nor so located as to unduly impair the strength of the construction. The Engineer shall approve the location of all conduits and fixtures.

D. Concrete foundations, supports and bases for all equipment and machinery shall be built to the equipment manufacturer's requirements, as approved by the Engineer, with anchor bolts installed.

CONCRETE

FINISHES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to finish cast in place concrete surfaces as shown on the Drawings and as specified herein.

B. All interior concrete floor slabs are to receive concrete sealer unless otherwise noted on the Drawings. Exterior slabs and wet wells or basins do not require a sealer, unless noted otherwise on the Drawings.

C. Related Work:

1. Division 01: General Requirements

2. Section 03 11 00: Concrete Formwork

3. Section 03300: Cast-in-Place Concrete

43. Section 03 60 00: Grout

5. Section 03740: Modifications and Repairs to Concrete

6. Section 09900: Painting and Coating

1.0302 SUBMITTALS

A. Submit shop drawings and product data, in accordance with Division 01 - General Requirements and 01 340 33 26 - Shop DrawingsSubmittals, Working Drawings, and Samples, showing materials of construction and details of installation for:

1. Concrete sealer. Conformation that the sealer is compatible with additionally applied coating shall also be submitted.

1.0403 REFERENCE STANDARDS

A. Design, manufacturing and assembly of elements of the products herein specified shall be in accordance with, but not limited to, published standards of the following, as applicable:

1. American Society for testing and materials (ASTM)

a. ASTM C33 – Standard specification for concrete aggregates

B. Where reference is made to standards of one of the above, or other organizations, the version of the standard in effect at the time of bid opening shall apply.

1.0504 QUALITY ASSURANCE

A. Finishes

1. For concrete which will receive additional applied finishes or materials, the surface finish specified is required for the proper application of the specified manufacturer's products. Where alternate products are approved for use, determine if changes in finishes are required and provide the proper finishes to receive these products.

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

B. Services of manufacturers representative

1. The Contractor shall make available at no extra cost to the Owner, upon 72 hours notification, the services of a qualified field representative of the manufacturer of concrete sealer to instruct the user on the proper application of the product under prevailing job conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete sealer shall be a silicate based sealer and shall be "Protecrete" by Advanced Concrete Technology Inc., Arlington Heights, Illinois: "Sonosil" by Sonneborn Building Products, Minneapolis, Minnesota: or equal as approved by the Engineer.

PART 3 - EXECUTION

3.01 FORMED SURFACES

A. Forms shall not be removed before the requirements of section 03300, cast in place concrete, have been satisfied.

B. Exercise care to prevent damaging edges or obliterating the lined of chamfers, rustications or corners when removing the forms or performing any other work adjacent thereto.

C. Prepare the exposed surface as specified in Section 03 31 00, cast Cast-Iin -pPlace concreteConcrete.

D. As – cast finish.

1. No additional finishing is required.

E. Rubbed Finish

1. While the wall is still damp apply a thin coat of medium consistency neat cement slurry by means of bristle brushes to prove a bonding coat within all pits, air holes, or blemishes in the parent concrete. Avoid coating large areas with the slurry at one time.

2. Before the slurry has dried or changed color, apply a dry (almost crumbly) grout proportioned by volume and consisting of one part cement to 1-1/2 parts of clean masonry sand having a fineness modulus of approximately 2.3 and complying with the gradation requirements of ASTM C33 for such a material. Grout shall be uniformly applied by means of damp pads of coarse burlap approximately 6 sq in, used as a float. Scrub grout into the pits and air holes to provide a dense mortar in all imperfections.

3. Allow the mortar to partially harden for 1 to 2 hours depending upon the weather. If the air is hot and dry, keep the wall damp during the period using a fine, fog spray. When the grout has hardened sufficiently so it can be scrapped from the surface with the edge of steel trowel without damaging the grout in the small pits or holes, cut off all that can be removed with a trowel. (Note: Grout allowed to remain on the wall too long will harden and will be difficult to remove.)

4. Allow the surface to dry thoroughly and rub it vigorously with clean dry burlap to completely remove any dried grout. No visible film of grout shall remain after this rubbing. The entire cleaning operation for any area must be completed the day it is started. Do not leave grout on surfaces overnight. Allow sufficient time for grout to dry after it has been cutoff with the trowel so it can be wiped off clean with the burlap.

5. On the day following the repair of pits, air holes and blemishes the walls shall again be wiped off clean with dry, used pieces of burlap containing

old hardened mortar which will act as a mild abrasive. After this treatment, there shall be no built- up film remaining on the parent surface. If, however, such a film is present, a film is present; a fine abrasive stone shall be used to remove all such materials without changing the texture of the concrete.

6. A thorough wash down with stiff bristles shall follow the final bagging or stoning operation. No extraneous materials shall remain on the surface of the wall. The wall shall be sprayed with a fine fog spray periodically to maintain a continually damp condition for at least three days after the application of the repair grout.

3.02 FLOOR AND SLABS

A. Floated Finish:

1. Machine Floating

a. Screed floors and slabs with straightedges to the established grades shown on the Drawings. Immediately after final screeding, a dry cement/sand shake in the proportion of two sacks of Portland cement to 350 lbs of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 lbs per 1,000 sq ft of floor. Do not sprinkle neat, dry cement on the surface.

b. The application of cement /sand may be eliminated at the discretion of the Engineer if the base slab concrete exhibits adequate fattiness and homogeneity, and he needs not indicated. When the concrete has hardened sufficiently to support the weight of a power float without digging into or disrupting the level surface, thoroughly float the shake into the surface with a heavy revolving disc type power compacting machine capable of providing a 200 lb. compacting force distributed over a 24-in diameter disc.

c. Start floating along the walls and around columns and then move systematically across the surface leaving a matte finish.

d. The compacting machine shall be the "Kelly power float with compaction control" as manufactured by Kelley Industries of SSP Construction Equipment, Inc. Pomona California, or approved equal. Troweling machines equipped with float (shoe) blades that are slipped over the trowel blades may be used for floating. Floating with a troweling machine equipped with normal trowel blades shall not

be permitted. The use of any floating or troweling machine which has a water attachment for wetting the concrete surface during finishing shall not be permitted.

2. Hand Floating

a. In lieu of power floating, small areas may be compacted by hand floating. The dry cement/sand shale previously specified shall be used unless specifically eliminated by the Engineer. Screed the floors and slabs with straightedges to the established grades shown on the Drawings. While the concrete is still green, but sufficiently hardened to support a finisher and kneeboards with no more than ¼-in indentation, wood float to a true, even plane with no coarse aggregate visible. Use sufficient pressure on the wood floats to bring moisture to the surface.

3. Toweling

a. All floor slabs shall receive a light trowel finish, unless otherwise specified.

4. Finishing tolerances

a. Level floors and slabs to a tolerance of plus or minus ½-in when checked with a 10-ft. straightedge placed anywhere on the slab in any direction. Where drains occur, pitch floors to drains such that there are no low spots left un-drained. Failure to meet either of the above requirements shall be cause for removal, grinding, or other correction as directed by the Engineer at Contractor's expense.

B. Broom Finish

1. Screed slabs with straightedges to the established grades indicated on the Drawings. When the concrete has stiffened sufficiently to maintain small surface indentations, draw a stiff bristle broom lightly across the surface in the direction of drainage, or, in the case of walk and stairs, perpendicular to the direction of traffic to provide a non- slip surface.

C. Steel Trowel Finish

1. Finish concrete as specified in paragraph 3.02A. Power trowel surface and then hand steel trowel to a perfectly smooth hard even finish free from high or low spots, trowel marks, or other defects.

D. Concrete Sealer

1. Prepare and seal surfaces indicated on the room finish schedule to receive a sealer as follows:

   a. Finish concrete as specified in paragraph 3.02A.

   b. Newly placed concrete: Surface must be sound and properly finished. Surface is application-ready when it is damp but not wet and can no longer be marred by walking workman.

   c. Newly-Cured bare concrete: Level any spots gouged out by trades. Remove all dirt, dust, droppage, oil, grease, asphalt, and foreign matter. Cleanse with caustics and detergents as required. Rinse thoroughly and allow to dry so that surface is no more than damp, and not wet.

   d. Aged concrete: Restore surface soundness by patching, grouting, filling cracks, and holes, etc. Surface must also be free of any dirt, dust, and other foreign matter. Use power tools and/or strippers to remove any incompatible sealers or coatings. Cleanse as required, following the procedure indicated under cured concrete.

   e. Methods: Apply sealer so as to form a continuous, uniform film by spray, soft-bristle push broom, long-nap roller, or lambs wool applicator. Ordinary garden-type sprayers using neoprene hose, are recommended for best results.

   f. Applications: Apply first coat evenly and uniformly as soon as possible after final finishing. Apply second coat when all trades are completed and structure is ready for occupancy.

   g. To seal and dustproof, two coats are required. For sealing new concrete, both coats shall be applied full-strength. On aged concrete, when renovating, dust proofing and sealing, the first coat should be thinned per manufacturer's directions.

3.03 APPROVAL OF FINISHES

A. All concrete surfaces, when finished, will be inspected by the Engineer.

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

C. After finishing horizontal surfaces, regardless of the finishing procedure specified, the concrete shall be cured in compliance with Section 03300, Cast in place concrete, unless otherwise directed by the Engineer.

3.04 SCHEDULE OF FINISHES

A. Concrete shall be finished as specified either to remain as natural concrete to receive an additional applied finish or material under another Section.

B. Concrete for the following conditions shall be finished as noted on the Drawings and as further specified herein:

1. Concrete to receive damproofing: As-cast finish See paragraph 3.01D

2. Concrete not exposed to view and not scheduled to receive an additional applied finish or material: As-cast finish See paragraph 3.01D

3. Exterior vertical concrete above grade exposed to view: Rubbed finish. See paragraph 3.01E

4. Interior vertical concrete exposed to view except in water containment areas: Rubbed finish. See paragraph 3.01E

5. Vertical concrete in Water containment areas: Rubbed finish on exposed surfaces and extending at 2-ft below normal operating water level: As-cast finish on remainder of submerged areas. See paragraph 3.01E and 3.01D

6. Interior and exterior underside concrete exposed to view: Rubbed Finish. See paragraph 3.01E

7. Concrete to be painted: Rubbed finish. See paragraph 3.01E

8. Concrete to receive heavy duty or extra heavy-duty concrete topping: Light broomed finish.

9. Concrete to receive floor sealer: See paragraph 3.02D

10. Concrete slabs noted to receive steel trowel finish: See paragraph 3.02C.

11. Concrete for exterior walks, interior and exterior stairs: Broomed finish perpendicular to direction of traffic. See paragraph 3.02B

12. Interior and exterior horizontal concrete not required or steel trowel finish: Floated finish. See paragraph 3.02A

13. Concrete surfaces to be covered with grout: See paragraph 03600

14. Concrete to receive ceramic tile: Steel trowel

GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The work included in this Section consists of grouting the various items listed hereinafter and indicated on the Drawings.

1.02 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01 33 23, Submittals, showing materials of construction and details of installation for:

1. Commercially manufactured nonshrink cementitous grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.

2. Commercially manufactured nonshrink epoxy grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.

3. Cement grout. The submittal shall include the type and brand of the cement, the gradation of the fine aggregate, product data on any proposed admixtures and the proposed mix of the grout.

4. Concrete grout. The submittal shall include the mix design, constituent quantities per cubic yard and the water/cement ratio.

B. Laboratory Test Reports

1. Submit laboratory test data as required for concrete to be used as concrete grout.

C. Certifications

1. Certify that commercially manufactured grout products and concrete grout admixtures are suitable for use in contact with wastewater after 3 days curing.
2.

D. Qualifications

1. Grout manufacturers shall submit documentation that they have at least 10 years experience in the production and use of the proposed grouts which they will supply.

1.03 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C33 - Specification for Concrete Aggregates

2. ASTM C150 - Specification for Portland Cement

3. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes

4. ASTM C579 - Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes

5. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures

6. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

7. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics.

B. U.S. Army Corps of Engineers Standard (CRD)

1. CRD C-621 - Corps of Engineers Specification for Nonshrink Grout

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

A. Qualifications

1. The Contractor shall submit certification documents showing that application Contractor have at least 3 years experience in the use of the proposed grouts which they will use.

B. Pre-installation Conference

1. Well in advance of grouting, hold a pre-installation meeting to review the requirements for surface preparation, mixing, placing and curing procedures for each product proposed for use. Parties concerned with grouting shall be notified of the meeting at least 10 days prior to its scheduled date.

C. Services of Manufacturer's Representative

1. A qualified field technician of the nonshrink grout manufacturer, specifically trained in the installation of the products, shall attend the pre-installation conference and shall be present for the initial installation of each type of nonshrink grout. Additional services shall also be provided, as required, to correct installation problems.

D. Field Testing

1. All field testing and inspection services required shall be provided by the Contractor using an independent third-party test lab. The Contractor shall sample the materials and shall provide any ladders, platforms, etc, for access to the work. The methods of testing shall comply in detail with the applicable ASTM Standards.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.

B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.

D. Nonshrink cement-based grouts shall be delivered as preblended, prepackaged mixes requiring only the addition of water.

E. Nonshrink epoxy grouts shall be delivered as premeasured, prepackaged, three component systems requiring only blending as directed by the manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Nonshrink Cementitious Grout

1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be portland cement based, contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

   a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by Master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by The Euclid Chemical Co.; NBEC Grout by U. S. Grout Corp. or equivalent.

   b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Corp.; Supreme Grout by Gifford Hill & Co.; Five Star Grout by U. S. Grout Corp. or equivalent.

B. Nonshrink Epoxy Grout

1. Nonshrink epoxy-based grout shall be a pre-proportioned, three component, 100 percent solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 14,000 psi in 7 days when tested in conformity with ASTM D695 and have a maximum thermal expansion of 30×10^{-6} when tested in conformity with ASTM C531. The grout shall be Ceilcote 648 CP by Master Builders Inc.; Five Star Epoxy Grout by U.S. Grout Corp.; Sikadur 42 Grout-Pak by Sika Corp.; High Strength Epoxy Grout by the Euclid Chemical Co. or equivalent.

C. Cement Grout

1. Cement grouts shall be a mixture of one part portland cement conforming to ASTM C150, Types I, II, or III and 1 to 2 parts sand conforming to ASTM C33 with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

D. Concrete Grout

1. Concrete grout shall be proportioned with cement, pozzalan (below the water line), coarse and fine aggregates, water, water reducer and air entraining agent to produce a mix having an average strength of 2500 psi at 28 days, or 2500 psi nominal early strength. Coarse aggregate size shall be 3/8-in for small repair or 1/2-in maximum large repair. Slump should not exceed 5-in and should be as low as practical yet still retain sufficient workability.

2. Synthetic reinforcing fibers shall be added to the concrete grout mix at the rate of 1.5 lbs of fibers per cubic yard of grout. Fibers shall be added from the manufacturer's premeasured bags and according to the manufacturer's recommendations in a manner which will ensure complete dispersion of the fiber bundles as single monofilaments within the concrete grout.

E. Water

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

PART 3 - EXECUTION

3.01 PREPARATION

A. Grout shall be placed over cured concrete which has attained its full design strength unless otherwise approved by the Engineer.

B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may effect the bond or performance of the grout.

C. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance and firmly embedded into the parent concrete.

1. Air compressors used to clean surfaces in contact with grout shall be the oilless type or equipped with an oil trap in the air line to prevent oil from being blown onto the surface.

D. Remove all loose rust, oil or other deleterious substances from metal embedments or bottom of baseplates prior to the installation of the grout.

E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker

hose, flooding the surface, or other method acceptable to the Engineer. Upon completion of the 24 hour period, visible water shall be removed from the surface prior to grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the Engineer for each specific location of grout installation.

F. Epoxy-based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.

G. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.

1. Forms for epoxy grout shall be designed to allow the formation of a hydraulic head and shall have chamfer strips built into forms.

H. Level and align the structural or equipment bearing plates in accordance with the structural requirements and the recommendations of the equipment manufacturer.

I. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks or other approved means. The shims, wedges and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the Engineer.

3.02 INSTALLATION - GENERAL

A. Mix, apply and cure products in strict compliance with the manufacturer's recommendations and this Section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of the foundation plate, supporting concrete, and grout between 60 and 90 degrees F during grouting and for at least 24 hours thereafter or as recommended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of baseplates and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.

E. Install grout in a manner which will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.

F. Reflect all existing underlying expansion, control and construction joints through the grout.

3.03 INSTALLATION - CEMENT GROUTS AND NONSHRINK CEMENTITIOUS GROUTS

A. Mix in accordance with manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures without prior approval by the Engineer.

B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Pre-wet the mixer and empty excess water. Add premeasured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3-in in depth shall include the addition of clean, washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix (retemper) after initial stiffening.

F. Just before the grout reaches its final set, cut back the grout to the substrate at a 45 degree angle from the lower edge of bearing plate unless otherwise approved by the Engineer. Finish this surface with a wood float (brush) finish.

G. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.04 INSTALLATION - NONSHRINK EPOXY GROUTS

A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener and aggregate.

B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.

C. Place grout into the designated areas in a manner which will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

D. Minimize "shoulder" length (extension of grout horizontally beyond base plate). In no case shall the shoulder length of the grout be greater than the grout thickness.

E. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.

F. Epoxy grouts are self curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.05 INSTALLATION - CONCRETE GROUT

A. Screed underlying concrete to the grade shown on the Drawings. Provide the surface with a broomed finish, aligned to drain. Protect and keep the surface clean until placement of concrete grout.

B. Remove the debris and clean the surface by sweeping and vacuuming of all dirt and other foreign materials. Wash the tank slab using a strong jet of water. Flushing of debris into tank drain lines will not be permitted.

C. Saturate the concrete surface for at least 24 hours prior to placement of the concrete grout. Saturation may be maintained by ponding, by the use or soaker hoses, or by other methods acceptable to the Engineer. Remove excess water just prior to placement of the concrete grout. Place a cement slurry immediately ahead of the concrete grout so that the slurry is moist when the grout is placed. Work the slurry over the surface with a broom until it is coated with approximately 1/16 to 1/8-in thick cement paste. [(A bonding grout composed of 1 part portland cement, 1.5 parts fine sand, an approved bonding admixture and

water, mixed to achieve the consistency of thick paint, may be substituted for the cement slurry.)]

D. Place concrete grout to final grade using the scraper mechanism as a guide for surface elevation and to ensure high and low spots are eliminated. Unless specifically approved by the equipment manufacturer, mechanical scraper mechanisms shall not be used as a finishing machine or screed.

E. Provide grout control joints as indicated on the Drawings.

F. Finish and cure the concrete grout as specified for cast-in-place concrete.

3.06 SCHEDULE

A. The following list indicates where the particular types of grout are to be used:

1. General purpose nonshrink cementitious grout: Use at all locations where non shrink grout is called for on the plans except for base plates greater in area than 3-ft wide by 3-ft long and except for the setting of anchor rods, anchor bolts or reinforcing steel in concrete.

2. Flowable nonshrink cementitious grout: Use under all base plates greater in area than 3-ft by 3-ft. Use at all locations indicated to receive flowable nonshrink grout by the Drawings. The Contractor, at his/her option and convenience, may also substitute flowable nonshrink grout for general purpose nonshrink cementitious grout.

3. Nonshrink epoxy grout: Use for the setting of anchor rods, anchor bolts and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.

4. Cement grout: Cement grout may be used for grouting of incidental base plates for structural and miscellaneous steel such as post base plates for platforms, base plates for beams, etc. It shall not be used when nonshrink grout is specifically called for on the Drawings or for grouting of primary structural steel members such as columns and girders.

5. Concrete grout: Use for overlaying the base concrete to allow more control in placing the surface grade.

STRUCTURAL

ALUMINUM

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The work under this Section includes fabrication and erection of structural aluminum, as shown on the Drawings and specified herein.

B. Related Work:

1. Division 01: General Requirements

2. Section 05 52 00: Aluminum Handrails and Railings.

1.02 QUALITY ASSURANCE

A. Standards: Unless otherwise specified, all materials, workmanship and practices shall conform to the following Standards:

1. Florida Building Code.

2. Aluminum Construction Manual, Latest Edition, by the Aluminum Association.

B. Qualifications: Fabrication and erection shall be by a qualified fabricator and erector approved by the Engineer. Preparation of shop drawings shall not begin until the fabricator and erector have been approved.

1.03 SUBMITTALS

A. Materials and Shop Drawings: Complete shop drawings, including material lists, fabrication and erection drawings shall be submitted for review in conformance with Division 01 – General Requirements and Section 01 33 23 – Submittals. Fabrication shall not be approved until the submission has been approved.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Standard Shapes, Bars & Plates:

1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

2. ASTM B308 - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

B. Standard Threaded Fasteners:

1. Aluminum Bolts Alloy 2024-T4.

2. Aluminum Nuts Alloy 6063-T6.

C. Welding Electrodes: 4043 filler metal.

D. Checkered Plate:

1. All checkered plates shall be aluminum, mill finish, and designed for a live load of 100 pounds per square foot of the gross projected area, with the limits for deflections as specified in Federal Specification RR-G-6610.

2. Checkered plates shall be standard pattern non-slip plates of minimum 3/8 inch thickness and sizes shown on the Drawings. Stiffener angles (aluminum) shall be provided as required to meet the superimposed live load requirements specified above. All checkered plate sections shall be cut to the dimensions shown on the Drawings. Flush type lifting handles shall be provided for each plate, unless otherwise noted on the Drawings.

3. Plate shall be 6063-T6 alloy aluminum. Raised lugs shall be diamond shaped and have an angled and opposed pattern.

2.02 FABRICATION

A. Fabrication shall be in accordance with the specified standards. Splices not indicated on the Drawings will not be permitted.

B. Surface Treatment: Treatment is required only if indicated on the Drawings. (Engineer coordinates with Designer)

PART 3 - EXECUTION

3.01 ERECTION

A. Erection shall be in accordance with the specified standards and as indicated on the Drawings.

B. Welding: Welding on aluminum shall be performed by the Gas Metal Arc (MIG) or Gas Tungsten Arc (TIG) process, per the AWS Welding handbook.

C. Painting: No painting is required.

D. Where the contact of dissimilar metals may cause electrolysis or where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be separated using not less than one (1) coat of zinc chromate primer and one (1) heavy coat of aluminum pigmented asphalt paint on each surface; or where deemed necessary by the Engineer, not less than one (1) course of asphalt saturated cotton fabric cemented to both metals with flashing cement, shall be used. Finished works shall be cleaned and excess cement removed.

MISCELLANEOUS

METAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install all miscellaneous metal complete as shown on the Contract Drawings and as specified herein.

B. Related Work Specified Elsewhere:

1. Division 01: General Requirements
2. Section 03250: Concrete Joints and Accessories
3. Division 09: Finishes
4. Division 11: Equipment
5. Division 15: Mechanical
6. Equipment anchor bolts are included in the respective Sections of Divisions 11 and 15.

1.02 QUALITY ASSURANCE

A. Standards: Design, manufacturing and assembly of elements of the products herein specified shall be in accordance with, but not limited to, published standards of the following as applicable:

1. Aluminum Association (AA)
    a. AA M31C22A41
        (1) M31: Mechanical Finish, Fine Satin
        (2) C22: Finish, Medium Matte
        (3) A41: Clear Anodic Coating, Class I
2. American Society for Testing and Materials (ASTM)

a. ASTM A36 - Standard Specification for Carbon Structural Steel

b. ASTM A48 - Standard Specification for Gray Iron Castings

c. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

d. ASTM A108 - Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality

e. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

f. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

g. ASTM A167 A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

h. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes

i. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

a. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105-ksi Minimum Tensile Strength

j. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

k.

3.

a. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

b.

4.

a. ASTM A536 - Standard Specification for Ductile Iron Castings

b.

5.

a. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

b.

6.

a. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

b.

7.

a. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

b.

8.

a. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

b.

9.

a. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube

b. ASTM F3125 - High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

10. American Iron and Steel Institute (AISI)

b. Specification for Structural Steel Buildings

11. American Welding Society (AWS)

a. AWS D1.1 - Structural Welding Code Steel

b. AWS D1.2 - Structural Welding Code - Aluminum

12. Federal Specifications

a. FS-FF-B-575C - Bolts, Hexagonal and Square

13. Occupational Safety and Health Administration (OSHA)

14. Florida Building Code (FBC)

15. International Building Code (IBC)

16. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

B. The work of this Section shall be completely coordinated with the work of other Sections and the Contract Drawings. Verify, at the site, both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.

C. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

D. All welding shall be performed by AWS certified welders. Welding of steel shall conform to AWS D1.1 and welding of aluminum shall conform to AWS D1.2.

1.02 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01 33 0023 - Submittals showing materials of construction and details of installation for:

1. Shop drawings showing sizes, finishes, locations, required hardware, and accessories and details for all fabricated metal work, threaded fasteners, and welds. Indicated welds, both shop and field, by symbols conforming to AWS Standards. Shop drawings for continually furnished items will be waived provided the Contract submits a letter naming the manufacturer who will furnish these items and provide this manufacturer has on file with the Engineer a certified standard drawing containing in the information specified above and herein which has been approved by the Engineer.

2. Setting diagrams, erection plans, templates, and directions for the installation of backing plates, anchors, and other items.

PART 2 -

1. Catalog descriptions of manufacturers' standard items.

2. Working Drawings and calculations for Contractor design hatches and gratings.

PART 3 -

1. Specific instructions for all phases of installation including bolt hole size, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

2. Samples: submit samples as requested by the Engineer during the course of construction.

3. Design Data:

   a. Submit signed and sealed calculations or test data by Professional Engineer licensed in the State of Florida demonstrating that the railings will resist the loads specified in the Florida Building Code, latest edition

   b. Submit manufacturer's load and deflection tables for grating.

4. Test Reports:

   a. Certified copy of mill test reports on each aluminum proposed for use showing the physical properties and chemical analysis.

5. Certificates:

   a. Submit certification that the railing system is in compliance with OSHA requirements and the Florida Building Code, latest edition

   b. Submit certificates that welders have been qualified under AWS, within the previous 12 months, to perform the welds required under this Section.

3.02 DELIVERY, STORAGE AND HANDLING

A. Identify and match mark, if applicable, all materials, items, and fabrications for installation or field assembly

B. Wherever practicable, deliver items to the site as complete units, ready for installation with all anchors, hangers, fasteners, and miscellaneous metal items needed for installation included.

C. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation.

PART 4 -

A. Provide adequate storage facilities at the site for the protection and storage of all delivered materials. Handle and store in such a manner as to not damage factory finishes.

PART 5 -

A. Repair items which have become damage or corroded to the satisfaction of the Engineer prior to incorporating them into the work as not additional cost to the Owner.

5.02 PROJECT/SITE REQUIREMENTS

A. Field measurements shall be taken at the site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items. Measurements shown in the Contract Drawings or provided in these Project Specification shall be field verified prior to fabrication and final installation of items.

PART 6 - PRODUCTS

6.01 GENERAL

A. The use of manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

B. Like items of materials shall be the end products of one (1) manufacturer in order to provide standardization for appearance, maintenance and manufacturer's service.

6.02 MATERIALS

A. Unless otherwise noted, materials for miscellaneous metals shall conform to the following standards:

1.	Structural Steel	ASTM A36
2.	Structural Steel Tubing	ASTM A500, Grade B
3.	Welded and Seamless ASTM A53,	ASTM A501 or Steel Pipe Type E or S, Grade B Schedule 40. Use standard malleable iron fittings, galvanized for exterior work
4.	Steel Sheets	ASTM A366
5.	Gray Iron Castings	ASTM A48, Class 35

6. Ductile Iron Castings — ASTM A536, Grade 65-45-12

PART 7 -

1. Aluminum Extruded Pipe — ASTM B429, Alloy 6063 T6
2. Aluminum Extruded Shapes — ASTM B221, Alloy 6061 T6
3. Aluminum Sheet and Plate — ASTM B209, Alloy 6061 T6
4. Stainless Steel Plates, Sheets,
5. and Structural Shapes

   a. Exterior, Submerged or Industrial Use — ASTM A240 A167,
   b. Type Industrial Use 316 (Type 316L for welded)
   c. Interior and Architectural Use — ASTM A240 A167, Type 304

6. Stainless Steel Bolts — ASTM A276, Type 316 Nuts, and Washers
7. Carbon Steel Bolts and Studs — ASTM A307, Grade A (hot dip galvanized nuts and washers where noted)
8. High Strength Steel Bolts, Nuts and Washers — ASTM F3125 (mechanically ASTM A325 (mechanically Nuts and washers galvanized per ASTM B695, Class 5 50, where noted)

   a. Elevated Temperature Exposure — Type I Exposure
   b. General Application — Type I or Type II

9. Galvanizing — ASTM A123,
10. Zn w/0.5 percent minimum Ni
11. Galvanizing, hardware — ASTM A153,
12. Zn w/0.5 percent minimum Ni

7.02 ANCHORS, BOLTS AND FASTENING DEVICES

A. Anchor bolt material shall be ASTM A307 unless otherwise noted.

B. Unless otherwise noted, bolts for the connection of carbon steel or iron shall be steel machine bolts; bolts for the connection of galvanized steel or iron shall be galvanized steel or stainless steel machine bolts; and bolts for the connection of aluminum or stainless steel shall be stainless steel machine bolts.

C. Unless otherwise noted, expansion anchors shall be zinc plated carbon steel wedge type anchors complete with nuts and washers. Type 316 stainless steel, wedge type anchors shall be used where they will be submerged or exposed to the weather or where stainless steel wedge type anchors are required. When the length or embedment of the bolt is not noted on the Contract Drawings, provide length sufficient to place the wedge and expansion sleeve portion of the bolt at least 1-inch behind the concrete reinforcing steel. Expansion anchors shall be Hilti, Kwik-bolt II; ITW Ramset; Redhead trubolt, or equivalent approved by the Engineer.

D. Compound masonry expansion anchors shall be lead expansion sleeve type anchors complete with nuts and washers. Anchors shall be precision die-cast zinc alloy with a minimum of two (2) lead alloy expansion sleeves. When the length or embedment of the bolt is not noted on the Contract Drawings, provide length sufficient to place the wedge and expansion sleeve portion of the bolt at least 1-inch behind the concrete reinforcing steel. Expansion anchors shall be Star Expansion Industries, Star Slugin, or equivalent approved by the Engineer.

E. Adhesive capsule anchors shall be a two-part stud and capsule chemical resin anchoring system. Capsules shall contain premeasured amounts of polyester or vinyl ester resin, aggregate and a hardener contained in a separate vial within the capsule. Stud assemblies shall consist of an all-thread anchor rod with nut and washer. Adhesive capsule anchors shall be Hilti, HVUA Adhesive Anchor; Molly, Parabond; Rawlplug, Rawl Chem-Stud or equivalent approved by the Engineer.

F. Adhesive anchors, for fastening to hollow concrete block or brick, shall be a three-part stud, screen and chemical dispenser anchoring system. Adhesive cartridges shall contain premeasured amounts of resin and hardener which are mixed and deposited in a screen tube by a dispenser. Stud assemblies shall consist of an all-thread anchor rod with nut and washer. Anchors shall be Hilti, HIT C-20 System, or equivalent approved by the Engineer.

G. Automatic end welded headed anchor studs shall be flux ended studs made from cold drawn steel, ASTM A108 Grades C-1010 through C-1020. Headed anchor studs shall be Nelson, H4L Headed Concrete Anchors, or equivalent approved by the Engineer

H. Machine bolts and nuts shall conform to Federal Specification FF-B-575C. Bolts and nuts shall be hexagon type. Bolts, nuts, screws, washers and related appurtenances shall be Type 316 stainless steel.

I. Toggle bolts shall be Hilti, Toggler Bolt or equivalent.

7.03 METAL GRATING

A. Grating shall have rectangular, 3/16-inch thick, bearing bars spaced 1-3/16-inch on center with cross bars spaced at 4-inch on center. All grating panels shall be banded with a bar the same size as the bearing bars.

1. Grating shall not exceed the fabricator's maximum recommended span, and meet or exceed the following load and deflection criteria for the maximum span length at the opening being covered by the grating.

a. The grating shall produce a deflection of 1/360 of the span or less under a uniform live load of 100-psf on the maximum span.

b. The grating shall produce a deflection of 1/360 of the span or less under a concentrated live load of 300-lbs applied at the mid point of the maximum span.

2. Openings 2-inch or greater in diameter/dimension and grating edges shall be banded with a bar of the same depth and thickness as the bearing bars. Cut bearing bars or cross bars shall be welded to the banding bar.

3. Provide trench grating with symmetrical cross bar arrangement.

4. Grating clamps, nuts, bolts, washers and other fastening devices for grating and grating supports shall be Type 316 stainless steel. All grating shall be anchored to the supporting system using saddle clips.

B. Aluminum grating material shall be aluminum alloy 6063-T6 with an anodized finish. Cross bars shall be attached to the bearing bars with interlocked swaged joints. The grating shall be Type BS by Harsco Industrial IKG Borden, Houston, TX; Type 19 SG-4 by Ohio Gratings, Inc., Canton, OH; Type 19S4 by Seidelhuber Metal Products, San Carlos, CA or equivalent.

C. Metal frames and supports for grating shall be of the same material as the grating unless otherwise shown on the Contract Drawings. Where aluminum supports are used, they shall be fabricated from aluminum alloy 6061-T6.

7.04 RAILINGS

A. Handrail and railing systems shall comply with the requirements of OSHA and FBC.

B. Aluminum railing and handrail shall be a welded or mechanically fastened, seamless, extruded aluminum pipe system. Rails shall be 6063-T6 alloy. Posts shall be 6061-T6 alloy. Splice and reinforcing sleeves, brackets, end caps, toeboards, etc, shall be aluminum alloy 6063-T6 or 6061-T6. Cast fittings shall be aluminum alloy No. 214. Railing system fastening hardware shall be Type 304 stainless steel. Aluminum shall have a mill finish. After welding, aluminum shall be anodized. All railing, posts, toeboards and exposed aluminum shall be anodized with an architectural Class I satin finish providing a minimum coating thickness of 0.7 mils and a minimum coating weight of 32 milligrams per square inch in compliance with AA M12C22A41.

C. Railings shall be 2 rail welded railing systems, as shown on the Contract Drawings, fabricated with 1½-inch nominal diameter pipe. Posts shall be Schedule 80 pipe, minimum and rails and handrail shall be Schedule 40 pipe, minimum. Posts and top rails shall be continuous. Spacing of posts shall not exceed 5-foot on center and shall be uniformly spaced except as otherwise shown on the Contract Drawings. Posts will be required on each side of structure expansion joints. All railing posts shall be vertical.

D. Welds shall be circumferential welds ground smooth and even to produce a railing that is neat in appearance and structurally sound. Welding methods shall be in conformity with AWS standards for the materials being joined. All rail to post connections shall be coped and fastened by continuous welds. There shall be no burrs, sharp edges or protrusions on any weld on any part of the handrail system. After fabrication, the welds and surrounding area shall be cleaned and hand buffed to blend with the adjacent finish. All mechanical fasteners shall be unobtrusively located in countersunk holes with the top flush with the surface of the rail. Bends in the railing shall be as indicated by the Contract Drawings. No distortion of the circular railing shape will be allowed. Bends and terminal sections shall be made without the use of fittings. Corner bends shall be mitered and welded bends.

E. Railing shall be assembled in sections as long as practical but shall not be greater than 24-foot in length. A field splice shall be used when an assembled section is to be attached to another section. Field splices shall be used in all railing panels that cross over structure expansion joints.

1. Field splices shall use internal splice sleeves located within 8-inch of railing posts. The sleeve shall be welded to the rail on one side and fastened with a set screw to the rail on other side. The field splice shall be detailed to take the differential expansion between the railing system and the supporting structure.

2. When the field splice occurs in a railing panel crossing a structure expansion joint, the sleeve shall be welded to the rail on one side and be free to slide in the rail on other side. The field splice shall be detailed to take the same movement as the structure expansion joint.

F. The bases or supports for railing posts and handrail shall be the types indicated on the Contract Drawings.

1. Where non-removable railing is set in concrete, the posts shall be placed in 2½-inch diameter formed concrete openings and firmly caulked with a nonsulphur compound, hydraulic cement equivalent to Por-Rok by Minwax Construction Products Division Sterling Drug, Montvale, NJ. Collars shall be placed around the post bases and fastened in place with set screws on the side of the post away from the walkway. Posts shall be placed with the centerline 4-inch from the edge of the concrete except that posts shall be set at the centerline of concrete curbs.

2. Stainless steel and aluminum railing posts, which may collect condensation, shall have a 3/16-inch drain hole drilled immediately above the concrete encased area, the base flange, or supporting socket on the side away from the walking area. The bottom of the rail post between the drain hole and the bottom of the post shall be filled with an inert material such as a compressed closed cell neoprene rod.

3. Where handrail is to be fastened to walls, the rails shall be provided with screwed wall flanges fastened to the walls with three ⅜-inch stainless steel flat head machine screws.

G. Safety gates, for railing openings, shall be fabricated of matching pipe and rail material and configuration. The gates shall be self-closing gates with approved stop, latch and stainless steel closure spring and hinges.

H. Barrier chains, for railing openings, shall be fabricated of stainless steel chains. Chain shall be ¼-inch stainless steel links, with eleven links per foot as manufactured by Eastern Chain Works, Inc., NY; Lawrence Metal Products, Inc. or equivalent. Chains shall be fastened to the handrail posts at the elevation of each rail. One (1) end of each chain shall be connected to one (1) post with a ¼-inch diameter stainless steel eye bolt and the other end shall be connected to the other post by means of a heavy chromium plated bronze swivel eye slide harness snap and a similar eye bolt.

I. Toeboards shall be provided on all railing adjacent to a drop in elevation of 4-feet or more. Toeboards are not required on the inclined portion of stairway railings or where concrete or steel curbs, 4-inch or more in height, are present. Toeboards shall be 4-inch high channels of the same material as the railing. The channels shall have a minimum thickness of ⅛-inch and have flanges of not less than ¾-

inch nor more than 1½-inch in width. Toeboards shall be positioned with a maximum clearance of ¼-inch from the floor and fastened to railing posts with ¼-inch stainless steel U-bolts, with J-bolts at corner posts and with clip angles and two (2) ¼-inch stainless steel expansion bolts at walls.

J. All railings shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed. After protective materials are removed, the surfaces shall be made clean and free from stains, marks, or defects of any kind.

7.05 ACCESS HATCHES

A. Access hatches shall have single or double leaf doors as indicated by the Contract Drawings. The doors shall be 1/4-in aluminum diamond pattern plate with welded stiffeners, as necessary, to withstand a live load of 100 lbs/sq ft with a maximum deflection of 1/150th of the span. Hatches shall have a 1/4-in aluminum channel frame with a perimeter anchor flange or strap anchors for concrete embedment around the perimeter. Unless otherwise noted on the Contract Drawings, use pivot torsion bars for counterbalance or spring operators for easy operation along with automatic door hold open. Hardware shall be durable and corrosion resistant with Type 316 stainless steel hardware used throughout. Provide removable lock handle. Finish shall be the factory mill finish for aluminum doors and frames with bituminous coating on the exterior of the frames in contact with concrete. Hatches shall be watertight and have a 1-1/2-in drainage coupling to the channel frame. Access hatches shall be Types as indicated on the Contract Drawings by Bilco Company, New Haven, CT or equivalent.

7.06 ACCESS HATCHES

7.07

7.08 Access hatches shall have single or double leaf doors as indicated by the Contract Drawings. Unless otherwise noted, the hatches shall be ¼-inch aluminum diamond pattern plate with welded stiffeners, as necessary, to withstand a live load of 300-psf with a maximum deflection of 1/150th of the span. Hatches for lift station wet wells and valve vaults shall be designed for AASHTO H-20 wheel loads. Hatches shall have a ¼-inch aluminum channel frame with a perimeter anchor flange or strap anchors for concrete embedment around the perimeter. Unless otherwise noted on the Contract Drawings, use pivot torsion bars for counterbalance or spring operators for easy operation along with automatic door hold open. Hardware shall be durable and corrosion resistant with Type 316 stainless steel hardware used throughout. Provide removable lock handle. Finish shall be the factory mill finish for aluminum doors and frames with bituminous coating on the exterior of the frames in contact with concrete. Hatches shall be watertight and have a 1½-inch drainage coupling to the channel frame. Access hatches shall be Types as

indicated on the Contract Drawings by Halliday Products, Orlando, FL; Bilco Company, New Haven, CT or equivalent.

7.09

7.10 MISCELLANEOUS ALUMINUM

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Welding shall be on the unexposed side as much as possible in order to prevent pitting or discoloration of the aluminum exposed surface. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Miscellaneous aluminum items shall include: beams, angles, closure angles, grates, hatches, floor plates, stop plates, stair nosings, and any other miscellaneous aluminum called for on the Contract Drawings and not otherwise specified.

D. Angle frames for hatches, beams, grates, etc, shall be complete with welded strap anchors attached.

E. Aluminum diamond plate and floor plate shall have a minimum thickness of ⅜-inch. Frames and supports shall be of aluminum construction. Fastening devices and hardware shall be Type 304 stainless steel. Plates shall have a mill finish.

F. Stair treads for aluminum stairs shall have abrasive non-slip nosing in accordance with OSHA and other applicable standards.

G. Aluminum nosing at concrete stairs shall be Wooster Products, Inc.; Alumogrit Treads, Type 116; similar by Barry Pattern & Foundry Co.; or Peterson Company. Furnish with wing type anchors and flat head stainless steel machine screws, 12-inches O.C. Nosing shall also be used at concrete ladder openings. Nosing shall a single piece for each step extending to within 3-inches at each side of stair or full ladder width. Set nosing flush with stair tread finish at concrete stairs. Furnish treads with heavy duty protective tape cover.

H. Miscellaneous aluminum items shall have a cleaned and degreased mill finish.

7.11 MISCELLANEOUS STEEL

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Miscellaneous steel items shall include: beams, angles, lintels, metal stairs, support brackets, base plates for other than structural steel or equipment, closure angles, bridge crane rails, monorail hoist beams, holddown straps and lugs, door frames, splice plates, subframing at roof openings and any other miscellaneous steel called for on the Contract Drawings and not otherwise specified.

D. Structural steel angle and channel door frames shall be shop coated with primer. Frames shall be fabricated with not less than three (3) anchors on each jamb.

PART 2 -

A. Steel pipe pieces for sleeves, lifting attachments and other functions shall be Schedule 40 pipe unless otherwise shown on the Contract Drawings or specified elsewhere. Wall and floor sleeves, of steel pipe, shall have welded circumferential steel waterstops at mid-length.

B. Lintels, relief angles or other steel supporting masonry or embedded in masonry shall be shop coated with primer.

C. All steel finish work shall be thoroughly cleaned, by effective means, of all loose mill scale, rust and foreign matter and shall be given one shop coat of primer compatible with the finish coat after fabrication but before shipment. Paint shall be omitted within 3-inches of proposed field welds. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces.

D. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Coating shall be not less than 2-oz/sq ft of surface.

E. Interior Metal Stud Wall Framing;
Minimum 16 gauge metal studs for load bearing walls.
Minimum 20 gauge metal studs for non-load bearing walls.
Minimum 16 gauge metal studs for any exterior framed walls.

F. All free standing walls must be braced at the top every 6-foot maximum and every 4-feet minimum.

G. Metal furring shall be fastened maximum of 24-inch O.C. vertically while maintaining 16-inch O.C. spacing.

H. All framing will maintain 16-inch O.C. spacing.

7.12 MISCELLANEOUS STAINLESS STEEL

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability. Holes shall be drilled or punched. Edges shall be smooth and without burrs. Fabricate supplementary pieces necessary to complete each item though such pieces are not definitely shown or specified.

B. Connections and accessories shall be of sufficient strength to safely withstand the stresses and strains to which they will be subjected. Exposed joints shall be close fitting and jointed where least conspicuous. Threaded connections shall have the threads concealed where practical. Welded connections shall have continuous welds or intermittent welds as specified or shown. The face of welds shall be dressed flush and smooth. Grind smooth continuous welds that will be exposed. Provide holes for temporary field connections and for attachment of the work of other trades.

C. Miscellaneous stainless steel items shall include: beams, angles, bar racks and any other miscellaneous stainless steel called for on the Contract Drawings or otherwise specified.

PART 8 - EXECUTION

8.01 INSTALLATION

A. Install all items except those to be embedded in concrete which shall be installed under Division 03. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.

B. Abrasions in the shop primer shall be touched up immediately after erection. Areas left unprimed for welding shall be painted with primer after welding.

C. Zinc coating which has been burned by welding, abraded, or otherwise damaged shall be cleaned and repaired after installation. The damage area shall be thoroughly cleaned by wire brushing and all traces of welding flux and loose or cracked zinc coating removed prior to painting. The cleaned area shall be painted with two (2) coats of zinc oxide-zinc dust paint conforming to the requirements of Military Specifications MIL-P-15145. The paint shall be properly compounded with a suitable vehicle in the ratio of one part zinc oxide to four parts zinc dust by weight.

D. Specialty products shall be installed in accordance with the manufacturer's recommendations.

E. Expansion bolts shall be checked for tightness a minimum of 24 hours after initial installation.

F. Install adhesive capsule anchors using manufacture's recommended drive units and adapters and in compliance with the manufacturer's recommendations.

PART 9 -

A. Headed anchor studs shall be welded in accordance with manufacturer's recommendations.

B. All railings shall be erected to line and plumb.

C. All steel surfaces that come into contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation.

D. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer followed by two (2) coats of aluminum metal and masonry paint to the dissimilar metal.

E. Where aluminum contacts masonry or concrete, apply a heavy coat of approved alkali resistant paint to the masonry or concrete.

F. Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.

G. Between aluminum grating, aluminum stair treads, or aluminum handrail brackets and steel supports, insert ¼-inch thick neoprene isolator pads, 85 plus or minus 5 Shore A durometer, sized for full width and length of bracket or support.

METAL STAIRS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: This section is intended to include shop fabrication of aluminum stairs complete with anchors and brackets, shop primed ready for site applied finish, including integral handrails and balusters when applicable.

B. Related Work Described Elsewhere:

1. Divison 01: General Requirements
2. Section 05 14012 00: Structural Aluminum
3. Section 05 50 130: Miscellaneous Metal
4. Section 09 96 00: Painting and Coating

1.02 QUALITY ASSURANCE

A. Standards:

1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. Aluminum Association, Designation System for Aluminum Finishes.
3. AWS Dl.l - Structural Welding Code.
4. Florida Building Code, Latest Edition.

1.03 SUBMITTALS

A. Materials and Shop Drawings:

1. Submit the Shop Drawings in accordance with Division 01 – General Requirements and Section 01 33 2340 - Shop Drawings, Working Drawings, and SampleSubmittals.

2. Indicate construction details, sizes of metal sections, thicknesses of metals, profiles, attachments, dimensions and field joints, method of support from structure, work to be built-in or provided by other Sections and finishes.

3. Samples: Two (2) pieces, each 8 inches square in area, of each type finished material.

4. Indicate welded connections, both shop and field, using standard AWS welding symbols. Indicate net weld lengths.

5. Certificates: Manufacturer's certification that materials meet specification requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. Verify dimensions on site prior to shop fabrication.

B. Fabricate stairs, landings, and component connections to support live loads of minimum 100 pounds per square foot (psf) with deflection of stairs and landings not exceeding 1/360 of span.

C. Fabricate integral railings and component connections capable of resisting lateral forces as indicated by the Standard Building Code.

D. Shop assemble sections in largest practical sizes, easily handled through building openings.

E. Accurately form and fit components and connections. Grind exposed edges and welds smooth and flush.

F. Accurately form components required for proper anchorage of stairs and landings to each other and to building structure.

2.02 MATERIALS

A. Steel: See Section 11100. Components:

1. Aeration tank bridge deck and stair treads: Aluminum.

21. All other bridge components, stairs and railings: Galvanized Steel.

B. Aluminum: ASTM B221, Alloy 6063, Finish AA-C 22A31. Components:

1. Stringers: Aluminum.

2. Headers: Aluminum.

3. Risers: Aluminum.

4. Railings: Aluminum.

5. Handrails: Aluminum.

C. Primer shall be as specified in Section 09900 – Painting and Coating.

CD. All bolts, nuts and washers used to fabricate the stairs will be SST.

2.03 FABRICATION OF OPEN GRATING STAIRS (AND LANDINGS)

A. Fabricate stairs with open risers with treads of open gratings.

B. Treads: Minimum 1/4 inch thick by 1-1/2 inches deep by width of stair.

C. Properly secure treads to stringers, bolt in place.

D. Form stringers of channels. Weld fascial plates of minimum 14-gauge sheet stock across channel toes.

E. Landings same as treads, minimum ¼-inch thick by 1-1/2-inch deep grating. Reinforce underside of landings with angle T's.

PART 3 - EXECUTION

3.01 ERECTION

A. Erect stairs square, level, plumb and free from distortion or defects detrimental to appearance and performance.

B. Provide necessary anchors, plates, angles, hangers, and struts as required for connecting stairs to the structure. Stair assembly to be securely fastened to structure such that no swaying or other distortion of the assembly will occur.

C. Ensure alignment with adjacent construction. Coordinate with related work to ensure no interruption in installation.

D. Perform necessary cutting and altering for the installation of work of other Sections. Do not perform any other additional cutting without review of the Engineer.

E. Field bolt and weld to match standard of shop bolting and welding. Hide bolts and screws whenever possible. Where not hidden, use flush countersunk fastenings, unless indicated otherwise. Make mechanically fastened joints flush hairline butted. Grind welds smooth and flush.

ALUMINUM HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. This Section includes providing all labor, materials and equipment necessary to fabricate and install aluminum railings and accessories. All handrails shall consist of two (2) horizontal rails.

B. Related Work Described Elsewhere:

1. Division 01: General Requirements

2. Section 05 50 013: Miscellaneous Metal

3. Section 05 14 00: Structural Aluminum

1.02 QUALITY ASSURANCE

A. Standards:

1. Occupational Safety and Health Administration Standards, latest edition.

2. Florida Building Code (design standards may exceed OSHA Design Standards).

1.03 SUBMITTALS

A. Materials and Shop Drawings: Shop drawings for aluminum railings and accessories shall be submitted for review in conformance with Division 01 – General Requirements and Section 01 33 2340 – Shop Drawings, Working Drawings, and SampleSubmittals.

1.04 DELIVERY AND STORAGE

A. Deliver packaged materials to the site in manufacturer's original, unopened containers. Arrange deliveries to provide sufficient quantities to permit continuity of erecting of any phase of work.

B. Store to prevent damage to materials or structure. Cover handrails in protective polyethylene wrap to avoid damage to the anodized finish.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The aluminum railing shall be equivalent to either one (1) of the following specifications, or an approved equivalent:

1. Aluminum railing equivalent to the system produced by CV pipe rail, CraneVeyor Corporation, South El Monte, California. All rails, posts and formed elbows shall be extruded aluminum tube, alloy 6063-T6. Splice and reinforcing sleeves shall be drawn aluminum tubing alloy 6063-T832. Brackets, end caps, toe boards and other fittings shall be extruded aluminum alloy 6063-T5. Fasteners, where used, shall be per "C-V Pipe Rail" standard details and shall be a Type 300 stainless steel. All exposed aluminum shall be anodized with a clear architectural Class I satin finish. The anodic coating shall be a minimum thickness of 0.7 mil and a minimum coating weight of 32 milligrams per square inch, in accordance with the Aluminum Association Designation AA-M12C22A41. Posts, gates, brackets and other fittings shall be anodized after fabrication. Post and rail diameter shall be as shown on the Drawings.

2. Aluminum railing equivalent to the system produced by C/S Rigid Rail 111, Construction Specialties, Inc., Alumaguard Corp., Denver, Colorado, or equivalent. All rails and posts shall be a special anodizing quality 6063 extruded schedule 40 aluminum pipe with special tolerances to accept machined components. All other aluminum parts shall be fabricated from 6063 or 6061 extruded aluminum. All fittings, except bases, shall be a one piece extrusion machined to final shape. All components shall be attached to the rails and posts by use of stainless steel blind rivets and self-tapping screws. Mounting hardware shall be Type 300 stainless steel. All aluminum railing and components shall receive a 215Rl clear anodize finish, minimum 0.7 mil coating. Post and rail diameter shall be as shown on the Drawings (Engineer coordinate with Designer).

B. Chains at openings greater than 21 inches between sections of railing will not be allowed. Contractor to provide either a removable section of handrail at these areas or fabricate a hinged gate with locking hasp.

C. Aluminum kickplates where not specifically called for on the Drawings shall be furnished and installed typically at the edges of all elevated walkways. Kickplates shall be 1/4 inch angle or plate stock (depending on the specific walkway edge detail) meeting OSHA requirements and shall project 4 inches above walkway surface. Kickplates shall not infringe on minimum required

walkway width and material must be same as that of the railing construction. Kick plates shall not interfere with the removal of grating panels.

PART 3 - EXECUTION

3.01 FABRICATION

A. Insofar as possible, fabricated material shall be fitted and shop assembled ready for erection. Welding and equipment shall conform to American Welding Society's Code for Welding in Building Construction, latest edition. All work shall be square, plumb and true, accurately fitted with tight joints and intersections. Exposed work shall be finished smooth with welds ground smooth. The completed work shall conform to both OSHA Standards and the Standard Building Code. (Standard Building Code requires three horizontal rails).

3.02 ERECTION

A. Installation: Where the contact of dissimilar metals may cause electrolysis and where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be separated using not less than one (1) coat of zinc chromate primer and one (1) heavy coat of aluminum pigmented asphalt paint on each surface; or where deemed necessary by the Engineer, not less than one (1) course of asphalt saturated cotton fabric cemented to both metals with flashing cement, shall be used. Finished works shall be cleaned and excess cement, shall be used. Finished works shall be cleaned and excess cement removed. All work shall be adequately anchored in place at proper elevations, planes and locations.

ALUMINUM GRATING SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Furnish all labor, materials, and incidentals required to install the aluminum grating, the structural members supporting the grating and the angles, connections, fastenings and concrete inserts attached to or supporting the grating, or those structural members as shown on the Drawings, or specified herein.

B. Related Work:

1. Division 01: General Requirements

2. Items specified in this Sections which are to be embedded in concrete are to be furnished as part of the work of this Section, but their installation is a part of the work in Division 03 - Concrete.

1.02 STANDARDS

A. Unless otherwise indicated, all materials, workmanship and practices shall meet all requirements and recommendations of the following standards:

1. Metal Bar Grating Manual - 1974 of the National Association of Architectural Metal Manufacturers.

2. Aluminum Construction Manual, Section 3, third edition 1975 of the Aluminum Association.

1.03 SUBMITTALS

A. Complete fabrication and erection drawings showing all components of the aluminum grating system shall be submitted for review in conformance with Division 01 – General Requirements and Section 01 3340 23 - Shop Drawings, Working Drawings, and SamplesSubmittals. Fabrication shall not begin until Engineer's review is complete.

PART 2 - PRODUCTS

2.01 ALUMINUM GRATING

A. Configuration: Grating shall be pressure locked aluminum having I shaped bearing bars spaced at 1-3/16 inches on centers and sized as indicated on the Drawings. Cross bars shall be spaced at 4 inches on centers. All grating surfaces shall be "slip-resistant" serrated type.

B. Material: Bearing bars shall be of extruded aluminum meeting all requirements of ASTM B-221-76, alloy 6061-T6 or 6063-T6. Cross bars shall be drawn or extruded aluminum meeting all requirements of ASTM B-210-76 or B-221-76.

C. Anchors shall be galvanized steel saddle clips.

D. Fabrication shall meet all requirements of the NAAMM Metal Bar Grating Manual. Finish shall be mill finish.

E. Aluminum Grating System shall be designed for a uniform live load of 100 pounds per square foot of gross projected area and a concentrated load of 300 lbs with with deflection not-to-exceed 1/360 180 of span.

2.02 ALUMINUM SHAPES

A. Configuration: Shapes shall be as indicated on the Drawings and as detailed in Section 3 of the Aluminum Construction Manual.

B. Material: Shapes shall meet all requirements of ASTM B-209 or B-308 for alloy 6061 T6.

2.03 ALUMINUM FASTENINGS

A. Aluminum fasteners shall not be permitted. All connections of aluminum to aluminum shall be stainless steel as required under Paragraph 2.05, herein.

2.04 STAINLESS STEEL SHAPES

A. Members supporting FRP aluminum grating or members embedded in concrete at the Pretreatment Structure shall be stainless steel plate AISI Type 304 formed as indicated. Anchor straps shall be stainless steel shop welded to the stainless steel shapes.

2.05 STAINLESS STEEL FASTENINGS

A. A. Connections of stainless steel to aluminum or concrete shall be stainless steel bolts of AISI Type 316. Nuts shall be AISI Type 430 stainless steel.

PART 3 - EXECUTION

3.01 FIELD INSPECTION

A. Prior to beginning installation, a thorough investigation shall be made of the structure to receive the system to insure that the system can be installed to the indicated alignment. Installation shall not be started until that surface is satisfactory.

3.02 INSTALLATION

A. The aluminum grating system shall be installed as indicated on the Drawings and Shop Drawings.

PAINTING AND

COATING

PART 1 - GENERAL

1.01 SCOPE

A. This specification defines the methods of surface preparation, coating systems, and methods of application for painting as outlined herein.

B. The work includes painting/coating and finishing of interior and exterior exposed items above and below grade surfaces, such as structural steel, miscellaneous metals, ceilings, walls, floors, doors, frames, pipe, handrails, posts, fittings, valves, pumps, tanks, equipment, and other work required to be painted/ coated unless otherwise specified herein. The omission of minor items in the schedule of work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the specification as stated herein.

C. The Contractor shall furnish all supervision, labor, tools, materials, equipment, scaffolding or other structures, and supervision required for the transportation, unloading, storage, and application of the paint/coating and associated products covered by this specification.

D. The Contractor or subcontractor shall be certified and licensed for painting/coating and shall have a minimum of 5 years of experience of similar projects in the State of Florida.

E. The Contractor shall perform surface preparation and application of the painting/ coating strictly as specified herein or recommended by the Painting/Coating Manufacturer or the Manufacturer's Representative for each item as specified herein or elsewhere.

F. The following items will not be painted/coated:

1. Any code requiring labels, such as Underwriters' Laboratories (UL) and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.

2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.

3. Aluminum handrails, walkways, windows, louvers, and grating unless otherwise specified herein or elsewhere.

4. Signs and nameplates.

5. Finish hardware.

6. Stainless steel angles, tubes, pipe, etc.
7. Products with polished chrome, aluminum, nickel, or stainless steel finish.

8. Plastic switch plates and receptacle plates.

9. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.

10. Sprinkler heads.

G. All work shall be done in strict accordance with this specification, Contract Documents, and the painting package, including manufacturer's printed instructions.

H. The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules, and regulations promulgated by authorities having jurisdiction, which may bear on the work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970."

I. Surfaces to be painted: (Refer to Section 2.12 Coating Systems Schedule for description of surfaces to be painted/coated, preparation, and their specified coating systems and colors).

1.02 DEFINITIONS

A. Field Painting: Painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.

B. Shop Painting: Painting of new or rebuilt items in the shop prior to delivery to the jobsite.

C. Abbreviations and Terms:

1. SSPC - Society for Protective Coatings

2. ASTM - American Society of Testing Materials

3. NACE - National Association of Corrosion Engineers

4. NSF - National Sanitation Foundation (Standard 61)

5. AWWA - American Water Works Associates (AWWA D102-14)

6. ICRI - International Concrete Repair Institute

7. CSP - Concrete Surface Profile (1-9)

8. Exterior - outside, exposed to weather

9. Interior Dry - inside, not subject to immersion service

10. Interior Wet - inside, subject to immersion service

1.03 RESOLUTION OF CONFLICTS

A. It shall be the responsibility of the Contractor to arrange a meeting prior to the start of painting/coating between the Contractors, the Painting/Coating Manufacturer, whose products are to be used, City, and Engineer. All aspects of surface preparation, application and coating systems as specified herein will be reviewed at this meeting.

B. Clarification shall be requested promptly from the Engineer when instructions are lacking, conflicts occur in the specification, or the procedure seems improper or inappropriate for any reason.

C. It shall be the responsibility of the Painting/Coating Manufacturer to have their factory representative meet in person with the Contractor and Engineer a minimum of three (3) times during the job as a consultant on surface preparation, mil thickness of coating and proper application of coating unless meeting is determined to be unnecessary by the Engineer.

1.04 INSPECTION OF SURFACES

A. Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the Engineer. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.

B. Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the Engineer.

C. When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the Painting/Coating Manufacture or their factor representative, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of manufacturer's printed instructions shall be adhered to.

D. Coating thickness shall be determined by the use of a properly calibrated "Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG202 "Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "tooke" gauge is classified as a destructive test. Thickness testing shall be performed in the presence of the Engineer.

1.05 EQUIPMENT

A. Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practical from the compressor.

B. All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the Painting/Coating Manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials specified herein are manufactured by the Tnemec Company, Inc. or Carboline Company. These products are specified to establish standards of quality and are approved for use on this project. No alternatives or substitutions will be acceptable.

B. All coatings to be shop applied must meet the requirements for volatile organic compounds (VOC) of not more than 3.5-lbs/gallon after thinning.

C. Colors, where not specified, shall match as close as possible to the existing color of the existing facilities or as selected by the City or Engineer.

D. All coatings in contact with potable water need to be NSF Certified in accordance with NSF Standard 61.

2.02 SURFACE PREPARATION

A. The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Steel Structures Painting Council's Surface Preparation Specification, unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

B. Standards for Surface Preparation:

SSPC-SP1 Chemical and/or Solvent Cleaning
Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter, and contaminants, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.

SSPC-SP2 Hand Tool Cleaning
Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by hand chipping, scraping, sanding, and wire brushing.

SSPC-SP3 Power Tool Cleaning
Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by power tool chipping, descaling, sanding, wire brushing, and grinding.

SSPC-SP4 Flame Cleaning
Dehydrating and removal of rust, loose mill scale, and some light mill scale by use of flame, followed by wire brushing.

SSPC-SP5 (NACE-1) White Metal Blast Cleaning
Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.

SSPC-SP6 (NACE-3) Commercial Grade Blast Cleaning
Complete removal of all dirt, rust scale, mill scale, foreign matter, and previous coatings, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66 percent (66%) of each square inch of surface area is to be free of all visible residues, except slight discoloration.

SSPC-SP7 (NACE-4) Brush-Off Blast Cleaning
Removal of rust scale, loose mill scale, loose rust, and loose coatings, leaving tightly bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils, and solid contaminants. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bug holes, air pockets, and other subsurface irregularities, but so as not to expose underlying aggregate.

SSPC-SP8 Pickling
Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).

SSPC-SP10 (NACE-2) Near-White Blast Cleaning
Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale, and small specks of previous coating. At least 95

percent (95%) of each square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.

SSPC-SP11 Power Tool Cleaning to Bare Metal
Complete removal of rust, rust scale, mill scale, foreign matter, and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.

SSPC-SP12 (NACE-2) Surface Preparation by Water Jetting
Surface preparation of steel and other substrates by ultra-high pressure water jetting.

SSPC-SP13 (NACE-6) Surface Preparation of Concrete
Surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.

SSPC-SP14 (NACE-8) Industrial Blast Cleaning
Surface preparation standards for industrial blast cleaning allowing for traces of tightly adherent mill scale, rust, and coating residues on 10 percent (10%) of the surface.

SSPC-SP15 Commercial Grade Power Tool Cleaning
Commercial grade power tool cleaning a steel surface to produce a 1.0-mil surface profile. This method of cleaning falls between SP3 & SP11.

C. Visual standards – SSPC-VIS-1 (Swedish SIS OS 5900), "Pictorial Surface Preparation Standards for Painting Steel Surfaces," and the National Association of Corrosion Engineers, "Blasting Cleaning Visual Standards" NACE No. 1/SSPC-SP 5; NACE No. 2/SSPC-SP 10; NACE No. 3/SSPCSP 6; and NACE No. 4/SSPCSP 7 shall be considered as standards for proper surface preparation.

D. Visual standards from International Concrete Repair Institute CSP1-9 for degree of roughness and surface profile of concrete.

E. Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to SSPC-SP1 Solvent Cleaning.

F. Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per SSPC-SP11-87T.

G. All weld seams, sharp protrusions, and edges shall be ground smooth prior to surface preparation or application of any coatings.

H. All areas requiring field welding shall be masked off prior to shop coating, unless waived by the Engineer.

I. All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in SSPC-SP11-87T.

J. Touch-up systems will be same as original specification except that approved manufacturer's organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also, strict adherence to the manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the City's and Engineer's attention; otherwise, Contractor assumes full responsibility.

2.03 PRETREATMENTS

A. When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

2.04 STORAGE

A. Materials shall be delivered to the job site in the original packages with seals unbroken and with legible unmutilated labels attached. Packages shall not be opened until they are inspected by the Engineer and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, and direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by him at the job site. Empty coating cans shall be required to be neatly stacked in an areas designated by the City or Engineer and removed from the job site on a schedule determined by the City or Engineer. City and/or Engineer may request a notarized statement from the Contractor detailing all materials used on the project.

2.05 PREPARATION OF MATERIALS

A. Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint/coating prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to 1-gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Volume 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with the manufacturer's recommendations.

B. Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

2.06 APPLICATION

A. Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint/coating manufacturer. Except as provided below, painting shall not be permitted when the atmospheric temperature is below 50°F, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period.

B. No coatings shall be applied unless surface temperature is a minimum of 5°F above dew point; temperature must be maintained during curing.

C. Dew Point: Temperature at which moisture will condense on surface. No coatings should be applied unless surface temperature is a minimum of 5°F above this point. Temperature must be maintained during curing.

Example: If air temperature is 70°F and relative humidity is 65 percent (65%), the dew point is 57°F. No coating should be applied unless surface temperature is 62°F minimum.

D. Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.

E. Field Painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the Engineer.

F. Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not be affected.

DEW POINT CALCULATION CHART
Ambient Air Temperature – Fahrenheit

Relative Humidity	20	30	40
50	60	70	80
90	100	110	120
90%	18	28	37
47	57	67	77
87	97	107	117
85%	17	26	36
45	55	65	76
84	95	103	113

80%		16	25	34
	44	54	63	73
	82	93	102	110
75%		15	24	33
	42	52	62	71
	80	91	100	108
70%		13	22	31
	40	50	60	68
	78	88	96	105
65%		12	20	29
	38	47	57	66
	76	85	93	103
60%		11	29	27
	36	45	55	64
	73	83	92	101
55%		9	17	25
	34	43	53	61
	70	80	89	98
50%		6	15	23
	31	40	50	59
	67	77	86	94
45%		4	13	21
	29	37	47	56
	64	73	82	91
40%		1	11	18
	26	35	43	52
	61	69	78	87
35%		-2	8	16
	23	31	40	48
	57	65	74	83

30%	-6	4		13
20	28	36		44
52	61	69		77

G. The Contractor's scaffolding shall be erected, maintained, and dismantled without damage to structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observations shall be cleaned immediately after paint application.

H. Painting shall not be performed on insulated pipe within 3-feet of insulation operations or on insulation whose covering and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within 1-foot of any type of connection until the connection has been made, except as directed by the Engineer.

I. The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint/coating manufacturer.

J. Each coat of paint shall be recoated as per manufacturer's instructions. Paint/coating shall be considered recoatable when an additional coat can be applied without any detrimental film irregularities such as lifting or loss of adhesion.

K. Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.

L. Finish colors shall be in accordance with the City's Direction or match existing colors and shall be factory mixed (i.e., there shall be no tinting by the Contractor).

M. All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) of the 1st coat prior to application of the full 1st coat.

N. All hairline cracks or patches shall receive "stripe coat" of the 1st coat prior to application of the full 1st coat.

O. All open seams in the roof area of tanks shall be filled after application of the topcoat with a flexible caulking such as Sika Flex 1A.

2.07 WORKMANSHIP

A. The Contractor must show proof that all employees associated with this project shall have been employed by the Contractor for a period not less than 6 months.

B. Painting/coating shall be performed by experienced painters/coaters in accordance with the recommendations of the paint/coating manufacturer. All paint/ coating shall be uniformly applied without sags, runs, spots, or other blemishes. Work, which shows carelessness, lack of skill, or is defective in the opinion of the City or Engineer, shall be corrected at the expense of the Contractor.

C. The Contractor or subcontractor shall be certified and licensed for painting/coating and shall have a minimum of 5 years of experience of similar projects in the State of Florida.

D. The Contractor shall guarantee the workmanship of the Work performed and materials will be free from defects or failure of workmanship for a period of 1 year upon completion of the Work.

2.08 APPLICATION OF PAINT

A. Brush and/or Rollers:

1. Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenohl core shall be utilized.

2. The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth the film without leaving deep or detrimental marks.

3. Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.

4. It may require two (2) coats to achieve the specified dry film thickness if application is by brush and roller.

B. Air, Airless, or Hot Spray:

1. The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.

2. Paint shall be applied in a uniform layer, with a 50 percent (50%) overlap pattern. All runs and sags should be brushed out immediately or the paint shall be removed and the surface resprayed.

3. High build coatings should be applied by a crosshatch method of spray application to ensure proper film thickness of the coating.

4. Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.

5. Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.

6. Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.

7. The first coat on concrete surfaces in immersion service should be sprayed and backrolled.

2.09 PROTECTION AND CLEAN-UP

A. It shall be the responsibility of the Contractor to protect at all times, in areas where painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint/coating work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting/coating work.

B. At the option of the Engineer during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the Engineer and/or City, including but not limited to, full shrouding of the area.

C. If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.

D. At completion of the work, remove all paint/coating where spilled, splashed, splattered, sprayed or smeared on all surfaces, including glass, light fixtures, hardware, equipment, painted, and unpainted surfaces.

E. After completion of all painting, the Contractor shall remove from job site all painting/coating equipment, surplus materials, and debris resulting from the Work.

F. The Contractor is responsible for the removal and proper disposal of all hazardous materials from the jobsite in accordance with Local, State, and Federal requirements as outlined by the USEPA.

G. A notarized statement shall be presented to the City and Engineer that all hazardous materials have been disposed of properly including but not limited to: name of disposal company, disposal site, listing of hazardous materials, weights of all materials, cost per pound and USEPA registration number.

2.10 TOUCH-UP MATERIALS

A. The Contractor shall provide at the end of the project at least 1-gallon of each generic topcoat in each color as specified by the Engineer for future touch-up. Two (2) gallons may be required for two (2) component materials.

2.11 ON-SITE INSPECTION

A. During the course of this project the City and/or Engineer will reserve the option of incorporating the services of a qualified inspection service. The inspection service will be responsible for assuring the proper execution of this specification by the successful Contractor.

2.12 COATING SYSTEM SCHEDULE

A. Painting/coating all items specified here in shall be in accordance with the manufacturer's recommendations for surface preparation, painting/coating system and application methods. If the painting/coating surface preparation, painting/ coating system, dry film thicknesses (DFTs), and application methods specified herein are in conflict the manufacturer's recommendations, the manufacturer's recommendations shall supersede what is specified herein.

STEEL - STRUCTURAL, TANKS, PIPES, AND EQUIPMENT

B. Exterior Exposure (Non-Immersion)

1. System No. 1074U-1 Zinc/Epoxy/Urethane

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

	DFT-Mils
1st Coat: 90-97 Tneme-Zinc	2.5 – 3.5
2nd Coat: N69-Color Hi-Build Epoxoline II	2.0 – 3.0
3rd Coat: 1074-Endura-Shield UVX	3.0 – 5.0
	7.5 – 11.5
	Minimum 7.5 Mils DFT

NOTE: This system is highly resistant to abrasion, wet conditions, corrosive fumes, and chemical contact. Second coat to be same color or close to finish color.

2. System No. 1074U-2 High Build Urethane For Marginally Cleaned Surfaces or Topcoating Existing Systems.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning SSPC-SP3 Power Tool Cleaning Feather all edges.

		DFT-Mils
Shop Primer:	135*Chembuild	3.0 – 5.0
Tie Coat:	135*Chembuild	3.0 – 5.0
Topcoat:	1074U-Color Endura-Shield UVX	2.0 – 3.0
		5.0 - 8.0 + SPOTS
		Minimum 6.0 Mils

*Can substitute water-based epoxy Series 27 WB Typoxy @ 4.0 – 5.0 mils DFT.

NOTE: This system can be used over factory finish paint or over non-sandblasted steel and offer the high performance of a urethane coating. A test patch is always recommended to insure proper application.

3. System 700-1 Zinc/Urethane/Fluoropolymer (Long Term Color & Gloss Retention)

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

		DFT-Mils
Primer:	90-97 Tneme-Zinc	2.5 – 3.5
2nd Coat:	73 Endura-Shield	2.0 – 3.0
3rd Coat:	700 Hydroflon	2.0 – 3.0
		6.5 – 9.5
		Minimum 8.0 Mils

NOTE: This system offers the added corrosion protection of a zinc rich primer. Series 90-97 Tneme-Zinc is an organic zinc-rich primer that can be used for field touch up of a zinc primer or for touch up of galvanized surfaces that are damaged. You can substitute Series 91-H_2O Hydrozinc for the 90-97. You can substitute Series 701 for the Series 700 if a semi-loss finish is desired.

4. System 700-2 Fluoropolymer Overcoat System For Steel Tanks With Solvent-Based Coatings

Surface Preparation: Pressure Clean 3000-psi. Spot SSPC-SP6 Commercial Blast or SSPC-SP3 Power Tool Cleaning. Feather all edges.

		DFT Mils
Spot Primer:	135 Chembuild	3.0 – 5.0
Barrier Coat:	73 Endura-Shield	2.0 – 3.0
Topcoat:	700 Hydroflon	2.0 – 3.0

4.0 – 6.0 + Spot

NOTE: You can substitute Series 701 for the Series 700 if a semi-gloss finish is desired.

C. Interior Exposure (Non-Immersion)

1. System No. N69-1 High Solids Epoxy

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

		DFT Mils
1st Coat:	N69-Color Hi-Build Epoxoline II	5.0 – 7.0
2nd Coat:	1074U-Color Endura Shield	2.0 – 3.0
		7.0 –10.0
		Minimum 9.0 Mils

NOTE: This coating will provide maximum protection. It offers chemical and corrosion resistance for long-term protection against salt spray, moisture, corrosive fumes, and chemical attack. Series N69 is a polyamidoamine cured epoxy. Primer coat must be touched-up before 2nd coat is applied.

2. System No. N69-6 High Build Epoxy (Over OEM Finishes)

Surface Preparation: Spot SSPC-SP6 Commercial Blast Cleaning or SPC-SP11 Power Tool Cleaning To Bare Metal

		DFT-Mils
1st Coat:	Manufacturer's Standard (or existing coating)	1.0 – 2.0
2nd Coat:	135* Chembuild	3.0 – 5.0
3rd Coat:	1074U-Color Endura Shield	2.0 – 3.0
		5.0–8.0
		Minimum 7.0 Mils

*Can substitute water-based epoxy Series 27WB Typoxy @ 4.0 – 6.0 mils DFT.

NOTE: This system is to be used over standard manufacturer's primer to offer a high performance epoxy finish. Excellent for areas of rust not able to be completely cleaned.

D. Immersion

1. System No. N69-2 High Solids High Build Epoxy (Non-Potable Water)

Surface Preparation: SSPC-SP10 Near White Blast Cleaning

		DFT-Mils
Stripe Coat:	N69-Color Hi-Build Epoxoline II by brush and roller to all weld Seams and plate edges	3.0 – 5.0
1st Coat:	N69-Color Hi-Build Epoxoline II	6.0 – 8.0
2nd Coat:	N69-Color Hi-Build Epoxoline II	6.0 – 8.0
		15.0 -21.0 (Excluding stripe coat)
		Minimum 16.0 Mils

NOTE: This system provides maximum protection in immersion service. Scarify the surface before topcoating if the Series N69 has been exterior-exposed for 60 days or longer. If primer coat is damaged, it must be touched-up before 2nd coat is applied.

2. System No. N140 High Solids Epoxy (Potable Water)

Surface Preparation: SSPC-SP10 Near White Blast Cleaning

		DFT-Mils
Stripe Coat:	N140-15BL Pota-Pox Plus (by brush and roller to all weld seams and plate edges)	3.0 – 5.0
1st Coat:	N140-1255 Pota-Pox Plus (Beige)	6.0 – 8.0
2nd Coat:	N140-15BL Pota-Pox Plus (Tank White)	6.0 – 8.0
		12.0 - 16.0 (Excluding stripe coat)
		Minimum 16.0 Mils

NOTE: Series N140 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61.

3. System No. 46-30 Coal Tar-Epoxy (Non-Potable Water)

Surface Preparation: SSPC-SP10 Near White Blast Cleaning

		DFT-Mils
One Coat:	46H-413 Hi-Build Tneme-Tar	16.0 – 20.0

NOTE: May be applied in a two-coat application. Review critical recoat time if utilized.

4. System No. 91-H_2O Zinc/Epoxy (Potable Water)

Surface Preparation: SSPC-SP10 Near White Metal Blast

		DFT-Mils
Caulk:	Seal all open roof seems with a flexible NSF Certified caulking such as Sika-Flex 1A.	
Stripe Coat:	91-H2O Hydrozinc 2000 (by brush & roller to all weld seams and plate edges.)	2.5 – 3.5
1st Coat:	1- H2O Hydrozinc 2000	2.5 – 3.5
2nd Coat:	N140-1255 Pota-Pox Plus (Beige)	4.0 – 6.0
3rd Coat:	N140-15BL Pota-Pox Plus (Tank White)	4.0 – 6.0
		10.5 -15.5
		Minimum 12.0 Mils

NOTE: Meets AWWA D102-97 Inside Coating System No.3

5. System 406-1 Elastomeric Polyurethane

Surface Preparation: SSPC-SP10 Near White Metal Blast

		DFT-Mils
Primer:	1 Omnithane	2.5 – 3.5
Topcoat:	406 Elasto-Shield	75 –100
		82.5-103.5
		Minimum 80 Mils

OVERHEAD METAL DECKING, JOIST

E. Interior Exposure

1. System No. 115-1 Uni-Bond DF

Surface Preparation: Surfaces must be dry, clean, and free of oil, grease, and other contaminants. Allow concrete to cure 28 days. Galvanized metal decking must be scarified.

	DFT-Mils
Coating: 115-Color Uni-Bond DF	2.0 – 4.0

NOTE: This system should be used on ceiling areas where a one-coat system is desired. Can be applied over steel, galvanized, and aluminum decking, joist, beams, conduits, and concrete.

F. Exterior Exposure

1. System No. 27WB Epoxy/DTM Acrylic

Surface Preparation: Pressure clean to remove all dirt, oil, grease, chemicals, and foreign contaminants. Remove loose paint and all rust by hand and power tool cleaning (SSPC-SP 2 & 3). Feather all edges.

	DFT-Mils
Spot Primer: 27WB Typoxy	3.0 – 5.0
1st Coat: 30 Spra-Saf EN	2.0 – 4.0
2nd Coat: 30 Spra-Saf EN	2.0 – 4.0
	4.0 – 8.0 (For 2 Coats)

NOTE: This system can be applied over a wide variety of coatings and factory finishes. It can also be applied direct to galvanized aluminum decking, joists, conduits, and tight rust.

MILL COATED STEEL PIPE

G. Exterior/Interior Exposure (Non-Immersion)

1. System No. N69-3 Epoxy-Polyamide

Surface Preparation: Remove the black mill coating by abrasive blast cleaning per SSPC-SP6. Do not overblast the steel.

	DFT-Mils
1st Coat: N69-Color Hi-Build Epoxoline II	6.0 – 8.0
2nd Coat: 1074U Endura-Shield	(2.0 – 3.0)
	8.0–11.0
	Minimum 10.0 Mils

GALVANIZED STEEL – PIPE AND MISCELLANEOUS FABRICATIONS

H. Exterior (Non-Immersion)

1. System No. 1074U-2 Epoxy/High Build Urethane

Surface Preparation: SSPC-SP1 Solvent Cleaning and Scarify by Brush Off Blasting, Hand Sanding, or Chemical Treatment

	DFT-Mils
1st Coat: N69-Color Hi-Build Epoxoline II	2.0 – 4.0
2nd Coat: 1074U-Color Endura-Shield	2.0 – 3.0
	4.0 – 7.0
	Minimum 6.0 Mils

NOTE: Series N69 has excellent adhesion to galvanized steel. This system is highly resistant to abrasion, wet conditions, corrosive fumes, and

chemical contact. First coat to be same color as or close to the finish color.

I. Interior Exposure (Non-Immersion)

1. System No. N69-6 Polyamide Epoxy

Surface Preparation: SSPC-SP1 Solvent Cleaning and Scarify by Brush Off Blasting, Hand Sanding, or Chemical Treatment.

	DFT-Mils
1st Coat: N69-Color Hi-Build Epoxoline II	2.0 – 4.0
2nd Coat: 1074U-Color Endura-Shield	2.0 – 3.0
	4.0 – 7.0
	Minimum 6.0 Mils

J. Immersion (Potable Water)

1. System No. N140-1 Epoxy-Polyamide (Potable Water)

Surface Preparation: Solvent Clean Per SSPC-SP1 & Abrasive Blast per SSPC-SP7

	DFT-Mils
1st Coat: N140-1255 Pota-Pox Plus Primer	4.0 – 6.0
2nd Coat: N140-15BL Pota-Pox Plus Finish	4.0 – 6.0
	8.0–12.0
	Minimum 10.0 Mils

NOTE: Series N140 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61.

WASTEWATER EQUIPMENT IN IMMERSION SERVICE

K. Steel in Wastewater Immersion

1. System No. 446-1 Perma-Shield MCU

Surface Preparation: SSPC-SP10 (Near White Metal Blast)

	DFT-Mils
Primer: 1 Omnithane	2.5 – 3.5
1st Topcoat: 446 Perma-Shield MCU	5.0–10.0
2nd Topcoat: 446 Perma-Shield MCU	5.0–10.0
	12.5 –23.5
	Minimum 15.0 Mils

NOTE: This system offers fast cure for immersion service (4 hours ± @ 75°F). Substitute Series 1074U for 2nd topcoat of Series 446 for areas not in immersion service and exposed to the sun, such as walkways, platforms, handrails, etc.

CONCRETE

L. Exterior - Above Grade

1. System No. 6-1 Acrylic Emulsion

Surface Preparation: Surface must be clean and dry.

	DFT-Mils
1st Coat: 6-Color Tneme-Cryl	2.0 – 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 – 3.0
	4.0 – 6.0
	Minimum 5.0 Mils

NOTE: If semi-gloss finish is desired, use Series 1029 Enduratone as the 2nd coat @ 2.0 – 3.0 mils DFT.

2. System No. 156-1 Modified Acrylic Elastomer

Surface Preparation: Surface must be clean and dry.

	DFT-Mils
1st Coat: 156-Color Enviro-Crete	4.0 – 8.0
2nd Coat: 156-Color Enviro-Crete	4.0 – 8.0
	8.0 –16.0
	Minimum 10.0 Mils

NOTE: If texture is needed, use 157 Enviro-Crete TX (medium texture). For application over previously applied coatings, use Tnemec Series 151 Elasto-Grip at 1.0 - 2.5 mils DFT prior to the application of Series 156 Enviro-Crete.

3. System No. 100 Concrete Stain

Surface Preparation: The surface must be clean, dry, sound, free of cracks, and paint.

	SF/Gal/Ct*
Sealer: Chemprobe Prime A Pell H_2O	65-200
Concrete Stain: Two (2) coats of Chemprobe Conformal Stain	75-200

*Coverage rates depend on substrate.

M. Exterior - Below Grade

1. System No. 46-31 Coal Tar Epoxy

Surface Preparation: Surface shall be clean and dry. Allow new concrete to cure at least 28 days.

	DFT-Mils
One Coat: 46H-413 Hi-Build Tneme-Tar	14.0-20.0

2. System No. 100-1 Crystalline Waterproofing

Surface Preparation: Surface to be clean and opened up by Brush Blasting, Acid Etching, or Water Blasting w/Turbo Tips. Surface must be pre-wetted prior to application.

1st Coat: XYPEX Concentrate @ (1.5 #/SY)
2nd Coat: XYPEX Modified @ (1.5 #/SY)

NOTE: This system can be applied to concrete that is still wet or hasn't developed final cure. It can be used where wet surface conditions exist or where there is the potential for water intrusion due to hydrostatic pressure. Application shall be per XYPEX specification manual.

N. Interior Exposure (Non-Immersion)

1. System No. 6-1 Acrylic Emulsion (Interior/Exterior)

Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for 28 days.

	DFT-Mils
1st Coat: 6-Color Tneme-Cryl	2.0 – 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 – 3.0
	4.0 – 6.0
	Minimum 5.0 Mils

NOTE: This system will provide a decorative coating with good exterior durability, color retention, and a high vapor transmission rate. For Semi-Gloss finish, substitute Series 1029 Enduratone for the 2nd coat at 1.5 - 2.0 mils DFT. Apply both the Series 6 & 1029 in the same color.

2. System No. N69-4 Epoxy-Polyamidoamine (Interior)

Surface Preparation: Surfaces shall be clean and dry. Allow concrete to cure for 28 days.

	DFT-Mils
1st Coat: N69-Color Hi-Build Epoxoline II	4.0 – 6.0

2nd Coat:	N69-Color Hi-Build Epoxoline II	4.0 – 6.0
		8.0–12.0
		Minimum 10.0 Mils

3. System No. 113-2 Acrylic Epoxy Semi-Gloss

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
1st Coat:	113-Color Tneme-Tufcoat	4.0 – 6.0
2nd Coat:	113-Color Tneme-Tufcoat	4.0 – 6.0
		8.0 –12.0
		Minimum 8.0 Mils

NOTE: Substitute Series 114 Tneme-Tufcoat for gloss finish. Multiple coats may be required if application is by roller.

O. Immersion - Potable & Non-Potable Water

1. System No. N69-4 Epoxy-Polyamidoamine (Non-Potable Water)

Surface Preparation: Allow concrete to cure for 28 days. Abrasive blast clean per SSPC-SP13 with a CSP5 or better finish.

		DFT-Mils
Surfacer:	218 MortarClad	1/16"±
1st Coat:	N69-Color Hi-Build Epoxoline II	4.0 – 6.0
2nd Coat:	N69-Color Hi-Build Epoxoline II	4.0 – 6.0
		8.0 –12.0 + Surfacer
		Minimum 10.0 Mils + Surfacer

NOTE: First coat should be spray applied and backrolled.

2. System No. 104-5 High Solids Epoxy (Non-Potable Water)

Surface Preparation: Allow concrete to cure for 28 days. Abrasive blast clean per SSPC-SP13 with a CSP5 or better finish.

		DFT-Mils
Surfacer:	218 MortarClad	1/16"±
1st Coat:	104-1255 H.S. Epoxy	6.0 – 10.0
2nd Coat:	104-Color H.S. Epoxy	6.0 – 10.0
		12.0 - 20.0 + Surfacer
		Minimum 14.0 Mils + Surfacer

NOTE: First coat should be spray applied and backrolled.

3. System No. 46-31 Coal Tar-Epoxy (Non-Potable Water)

Surface Preparation: Allow concrete to cure for 28 days. Abrasive blast clean per SSPC-SP13.

	DFT-Mils
One (1) Coat: 46H-413 Hi-Build Tneme-Tar	14.0 – 20.0

NOTE: May be applied in a two-coat application. Review critical recoat time if utilized. Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with Tnemec Series 215 Surfacing Coat as required.

4. System No. N140-2 Epoxy-Polyamidoamine (Potable Water)

Surface Preparation: Allow concrete to cure for 28 days. Abrasive blast clean per SSPC-SP13 with a CSP5 or better finish.

		DFT-Mils
Surfacer:	218 MortarClad	1/16"±
1st Coat:	N140-1255 Pota-Pox Plus	6.0 – 8.0
2nd Coat:	N140-15BL Pota-Pox Plus	6.0 – 8.0
		12.0-16.0 + Surfacer
		Minimum 14.0 Mils + Surfacer

NOTE: Series N140 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Any remaining voids after the 1st coat should be filled as required with Tnemec Series 215 Surfacing Epoxy.

5. System No. 264-1 Elastomeric Polyurethane (Black) (Potable Water)

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive blast clean per SSPC-SP13 (Surface Preparation of Concrete) with a CSP5 or better profile.

		DFT-Mils
Surfacer:	218 MortarClad	1/16"±
Primer:	N140-15BL Pota Pox Plus (Tank White)	5.0
Coating:	264 Elasto-Shield	60.0 ±
		65.0 Mils + Surfacer

NOTE: This system is NSF Certified for Potable Water. This flexible liner can be used to rehab tanks with leaks. Multiple passes may be required to achieve the desired thickness that can range from 50-100 mils. See Elasto-Shield Application Guide for detailed instructions. Substitute Series 262 Elasto-Shield for non-potable water applications.

6. System 406-2 (Elastomeric Polyurethane Hybrid)

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive blast clean per SSPC-SP13 (Surface Preparation of Concrete) with a CSP5 or better profile.

		DFT-Mils
Surfacer:	218 Mortarclad	1/16"±
Primer:	1 Omnithane	2.5 – 3.5
Topcoat:	406 Elasto-Shield	60 – 75
		60.2-78.5+ Surface
		Minimum 65 Mils

NOTE: This system is NSF Certified for contact with potable water.

P. Interior Exposure (Non-Immersion) Over Existing Coatings

1. System No. 6-1 Acrylic Emulsion

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
1st Coat:	6-Color Tneme-Cryl	2.0 – 3.0
2nd Coat:	6-Color Tneme-Cryl	2.0 – 3.0
		4.0 – 6.0
		Minimum 5.0 Mils

NOTE: If semi-gloss finish is desired, use Series 1029 Enduratone as the 2nd Coat @ 1.5 – 2.0 mils DFT.

2. System No. 113-1 Acrylic-Epoxy Semi-Gloss

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
1st Coat:	113-Color Tneme-Tufcoat	2.0 – 3.0
2nd Coat:	113-Color Tneme-Tufcoat	2.0 – 3.0
		4.0 – 6.0
		Minimum 5.0 Mils

NOTE: This system will provide high performance and can be applied directly over existing coatings without lifting. Can be used when low odor is required during application. Specify Series 114 Tneme-Tufcoat for Gloss Finish. This coating can be spray applied in a single coat at 4.0 - 6.0 mils DFT.

CONCRETE FLOORS

Q. Epoxy Floor Coating

1. System No. 205-1 Epoxy-Polyamide

Surface Preparation: Allow concrete to cure 28 days. Acid Etch or Brush Off Blast Cleaning per SSPC-SP13.

	DFT-Mils
1st Coat: 205 Terra-Tread FC	3.0 – 5.0
2nd Coat: 205 Terra-Tread FC	3.0 – 5.0
	6.0–10.0
	Minimum 6.0 Mils

NOTE: This system will provide a durable, longwearing coating that bonds tightly to concrete and stands up under heavy foot traffic, frequent cleaning, and spillage of water, oil, grease, or chemical. For floors exposed to the sun, add a 3rd coat of Tnemec Series 290 CRU at 2.0 - 3.0 mils DFT. For a skid resistant finish broadcast 50 mesh dry washed silica sand into the 1st coat.

2. System No. 287-1 Waterborne Epoxy-Amine

Surface Preparation: Allow concrete to cure 28 days. Acid Etch or Brush Off Blast Cleaning per SSPC-SP13.

	DFT-Mils
1st Coat: 287-Color Enviro-Pox	2.0 – 4.0
2nd Coat: 287-Color Enviro-Pox	2.0 – 4.0
	4.0 – 8.0
	Minimum 5.0 Mils

NOTE: For a non-skid finish, add 287-300C skid resistance sand into the first coat. For floors exposed to the sun add a 3rd coat of Tnemec Series 290-CRU at 2.0 – 3.0 mils DFT.

3. System No. 280-1 High Build Polyamine-Epoxy Glaze Floor

Surface Preparation: Allow concrete to cure 28 days. Abrasive Blast Cleaning (Refer to Installation Guide of manufacturer.)

	DFT-Mils
1st Coat: 201 Epoxoprime	6.0 – 8.0
2nd Coat: 280 Tneme-Glaze	6.0 – 8.0
3rd Coat: 280 Tneme-Glaze	6.0 – 8.0
	18.0 - 24.0
	Minimum 18 Mils

NOTE: Please refer to manufacturer's Installation Guide and Technical Data for proper installation. For floors exposed to the sun add a coat of 290 @ 2.0 – 3.0 mils DFT.

4. System No. 237/280 Solid Color Double Broadcast Flooring (Non-Slip)

Surface Preparation: Abrasive Blast Cleaning (Refer to Installation Guide of manufacturer.)

	DFT-Mils
1st Coat: 237 Power-Tread	1/8" (2
cts. @1/16" each)	
2nd Coat: 280 Tneme-Glaze	8.0 –
12.0	
	Minimum 1/8"±

NOTE: Please refer to manufacturer's Installation Guide and Technical Data for proper installation. Optional 4th coat of Series 290 CRU at 2.0 - 3.0 mils DFT for floors exposed to the sun.

5. System No. 222/284 Multi-Color Quartz Broadcast Floor and Cove Base

Surface Preparation: Abrasive blast cleaning (Refer to Tnemec Surface Preparation and Installation Guide).

	DFT-Mils
1st Coat: 222 Deco-Tread	1/8" (2
cts. @ 1/16" each)	
2nd Coat: 84 Deco-Clear	8.0-10.0
	Total 1/8" +

NOTE: Please refer to manufacturer's Installation Guide and Technical Data for proper installation. Optional 4th coat of Series 295 CRU at 2.0 – 3.0 mils DFT for floors exposed to the sun.

POROUS MASONRY (BLOCK)

R. Exterior/Interior Exposure

1. System No. 6-2 Acrylic Emulsion, Low Sheen

Surface Preparation: Surface shall be clean and dry.

		DFT-Mils
Block Filler: 54 WB Surface Coat		120± SF
Gal		
1st Coat:	6-Color Tneme-Cryl	2.0 – 3.0
2nd Coat:	6-Color Tneme-Cryl	2.0 – 3.0
		*4.0 – 6.0

*Total dry film thickness of topcoats only.

NOTE: For semi-gloss finish, use Series 1029 Enduratone (SG) for the 2nd coat @ 2.0 – 3.0 mils DFT.

2. System No. N69-15 Epoxy-Polyamide (Interior)

Surface Preparation: Surface shall be clean and dry.

		DFT-Mils
Block Filler: 54WB Surface Coat Gal		120± SF
1st Coat:	N69-Color Hi-Build Epoxoline II	4.0 – 6.0
2nd Coat:	N69-Color Hi-Build Epoxoline II	4.0 – 6.0
		*8.0–12.0

*Total dry film thickness of topcoats only.

NOTE: Block filler is a water-based epoxy.

3. System No. 104-6 High Solids Epoxy (Interior Only)

Surface Preparation: Surface to be clean and dry.

		DFT-Mils
1st Coat:	104-Color H.S. Epoxy	6.0 – 10.0
2nd Coat:	104-Color H.S. Epoxy	6.0 – 10.0
		12.0 – 20.0
		Minimum 14.0 Mils

NOTE: The surface will be tile-like for easy cleaning and will provide protection against chemical attack, corrosive fumes, high humidity and wash down. Spray and backroll first coat to fill porosity.

4. System No. 113-1 Acrylic-Epoxy Semi-Gloss (Interior Only)

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
Block Filler: 54 WB Surface Coat Gal		120± SF
1st Coat:	113-Color Tneme-Tufcoat	4.0 – 6.0
2nd Coat:	113-Color Tneme-Tufcoat	4.0 – 6.0
		8.0-12.0

NOTE: Series 113 can be spray applied @ 4.0 - 6.0 mils DFT. Application by brush and roller will require additional coats. Series 113 Tneme-Tufcoat has very low odor and can be used when painting in occupied areas. Specify Series 114 Tneme-Tufcoat for a gloss finish.

5. System No. 156-1 Modified Acrylic Elastomer (Exterior)

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
Block Filler: 54 WB Surface Coat Gal		120± SF
1st Coat:	156-Color Enviro-Crete	4.0 – 8.0
2nd Coat:	156-Color Enviro-Crete	4.0 – 8.0
		8.0–16.0
		Minimum 10.0 Mils (For 2nd & 3rd Coats)

NOTE: If texture is needed, use 157 Enviro-Crete TX (medium texture). For application over previously applied coatings, use TNEMEC 151 Elasto-Grip at 1.0 - 2.5 mils DFT in place of the 54WB Surface Coat.

GYPSUM WALLBOARD

S. Interior Exposure

1. System No. 113-5 Acrylic-Epoxy

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
1st Coat:	6 Tnemec-Cryl (Thinned 10%)	1.0 – 2.0
2nd Coat:	113 H.B. Tneme-Tufcoat	2.0 – 3.0
3rd Coat:	113 H.B. Tneme-Tufcoat	2.0 – 3.0
		5.0 – 7.0
		Minimum 6.0 Mils

NOTE: Series 113 can be spray applied in a single coat at 4.0 - 6.0 mils DFT. Substitute Series 114 if a gloss finish is desired.

2. System No. N69-22 Hi-Build Epoxoline

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
1st Coat:	151 Elasto-Grip	0.7 – 1.5
2nd Coat:	N69-Color Hi-Build Epoxoline II*	4.0 – 6.0
		4.7 - 7.5
		Minimum 5.0 Mils+

NOTE: Two coats may be required if applied by roller.

3. System No. 6-1 Acrylic Emulsion, Low Sheen (Interior Exposure)

Surface Preparation: Surface must be clean and dry.

		DFT-Mils
1st Coat:	6-Color Tneme-Cryl	2.0 – 3.0
2nd Coat:	6-Color Tneme-Cryl	2.0 – 3.0
		4.0 – 6.0
		Minimum 5.0 Mils

NOTE: This system is designed for mild use areas like office walls, laboratory ceilings, stairwells, etc. For semi-gloss finish, use Series 1029 Enduratone at 2.0 - 3.0 mils DFT for the topcoat.

WOOD

T. Exterior/Interior Exposure

1. System No. 2H-4 Alkyd (Gloss)

Surface Preparation: Surface shall be clean and dry.

		DFT-Mils
1st Coat:	10-99W Tnemec Primer	2.0 – 3.5
2nd Coat:	2H Hi-Build Tneme-Gloss	1.5 – 3.5
3rd Coat:	2H Hi-Build Tneme-Gloss	1.5 – 3.5
		5.0–10.5
		Minimum 6.0 Mils

2. System No. 6-5 Acrylic Latex (Flat)

Surface Preparation: Surface shall be clean and dry.

		DFT-Mils
1st Coat:	10-99W Tnemec Primer	2.0 – 3.5
2nd Coat:	6-Color Tneme-Cryl	2.0 – 3.0
3rd Coat:	6-Color Tneme-Cryl	2.0 – 3.0
		6.0 – 9.5
		Minimum 7.5 Mils

NOTE: Substitute Series 1029 Enduratone for the third coat at 1.5 - 2.0 mils DFT if semi-gloss finish is desired.

PVC PIPE

U. Exterior Or Interior

1. System No. 73-23 Epoxy-Polyamide

Surface Preparation: Solvent clean per SSPC-SP1 & Scarify by Brush Blast or Hand Sanding.

		DFT-Mils
1st Coat:	N69-Color Hi-Build Epoxoline II	2.0 – 3.0
2nd Coat:	1074U Endura-Shield	2.0 – 3.0
		4.0 – 6.0
		Minimum 5.0 Mils

INSULATED PIPE

V. Interior Exposure

1. System No. 6-1 Acrylic Emulsion, Low Sheen

Surface Preparation: Surface shall be clean and dry.

		DFT-Mils
1st Coat:	6-Color Tneme-Cryl	2.0 – 3.0
2nd Coat:	6-Color Tneme-Cryl	2.0 – 3.0
		4.0 – 6.0
		Minimum 5.0 Mils

NOTE: For semi-gloss finish, use Series 1029 Enduratone for the 2nd coat.

HIGH HEAT COATING

W. Exterior/Interior Exposure

1. System No. 90E-92 Inorganic Zinc (750°F Max)

Surface Preparation: SSPC-SP10 Near White Metal Blast Cleaning

	DFT-Mils
Coating: 90E-02 Tneme-Zinc	2.0 - 3.5

NOTE: Coating will have a greenish gray color but will not require curing at elevated temperatures.

SURFACES EXPOSED TO H_2S/H_2SO_4 (SEVERE EXPOSURE/IMMERSION)

X. Cementitious Surfaces

1. System No. 446-2 Perma-Shield MCU (Concrete)

Surface Preparation: Abrasive blast clean per SSPC-SP13 to remove all laitance, fines, and contamination with a minimum surface profile of CSP5.

		DFT-Mils
Surfacer:	218 Mortarclad	1/16" - 1/8"*
1st Coat:	446 Perma-Shield MCU	5.0 – 10.0
2nd Coat:	446 Perma-Shield MCU	5.0 – 10.0
		10.0 - 20.0 + Surfacer
		Minimum 14.0 Mils + Surfacer

* Surfacer needs to be applied by trowel or sprayed and back trowelled.

2. System 436-1 Perma-Shield FR (Concrete)

Surface Preparation: Abrasive blast clean per SSPC-SP13 to remove all laitance, fines, and contamination with a minimum surface profile of CSP5.

		DFT-Mils
1st Coat:	218 Mortarclad	1/16" - 1/8"*
2nd Coat:	436 Perma-Shield FR	60 – 100
		60 – 100 + Surfacer

*First coat to be applied by trowel or sprayed and back trowelled. For severe H_2S exposure apply 436 @ 100-125 mils DFT.

Y. Ferrous Metal Surfaces Exposed

1. System No. 435-2 Perma-Glaze

Surface Preparation: SSPC-SP5 White Metal Blast Cleaning (3.0 Mil Profile)

		DFT-Mils
1st Coat:	435 Perma-Glaze	15.0 – 20.0
2nd Coat:	435 Perma-Glaze	15.0 – 20.0
		30.0 – 40.0
		Minimum 35.0 Mils

NOTE: Application of a stripe coat to all welds, seams and plate edges is recommended. Can be applied in a single sprayed coat @ 30-40 mils DFT.

PRESTRESSED CONCRETE TANKS

Z. Exterior Exposure

1. System No. 156-3 (New Tanks)

Surface Preparation: Surface to be clean and dry.

		DFT-Mils
1st Coat:	156-Color Enviro-Crete	4.0 – 6.0
2nd Coat:	156-Color Enviro-Crete	4.0 – 6.0
		8.0–12.0
		Minimum 10.0 Mils

2. System No. 156-4 Existing Tanks (Previously Painted)

Surface Preparation: Remove all dirt, oil, grease, chalk, and loose paint per High Pressure Water Blast (Min 3500 PSI).

		DFT-Mils
1st Coat:	151 Elasto-Grip	1.0 – 2.5
Stripe Coat:	Stripe all hairline cracks with a Brushed coat of 156 Enviro-Crete	3.0 – 5.0
Spot Coat:	156 Enviro-Crete	4.0 – 6.0
Topcoat:	156 Enviro-Crete	6.0 – 8.0
		(Cracks) 10.0–15.5
		(Other) 7.0 –10.5

NOTE: 1st coat is optional and can be eliminated with approval from coatings manufacturer. Spot coat of Series 156 for areas of bare concrete.

SECONDARY CONTAINMENT AREAS

AA. Interior

1. System No. 61-4 Epoxy Polyamide (For Fuel Oils)

Surface Preparation: Surface shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP13 with a CSP5 or better finish.

		DFT-Mils
Surfacer:	218 MortarClad (Vertical Surfaces)	1/16"
Primer:	61-5002 Tneme-Liner (Beige)	10.0 – 12.0
Topcoat:	61-5001 Tneme-Liner (Gray)	10.0 – 12.0
		20.0 – 24.0
		Minimum 20.0 Mils

NOTE: This system will provide excellent resistance to most chemicals including petrochemicals. Use Tnemec Series 215 Surfacing Epoxy between coats as a filler and surfacer wherever it is required.

2. System 262-1 Flexible Polyurethane

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP7 (Brush Off Blast).

	DFT-Mils
Surfacer: 218 MortarClad (Vertical Surfaces) 1/16"±	
Primer: N69 Hi-Build Epoxoline II	5.0
Coating: 262 Elasto-Shield (Black)	60.0
	65.0

NOTE: Multiple passes may be required to achieve recommended film thickness. See Elasto-Shield Application Guide for additional instructions. This product is only available in black. Repair all cracks, bugholes, and spalled areas with Series 265 Elasto-Shield TG prior to application of Series 262.

3. System No. 275 Fiber Reinforced Novolac Epoxy (For Acids & Caustics)

Surface Preparation: Allow new concrete to cure 28 days. Abrasive blast clean per SSPC-SP13. Test for moisture and moisture vapor transmission.

	DFT-Mils
Filler Surfacer for Vertical Surfaces: 218 MortarClad	1/16"
Prime Coat: Tnemec Series 201 Epoxoprime*	6.0 – 8.0
Body Coat: Tnemec Series 270 Stranlok applied by spray or trowel	30-35
Topcoat: Tnemec Series 282 Tneme-Glaze	6.0 – 10.0
	42-53
	Minimum 20.0 Mils

NOTE: Substitute Koesters VAP 1 2000 if moisture transmission exceeds 3# per 1000 SF in 24 hours for horizontal surfaces.

CLEAR WATER REPELLENT FOR CONCRETE, MASONRY & BRICK

BB.1 Silane/Siloxane Sealer (Water Based)

Surface Preparation: Allow new concrete to cure 28 days. Clean surfaces to be sealed by abrasive blasting or waterblasting.

COATING: BRICK, CONCRETE

Chemprobe PRIME A PELL H_2O
125-200 SF/GAL

SPLIT FACED OR POROUS MASONRY
Chemprobe PRIME A PELL H_2O
65-100 SF/GAL

BB.2 Silane/Siloxane Sealer w/Concrete Stain

Sealer: Chemprobe Prime A Pell H_2O, 65-200 SF/Gal
Concrete Stain: Two Coats of Chemprobe, 75-200 SF/Gal/Ct Conformal Stain

BB.3 RTV Silicone Rubber Water Repellent And Graffiti Protectorant

1st Coat: 626 Dur A Pell GS 75-300 SF/Gal*
2nd Coat: 626 Dur A Pell GS 75-300 SF/Gal*

NOTE: Depends on substrate. Use 680 Mark A Way for graffiti removal.

MANHOLES, WET WELLS, LIFT STATIONS, AND HEADWORKS AREAS

CC.1 System No. 434-3 Perma-Shield (Epoxy Mortar)

Surface Preparation: Abrasive blast clean per SSPC-SP13 with a CSP5 or better profile.

	DFT-Mils
Surfacer: 218 MortarClad	1/16" - 1/8"
Mortar: 434 Perma-Shield	1/8"
Glaze Coat: 435 Perma-Glaze	
15.0 – 20.0	

3/16"±

NOTE: Surfacer & mortar coats to be applied by trowel or sprayed and back trowelled. All surface voids, cracks, pinholes, and other defects must be filled flush with the adjacent surfaces by putty knife, trowel, float, squeegee, or other suitable method.

CC.2 System No. 100-1 Crystalline Waterproofing

Surface Preparation: Surface to be clean and roughened by Brush Blasting, Acid Etching, or High Pressure Water Blasting (3500 PSI) with turbo tips.

1st Coat: XYPEX Concentrate @ (1.5#/SY) – 1/16"±
2nd Coat: XYPEX Modified @ (1.5#/SY) – 1/16"±

NOTE: This system can be applied to concrete that is still wet or hasn't developed final cure. It can be used where wet surface conditions exist or where there is the potential for water intrusion due to hydrostatic pressure. Where rapid return to service is required use Mega Mix I instead of Modified.

PIPE CROSSINGS AND BACK FLOW PREVENTORS

DD.1 System 700-2 Zinc/Epoxy/Flouropolymer for New Pipe or Pipe Requiring Removal of Existing Coatings

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

DFT-Mils

Primer: 90-97 Tneme-Zinc
2.5 – 3.5
2nd Coat: 73- Endura-Shield
2.0 – 3.0
3rd Coat: 700 Hydroflon
2.0 – 3.0

6.5 – 9.5

Minimum 8.0 Mils

NOTE: Substitute Series 701 for a semi-gloss finish.

DD.2 System No. 27WB-2 High Build, High Gloss Urethane for Marginally Cleaned Surfaces or Topcoating Over Existing Systems

Surface Preparation: High Pressure Water Blast (Min 3500 PSI) or Solvent Clean (SSPC-SP1) and Spot Hand and Power Tool Clean (SSPC-SP2 & 3) or Brush Blast (SSPC-SP7). Existing coatings must be clean, dry, and tightly adhering prior to application of coatings.

DFT-Mils

Spot Primer:	27WB Typoxy
	3.0 – 5.0
Tie Coat:	27WB Typoxy
	3.0 – 5.0
2nd Coat:	700 Hydroflon
	2.0 – 3.0

5.0 – 8.0

Minimum 6.0 Mils

NOTE: A test Patch is always recommended to insure proper adhesion to existing coatings without lifting of existing coatings. Substitute Series 701 for a semi-gloss finish.

PART 3 – EXECUTION (NOT USED)

ELECTRICAL – GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required for a complete electrical system at the Water Treatment Plant Generator Installation in Nassau County, Florida, hereinafter specified and shown on the Drawings.

B. The work, apparatus and materials which shall be furnished under these Specifications and accompanying Drawings shall include all items listed hereinafter and/or shown on the Drawings. Certain equipment will be furnished as specified in other sections of these Specifications which will require wiring thereto and/or complete installation as indicated. All materials necessary for the complete installation shall be furnished and installed by the CONTRACTOR to provide complete power, lighting, communication systems, instrumentation, wiring and control systems as indicated on the Drawings and/or as specified herein.

C. The CONTRACTOR shall furnish and install the necessary cables, transformers, power panels, protective devices, conductors, exterior electrical system, etc., to serve motor loads, lighting loads and miscellaneous electrical loads as indicated on the Drawings and/or as specified hereinafter.

D. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All workmanship shall be of the highest quality; sub-standard work will be rejected.

E. Make all field connections to process instrument panels and other control panels furnished under other Divisions of these Specifications.

F. For process instrumentation furnish and install all conduit, wire and interconnections between primary elements, transmitters, local indicators and receivers.

G. Each bidder or his authorized representatives shall, before preparing his proposal, visit all areas in which work under this division is to be performed and inspect carefully the present installation. The submission of the proposal by this bidder shall be considered evidence that he or his representative has visited the site and noted the locations and conditions under which the work will be performed and that he takes full responsibility for a complete knowledge of all factors governing his work.

H. All power interruptions to existing equipment shall be at the Owner's convenience. Each interruption shall have prior approval.

I. It is the intent of these Specifications that the electrical system shall be suitable in every way for the service required. All material and all work which may be reasonably implied as being incidental to the work of this Section shall be furnished at no extra cost.

1.02 SERVICE AND METERING

A. Permanent electrical power is existing provided at the voltages indicated on the drawings.

B. The CONTRACTOR shall schedule all power interruptions with FPL and the OWNER. All interruptions shall have OWNER approval and 48 hour notification.

C. CONTRACTOR shall be responsible for all coordination efforts as required for providing temporary and permanent power.

1.03 CODES, INSPECTION AND FEES

A. All material and installation shall be in accordance with the latest edition of the National Electrical Code and all applicable national, local and state codes.

B. Pay all fees required for permits and inspections including any charges associated with the service modifications.

1.04 TESTS

A. Test all systems and repair or replace all defective work. Make all necessary adjustments to the systems and instruct the Owner's personnel in the proper operation of the systems.

B. The following minimum tests and checks shall be made prior to the energizing of electrical equipment. Test shall be by the CONTRACTOR and a certified test report shall be submitted stating that the equipment meets and operates in accordance with the Manufacturer's and job specifications, and that equipment and installation conforms to all applicable Standards and Specifications:

1. Testing and setting of protective relays for calibration and proper operation.

2. Mechanical inspection of all circuit breakers 200 amps and larger to assure proper operation.

3. Motors: Megger to ground each motor winding. Record date, motor temperature, terminal, reading and operator and have Owner representative sign off on each reading.

4. Conductors: Megger to ground prior to termination all 600 volt conductors not used for service conductors. Record the date, conductor,

reading and operator and have Owner representative sign off on each reading.

5. Data Base: After equipment suppliers test, calibrations, and inspection, megger all circuits leaving the MCCs and panelboards. Record the date, conductor, circuit condition (i.e. load connected or unconnected), reading and operator and have Owner representative sign off on each reading.

6. Hot Spot Testing: Perform infrared hot spot inspection of the service entrance rated automatic transfer switches, switchboards, power panels, motor control center, lighting panels and associated equipment as soon as determined by the Engineer that representative loads are present. Record the date, gear conditions found, operator and have the Owner's representative who must be present for the inspection sign off in each instance.

7. Miscellaneous:

   a. Meggering must be done at 1000 VDC for one minute. The ground plane used must be the one established at the main source of energy for conductors, service entrance rated ATS, Switchboards, MCC and panel. The motor frame may be used for the ground plane for motors.

   b. In the course of construction, it will become necessary to temporarily energize some systems for testing. Confirm that any motor has been meggered prior to connection and testing. Do not leave any motor or system unattended and energized without written authorization.

   c. An unsuccessful test will be one in which any one of the three megger readings differs from another by more than 25%. Engineer shall determine if cables and/or equipment bussing shall be replaced.

1.05 SLEEVES AND FORMS FOR OPENINGS

A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for electrical work and form before concrete is poured.

1.06 CUTTING AND PATCHING

A. All cutting and patching shall be done in a thoroughly workmanlike manner.

1.07 INTERPRETATION OF DRAWINGS

A. The Drawings are not intended to show exact locations of conduit runs.

B. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Drawings.

C. Unless otherwise approved by the Engineer conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.

D. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation.

E. The CONTRACTOR shall harmonize the work of the different trades so that interferences between conduits, piping, equipment, architectural and structural work will be avoided. All necessary offsets shall be furnished so as to take up a minimum space and all such offsets, fittings, etc., required to accomplish this shall be furnished and installed by the CONTRACTOR without additional expense to the Owner. In case interference develops, the Owner's authorized representative is to decide which equipment, piping, etc., must be relocated, regardless which was installed first.

F. Verify with the Engineer the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.

G. The locations of equipment, fixtures, outlets, and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.

H. Surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.

I. Circuit layouts shown are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting, and other electrical systems shown. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment.

J. The ratings of motors and other electrically operated devices together with the size shown for their branch circuit conductors and conduits are approximate only and are indicative of the probable power requirements insofar as they can be determined in advance of the purchase of equipment.

K. All connections to equipment shall be made as shown, specified, and directed and in accordance with the Manufacturer's approved shop drawings, regardless of the number of conductors shown on the Electrical Drawings.

1.08 SIZE OF EQUIPMENT

A. Investigate each space in the building where equipment must pass to reach its final location. If necessary, the Manufacturer shall be required to ship his material in sections, sized to permit passing through such restricted areas in the building.

B. The equipment shall be kept upright at all times. When equipment has to be tilted for ease of passage through restricted areas during transportation, the Manufacturer shall be required to brace the equipment suitably, to insure that the tilting does not impair the functional integrity of the equipment.

1.09 RECORD DRAWINGS

A. As the work progresses, legibly record all field changes on a set of project Contract Drawings. When the project is completed, furnish a complete set of reproducible "As-built" drawings and electronic files (AutoCAD 2019) for the Project Record Documents. These documents shall be 24" x 36" in size.

1.10 COMPONENT INTERCONNECTIONS

A. Component equipment furnished under this Specification will not be furnished as integrated systems. CONTRACTOR shall field install and wire completely all components.

B. CONTRACTOR shall analyze all systems components and their shop drawings, identify all terminals and prepare drawings and wiring tables necessary for component interconnection. CONTRACTOR shall provide crimp on wire numbers on both ends of all control wiring installed between all panels furnished under this contract. These numbers shall directly relate to the interconnect wiring drawing furnished by the CONTRACTOR and be reflected in the As-built drawings submitted prior to final acceptance of the project.

1.11 SHOP DRAWINGS

A. As specified under other sections shop drawings shall be submitted for approval of all materials, equipment, apparatus, and other items as required by the Engineer.

B. Shop drawings shall be submitted for the following equipment:

1. Transformers

2. Panelboards

3. Circuit Breakers

4. Surge Protection Devices

5. Wire and Cable

6. Grounding Systems and ground test reports

7. Conduit Layout Drawings

8. Equipment Racks (with Structural Engineering Certifications)

9. Coordination, Short Circuit and Arc Flash Study

10. Automatic Transfer Switch

C. The Manufacturer name and product designation and catalog data sheet shall be submitted for the following material:

1. Conduit

2. Receptacles

3. Boxes and fittings

4. Switches

5. Lamps

6. Control Relays

7. Grounding Systems Material

D. Prior to submittal by the CONTRACTOR, all shop drawings shall be checked for accuracy and contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to Specifications and Drawings. This statement shall also list all discrepancies with the Specifications and Drawings. Shop drawings not so checked and noted shall be returned.

E. The Engineer's check shall be only for conformance with the design concept of the project and compliance with the Specifications and Drawings. The responsibility of, or the necessity of, furnishing materials and workmanship required by the Specifications and Drawings which may not be indicated on the shop drawings is included under the work of this Section.

F. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this Section.

G. No material shall be ordered or shop work started until the Engineer's approval of shop drawings has been given.

1.12 MANUFACTURER SERVICES

A. Provide Manufacturer services for testing and start-up of the following equipment:

1. Automatic Transfer Switch

2. Other items as required by appropriate specification sections.

B. The Manufacturer of the above listed equipment shall provide experienced Field Service Engineer to accomplish the following tasks:

1. The equipment shall be visually inspected upon completion of installation and prior to energization to assure that wiring is correct, interconnection complete and the installation is in compliance with the manufacturer's criteria. Documentation shall be reviewed to assure that all Drawings, operation and maintenance manuals, parts list and other data required to check out and sustain equipment operation is available on site. Documentation shall be red-lined to reflect any changes or modifications made during the installation so that the "As-built" equipment configuration will be correctly defined. Spare parts shall be inventoried to assure correct type and quantity. The Manufacturer shall provide written approval that equipment supplied is approved for energization.

2. The Field Service Engineers shall provide engineering support during the energization and check out of each major equipment assembly. They shall perform any calibration or adjustment required for the equipment to meet the Manufacturer's performance specifications.

3. Upon satisfactory completion of equipment test, they shall provide engineering support of system tests to be performed in accordance with Manufacturer's test specifications.

4. Two (2) 4-hour training sessions on operation, and two (2) 4-hour training sessions (one for each system) on maintenance and trouble-shooting procedures shall be provided for the Owner's maintenance personnel. All training shall be conducted at a facility provided by the Owner. The maintenance and trouble-shooting sessions shall be conducted with record "As-built" electrical drawings sufficient for a class of eight personnel.

5. A final report shall be written and submitted to the CONTRACTOR within fourteen days from completion of final system testing. The report shall document the inspection and test activity, define any open problems and recommend remedial action. The CONTRACTOR shall forward a copy of this report to the ENGINEER for approval.

1.13 DEMOLITION

A. Remove all electrical work associated with equipment shown to be removed (TBR) except those portions indicated to remain or be reused. Remove all unused exposed conduit and wiring back to point of concealment. Remove unused wiring in concealed conduits back to source (or nearest point of usage). Electrical work to be removed corresponds to the associated mechanical equipment to be removed.

B. Where electrical systems pass through the demolition areas to serve other portions of the premises, they shall remain or shall be suitably relocated and the system restored to normal operation. Coordinate outages in systems with the Owner. Where duration of proposed outage cannot be allowed by the Owner, provide temporary connections as required to maintain service.

C. All removals and relocations of existing installations cannot be completely detailed on the Drawings. Survey the site before submitting bid proposal.

D. Continuous service is required on all circuits and outlets affected by these changes, except where the Owner will permit outage for a specific time. Obtain Owner's written consent before removing any circuit from continuous service.

E. Where required to disconnect and/or remove any part of an existing circuit, reconnect that circuit to reestablish service in the remaining portion.

F. Remove exposed conduits, wireways, outlet boxes, pull boxes and hangers made obsolete by the alternations, unless specifically designated to remain. Exposed conduits shall be removed back to point of concealment, where they shall be cut and threaded for a cap. A threaded cap shall then be installed. Conduits may be removed back to first coupling if within 3-inches of point of concealment. Cut back in traffic areas to the floor level and patch.

G. Repair all walls to "Like new" condition and paint to match existing wall color.

1.14 DISPOSITION OF REMOVED MATERIALS AND EQUIPMENT

A. In general, it is intended that all materials and equipment indicated to be removed and disposed of by the CONTRACTOR shall, upon removal, become the CONTRACTOR's property and shall be disposed of off the site by the CONTRACTOR, unless otherwise directed by the Owner.

B. Reuse of wire will not be permitted. An exception is the reuse or relocation when wire is part of an existing lighting branch circuit and reuse or relocation is specifically designated and can be accomplished without removing and re-pulling the wire.

C. All reusable and salvageable disconnect switches, starters, control devices, control panels and instruments, receptacles, light fixtures, etc. shall be sorted and returned to the Owner.

D. All electrical equipment to be salvaged shall be removed and shall be moved by the CONTRACTOR to a location on the site for storage as directed by the Owner.

1.15 CONDUIT LAYOUT DRAWINGS

A. In addition to the manufacturer's equipment shop drawings, the Contractor shall submit for the approval, electrical installation working drawings for the overall site work, electrical building, pump building and all process areas containing the following:

1. Concealed and buried conduit layouts shown on floor plans drawn at not less than 1/4-inch = 1-foot-0-inch scale. The layouts shall include locations of process equipment, distribution panelboard, transformers, lighting panelboard, control panel and equipment, motors, switches, motor starters, large junction or pull boxes, instruments, and any other electrical devices connected to concealed or buried conduits.

2. Plans shall be drawn on high quality reproducible bond, size 36-inch x 24-inch, and shall be presented in a neat, professional manner.

3. Concrete floors and/or walls containing concealed conduits shall not be poured until conduit layouts are approved.

4. Site plan conduit layout drawings shall be at 1" = 20'-0".

5. Note: AutoCAD drawing files are available from the Engineer.

1.16 MATERIALS

A. The materials used in all systems shall be new, unused and as hereinafter specified. All materials where not specified shall be of the very best of their respective kinds. Samples of materials or Manufacturer's specifications shall be submitted for approval as required by the Engineer.

B. Materials and equipment used shall be Underwriters Laboratories, Inc. listed.

C. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out-of-doors. Electrical equipment shall be stored in dry permanent shelters. If any apparatus has been damaged, such damage shall be repaired by the CONTRACTOR at his own cost and expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, at the expense of the CONTRACTOR, or shall be replaced by the CONTRACTOR at his own expense.

1.17 OPERATION AND MAINTENANCE DATA

A. Submit complete operations and maintenance data for all equipment furnished under this Division in accordance with Section 01300. The manuals shall be

prepared specifically for this installation and shall include all required cuts, Drawings, equipment lists, descriptions, complete part lists, etc. that are required to instruct operating and maintenance personnel unfamiliar with such equipment.

1.18 WARRANTY

A. Provide a warranty for all the electrical equipment in accordance with the requirements of other sections, but in no case less than 2 years from date of owner acceptance.

1.19 COORDINATION, SHORT CIRCUIT AND ARC FLASH HAZARD STUDY

A. General:

1. The Contractor shall provide a Power System Study and Arc Flash Study for the existing main breaker and new generator breaker. The studies shall be a totally independent effort to verify adequacy of all of the existing equipment as well as new additions being implemented under these Specifications. The studies shall be prepared by a professional Engineer, registered in the State of Florida, with demonstrated experience in the performance of industrial power system and fault arc hazard analysis. The Engineer may be an employee of an equipment manufacturer or supplier. All work shall be submitted both hard copy and thumb drive. The studies shall be prepared using the following software:

a. SKM Power Tools, latest version

b. No equal.

2. The Contractor shall provide data necessary to perform the study. This includes feeder cable sizes, approximate feeder length motor data, generator data, existing protective relay settings and any other information relevant to the study.

3. A summary of the short circuit analysis shall be provided to the Contractor at the time shop drawings for all of the new equipment is submitted for approval.

4. The Contractor shall provide complete sets of motor control center and emergency generator shop drawings for use in the studies.

B. Scope:

1. The short circuit study shall be in accordance with ANSI Standard C37.010 and C37.13, shall be performed to check the adequacy, and to verify the correct application of circuit protective devices and other system components specified. The study shall address the case when the system is being powered from the normal source as well as from the on-site

generating facilities. Minimum as well as maximum possible fault conditions shall be adequately covered in the study.

2. Fault contribution of all motors shall be considered. The Contractor shall be responsible for obtaining all required data of equipment. All back-up calculations shall become part of the final report. The calculations shall be in sufficient detail to allow easy review.

3. The arc flash analysis study shall include the calculations of flash protection boundary limits and the incident energy exposure for the maximum arc producing flash expected from the electrical equipment. The study will determine incident energy exposure level and flash arc protection boundaries for the electrical equipment, based on IEEE-1584 and NFPA-70E. The study shall be based on the protective device settings and interrupting device clearing time.

C. Contents:

1. The study shall include representation of the power company's system, the base quantities selected, impedance source-data, calculation methods and tabulations, one-line and impedance diagrams, conclusions and recommendations. Short-circuit momentary duties, shall be calculated on the basis of an assumed bolted three-phase short circuit at the main breaker, ATS, 480 volt motor control center, distribution panelboard, pertinent branch circuit panelboard, and other significant locations throughout the systems. The short circuit tabulations shall include significant X to R ratios, asymmetry factors, KVA, and symmetrical fault current.

2. A protective device time current coordination study shall be included with coordination plots of key and/or limiting devices, tabulated data, rating, and/or settings selected. The study shall present an Engineering balance between the competing objectives of protection and continuity of service for the system specified, taking into account the basic factors of sensitivity, selectivity and speed.

3. Separate plots shall be provided for each mode, "normal," and, "standby," operation. Maximum fault values shall be shown in each case. Both power sources shown in one plot will not be accepted.

4. Existing protective device settings in key locations shall be reviewed to ensure selectivity under the new conditions. Recommended changes shall be indicated in the report. The Contractor shall be made aware of the required changes immediately.

5. Generator short circuit decrement curves and thermal limit curves shall be included.

6. Required settings for breakers and relays shall be maximized to provide the most effective protection possible whether the system is fed from the normal or emergency source.

7. Tabulations indicating recommended set points for all protective devices shall be provided. This shall include the normal as well as the emergency source.

8. Arc Flash study shall include representation of the calculation methods and tabulations, and a one-line drawing of all identifying equipment included in this study. The complete study shall be turned over to the Owner as per 01420. as part of the study, the Contractor shall affix permanent adhesive non-fading labeling indicating the equipment ID number and required information as required by NFPA 70E. Samples of arc flash warning labels are presented below:

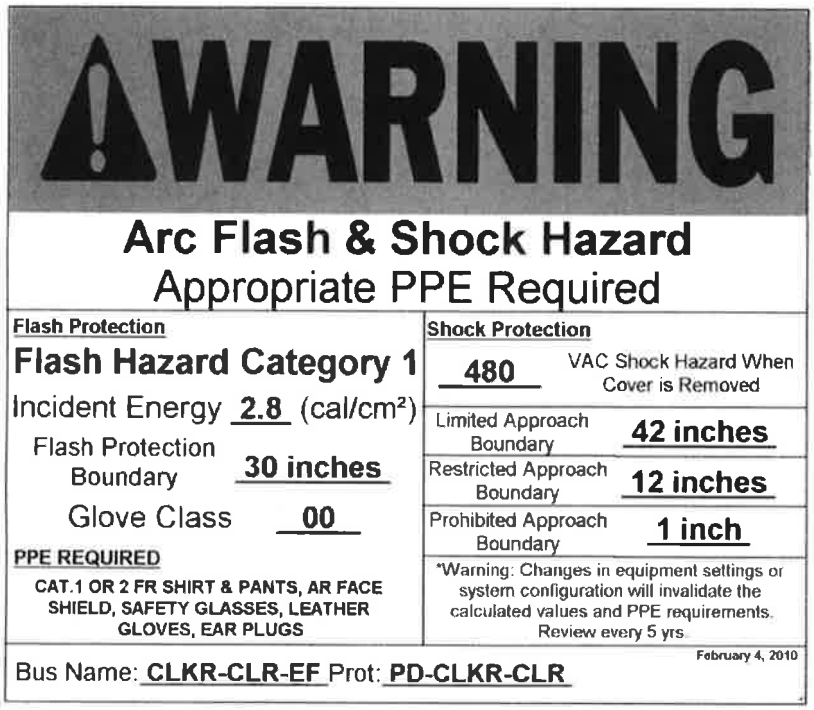


Figure 1

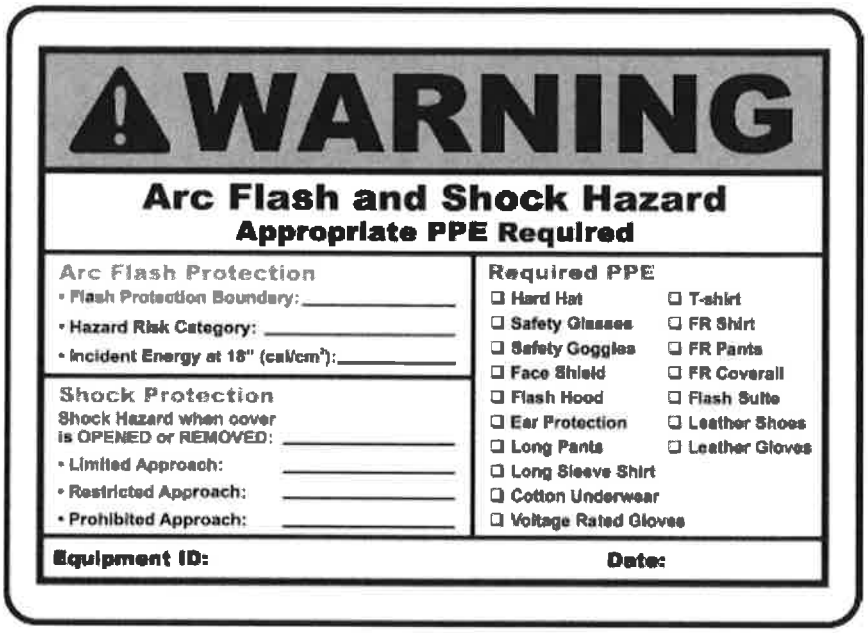


Figure 2

D. Motor Current-Time Characteristic Curves:

1. A complete independent set of current-time characteristic curves for all 480 volt motor drives indicating coordination between the protective relays and the thermal characteristics of the motor shall be provided.

2. The Contractor shall obtain from the motor supplier, the necessary information to perform the study. Certified curves for, "Safe time vs. current at 100 percent voltage," and "Accelerating time vs. current at 100 percent voltage," shall become part of the final report.

E. Motor Starting Study:

1. A motor starting study for all large electric drives to determine voltage dip or power inrush limitations at selected locations due to starting of motors shall be provided. This applies to both the normal and the emergency mode.

F. Generator Protective Devices:

1. The study shall address all of the protective devices provided for generator protection.

2. Protective relays requiring settings shall include, but not necessarily limited to:

a. Differential

b. Overcurrent with voltage restraint

c. Ground

d. Undervoltage

e. Reverse power

f. Unbalanced loading and open phase

g. Loss of excitation

G. General Information for Time-Current Curves Presentation:

1. The coordination plots shall include complete titles, representative one-line diagrams, legends, associated power company's relay or system characteristics, significant motor starting characteristics, complete parameters for power, and substation transformers, and complete operating bands for low-voltage circuit breaker trip devices.

2. The coordination plots shall define the types of protective devices selected, together with the proposed coil taps, time-dial settings and pickup settings required.

3. The short-time region shall indicate the medium voltage relay instantaneous elements, the magnetizing in-rush, and ANSI withstand transformer parameters, the low-voltage circuit breaker instantaneous trip devices, fuse manufacturing to tolerance bands, and significant symmetrical and asymmetrical fault currents.

4. Each primary protective device required for a delta-to-wye connected transformer shall be selected so that the characteristic or operating band is within the transformer parameters; which, where feasible, shall include a parameter equivalent to 58 percent of the ANSI withstand point to afford protection for secondary line-to-ground faults.

5. Low-voltage power circuit breakers shall be separated from each other and the associated primary protective device, where feasible, by a 16 percent current margin for coordination and protection in the event of secondary line-to-line faults.

6. Protective relays shall be separated, where feasible, by a 0.3 second time margin when the maximum three-phase fault flows, to assure proper selectivity.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

WIRES AND

CABLES

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish, install and test all wire, cable, and appurtenances as shown on the Drawings and as hereinafter specified.

1.02 SUBMITTALS

A. Samples of proposed wire and cable shall be submitted for approval. Each sample shall have the size, type of insulation and voltage stenciled on the jacket.

B. Installed, unapproved wire shall be removed and replaced at no additional cost to the Owner.

1.03 APPLICATIONS

A. Wire for lighting and receptacle circuits above grade shall be type THWN-2.

B. Wire for all power motor circuits and below grade lighting and receptacle circuits shall be type XHHW-2, stranded.

C. Single conductor wire for control, indication and metering shall be type MTW No. 14 AWG, 19 strand or type XHHW No. 14 AWG stranded.

D. Multi-conductor control cable shall be No. 14 AWG, 19 strand.

E. Wire for process instrumentation or shielded control cable shall be No. 16 AWG, shielded and stranded.

1.04 MINIMUM SIZES

A. Except for control and signal leads, no conductor smaller than No. 12 AWG shall be used.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All wires and cables shall be of annealed, 98 percent conductivity, soft drawn stranded copper conductors.

2.02 600 VOLT WIRE AND CABLE

A. Type XHHW-2 shall be cross-linked polyethylene (XLP); as manufactured by the Southwire Co., Collyer Insulated Wire Co., Rome Cable or approved equal.

B. Type THWN-2 shall be as manufactured by the Southwire Co., Collyer Insulated Wire Co., Rome Cable or approved equal.

2.03 INSTRUMENTATION AND CONTROL CABLE

A. Process instrumentation wire shall be twisted pair, 600V, cross-linked polyethylene insulated, aluminum tape shielded, polyvinyl chloride jacketed, type "XLP" as manufactured by the American Insulated Wire Co., Eaton Corp. "Polyset," or approved equal. Multi-conductor cables shall be supplied with individually shielded twisted pairs.

B. Multi-conductor control cable shall be stranded, 600V, cross-linked polyethylene insulated with PVC jacket, type "XLP" as manufactured by the American Insulated Wire Co., Eaton Corp. "Polyset," or approved equal.

2.04 TERMINATIONS AND SPLICES

A. Power Conductors: Terminations shall be die type or set screw type pressure connectors as specified. Splices (where allowed) shall be die type compression connector and waterproof with heat shrink boot or epoxy filling.

B. Control Conductors: Termination on saddle-type terminals shall be wired directly with a maximum of two conductors per termination. Termination on screw type terminals shall be made with a maximum of two spade connectors. Splices (where allowed) shall be made with insulated compression type connectors. Heat shrink boots shall be utilized for all outdoor splices.

C. Instrumentation Signal Conductors (including graphic panel, alarm, low and high level signals): Terminations permitted shall be typical of control conductors. Splices are allowed at instrumentation terminal boxes only.

D. Except where otherwise approved by the Engineer no splices will be allowed in manholes, handholes or other below grade located boxes.

E. Splices shall not be made in push button control stations, control devices (i.e., pressure switches, flow switches, etc.), conduit bodies, etc.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All conductors shall be carefully handled to avoid kinks or damage to insulation.

B. Lubrications shall be used to facilitate wire pulling. Lubricants shall be U.L. listed for use with the insulation specified.

C. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.

D. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only shielded instrumentation wire. Instrumentation cables shall be separated from control cables in manholes.

E. Shielding on instrumentation wire shall be grounded at one end only, as directed by supplier of the instrumentation equipment.

F. Wire and cable connections to terminals and taps shall be made with compression connectors. Connections of insulated conductors shall be insulated and covered. All connections shall be made using materials and installation methods in accordance with instructions and recommendations of the manufacturer of the particular item of wire and cable. The conductivity of all completed connections shall be not less than that of the uncut conductor. The insulation resistance of all completed connections of insulated conductors shall be not less than that of the uncut conductor.

G. All wire and cable shall be continuous and without splices between points of connection to equipment terminals, except a splice will be permitted by the Engineer if the length required between the points of connection exceeds the greatest standard shipping length available from the manufacturer specified or approved by the Engineer as the manufacturer of the particular item of wire and cable.

H. Steel fish tapes and/or steel pulling cables shall not be used in PVC conduit runs.

I. All control and instrumentation circuits and wiring shall be clearly and permanently numbered and labeled at each end so as to identify the location of the opposite end and the function of the circuit. Individual wires in a multi-wire circuit shall be identified with wire numbers. Labeling shall be in place prior to turnover of any equipment, system or sub-system to Owner.

3.02 TESTS

A. All 600-volt wire insulation shall be tested with a meg-ohmmeter after installation. Tests shall be made at not less than 1,000 VDC. Refer to specification section 16050 for additional testing requirements.

B. These tests shall be witnessed by the Engineer or Owner representative. A written report shall be submitted to the engineer for review.

GROUNDING

SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and as hereinafter specified and shown on the Drawings.

1.02 RELATED WORK

A. Wire shall be as specified under Section 16120.

B. Conduit shall be as specified under Section 16110.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ground rods: Ground rods shall be copperclad steel 5/8-inch x 20 foot. Ground rods shall be Copperweld or be an approved equal product. Install ground grid as shown on the plans.

PART 3 - EXECUTION

3.01 GENERAL

A. The service entrance equipment ground bus shall be grounded to the ground grid as indicated on the Drawings. The protecting conduits shall be bonded to the grounding conductor at both ends. The CONTRACTOR shall not allow the water pipe connections to be painted. If the connections are painted, they shall be disassembled and remade with new fittings.

B. Ground bus in all distribution panelboard shall be connected to the service entrance equipment ground bus with a No. 1/0 conductor.

C. The grounding wire shall, unless otherwise indicated on the drawings, be sized in accordance with Table 250-122 of the National Electrical Code, except that a minimum No. 12 AWG shall be used.

D. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.

E. All equipment enclosures, motor and transformer frames, conduits systems, cable armor, exposed structural steel and similar items shall be grounded.

F. Exposed connections shall be made by means of approved grounding clamps. Exposed connections between different metals shall be sealed with No-Oxide Paint Grade A or approved equal. All buried connections shall be made by welding process equal to Cadweld.

G. For reasons of mechanical strength, grounding conductors extending from the grounding grid to the ground buses of the service entrance equipment shall be No. 1/0 AWG.

H. The grounding grid conductors shall be embedded in backfill material around the structures.

I. All underground conductors shall be laid slack and where exposed to mechanical injury shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard.

J. The CONTRACTOR shall exercise care to insure good ground continuity, in particular between the conduit system and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

3.02 TESTS

A. The Independent Testing Company shall test the ground resistance of the system by 3 point method fall of potential. All test equipment shall be provided by the testing company and approved by the Engineer. Dry season resistance of the system shall not exceed 5 ohms. If such resistance cannot be obtained with the system as shown, the CONTRACTOR shall provide additional grounding as directed by the Engineer, without additional payment. The Contractor shall submit all grounding system test results and reports to the Engineer for review prior to energization.

RACEWAYS AND

FITTINGS

PART 1 - GENERAL

1.20 SCOPE OF WORK

A. Furnish and install complete raceway systems as shown on the Drawings and as specified herein.

1.21 APPLICATIONS

A. Except where otherwise shown on the Drawings, or hereinafter specified. The following describes the conduit requirements of the project:

1. All exposed raceways shall be in aluminum conduit unless otherwise noted below.

2. Underground power conductors shall be installed in Schedule 80 PVC conduits.

3. All instrumentation circuits (4-20 mA signal wire) shall be installed in PVC coated GRS conduit.

4. Underground power conductors and fiber optic cable shall be installed in Schedule 80 conduits, unless otherwise noted.

5. Conduit spacers shall be provided for underground conduit installation.

B. All conduit of a given type shall be the product of one manufacturer.

C. Unless otherwise hereinafter specified or shown on the Drawings, all boxes installed outdoors shall be NEMA 4X 316 gauge stainless steel. All boxes installed indoors, not in corrosive areas, shall be aluminum construction NEMA 1 rated.

D. Exposed switch, outlet and control station boxes and fittings shall be aluminum where installed in "noncorrosive" indoor areas, stainless steel where outdoors, and nonmetallic where installed in corrosive areas where located in NEMA 4.

E. Concealed switch, outlet and control station boxes shall be pressed steel. Terminal boxes, junction boxes, pull boxes, etc., installed outdoors shall be NEMA 4X stainless steel. Boxes installed indoors in non-corrosive areas shall be aluminum construction. NEMA rating for the PVC boxes shall be as shown on the drawings. Boxes installed in "corrosive" areas shall be nonmetallic. Hardware shall be 316 stainless steel.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Rigid Metal Conduit

1. Rigid metal conduit shall be for use under the provisions of NEC Article 344.

2. Rigid steel conduit interior and exterior shall be hot-dipped galvanized after threading and be as manufactured by the Allied Tube and Conduit Corp., Wheatland Tube Co., Triangle PWC Inc., or approved equal.

3. Rigid aluminum conduit shall be 6063 alloy and shall be as manufactured by New Jersey Aluminum Corp., AFC Co., VAW of America, Inc., or approved equal.

4. PVC coated rigid steel conduit shall have a 1/50-in thick, polyvinyl chloride coating permanently bonded to hot-dipped galvanized steel conduit and an internal phenolic coating, and shall be plasti-bond 2" as manufactured by Robroy Industries, Triangle PWC Inc., Perma-Cote Industries, or approved equal.

B. Rigid Nonmetallic Conduit

1. Rigid nonmetallic conduit shall be for use under the provisions of NEC Article 352.

2. PVC conduit shall be rigid polyvinyl chloride Schedule 80 as manufactured by Carlon, An Indian Head Co., Kraloy Products Co., Inc., Highland Plastics Inc., or approved equal.

C. Liquidtight Flexible Metal Conduit, Couplings and Fittings

1. Liquidtight flexible metal conduit shall be for use under the provisions of NEC Article 350.

2. Liquidtight flexible metal conduit shall be Sealtite, Type UA, manufactured by the Anaconda Metal Hose Div., Anaconda American Brass Co., American Flexible Conduit Co., Inc., Universal Metal Hose Co., or approved equal.

3. Fittings used with liquidtight flexible metal conduit shall be of the screw-in type as manufactured by the Thomas and Betts Co., Crouse-Hinds Co., or approved equal.

D. Flexible Couplings

1. Flexible couplings shall be as manufactured by the Crouse-Hinds Co., Appleton Electric Co., Killark Electric Manufacturing co., or approved equal.

E. Boxes and Fittings:

1. Steel elbows and couplings shall be hot-dipped galvanized. An extra 40 mil PVC protective coating shall be provided when used with PVC coated steel conduit. Joints shall be tapped.

2. Conduit hubs shall be as manufactured by Meyers Electric Products, Inc., Raco Div., Appleton Electric Co., or approved equal. Conduit hubs shall be provided for all outdoor conduit terminations.

3. Conduit wall seals shall be type WSK as manufactured by the O.Z. Electrical Mfg. Co., or approved equal.

4. Conduit wall seals for cored holes shall be type CSML as manufactured by the O.Z./Gedney Co., or approved equal.

5. Conduit wall and floor seals for sleeved openings shall be type CSMI as manufactured by the O.Z./Gedney Co., or approved equal.

6. Conduit sealing bushings shall be O.Z./Gedney Type CSB or approved equal.

F. Conduit Mounting Equipment:

1. In dry indoor areas, hangers, rods, backplates, beam clamps, channel, etc. shall be galvanized rigid steel or FRP construction..

2. Channel installed outdoors shall be 304 stainless steel with 304 stainless steel hardware.

PART 3 - EXECUTION

3.01 INSTALLATION

A. No conduit smaller than 3/4-inch electrical trade size shall be used, nor shall any have more than four 90 degree bends in any one run. Pull boxes shall be provided as required or directed. Minimum size in floor slabs shall be 3/4-inch.

B. No wire shall be pulled until the conduit system is complete in all details; in the case of concealed work, until all rough plastering or masonry has been completed; in the case of exposed work, until the conduit system has been completed in every detail.

C. The ends of all conduits shall be tightly plugged to exclude dust and moisture while the sites are under construction.

D. Conduit supports shall be spaced at intervals as required to obtain rigid construction, but in no case more than as required by the NEC.

E. Single conduits shall be supported by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the surface. Multiple runs of conduits shall be supported on trapeze type hangers with steel horizontal members and threaded hanger rods. The rods shall be not less than 5/8-inch diameter. Material type shall be as specified in Section 2.

F. Conduit hangers shall be attached to structural steel by means of beam or channel clamps. Where attached to concrete surfaces, concrete inserts of the spot type shall be provided.

G. All conduits on exposed work shall be run at right angles to and parallel with the surrounding walls and shall conform to the form of the ceiling. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduit shall be run perfectly straight and true. Conduits not installed in this fashion shall be replaced.

H. No unbroken run shall exceed 300 feet in length. This length shall be reduced by 75 feet for each 90 degree elbow.

I. Conduit terminating in pressed steel boxes shall have double locknuts and insulated bushings.

J. Conduit terminating in gasketed enclosures shall be terminated with conduit hubs.

K. Conduit wall seals shall be used for all conduits penetrating walls below grade or other locations shown on the Drawings.

L. Liquidtight flexible PVC conduit shall be used for all motor and transformer terminations and other equipment where vibration is present.

M. Flexible couplings shall be used in hazardous locations for all motor and transformer terminations and other equipment where vibration is present.

N. Conduit stub outs for future construction shall be provided with threaded PVC end caps at each end.

O. Galvanized steel conduit entering manholes and below grade pull boxes shall be terminated with grounding type bushings and connected to a 5/8" x 10" rod with a #6 bare copper wire.

P. Underground 120 volt circuits (GRS or Schedule 80 PVC) shall be installed directly to the respective distribution panelboard, lighting panels, etc. Stainless steel pull boxes shall be wall mounted on structures to eliminate excessive bends. With prior approval, below grade pull boxes, equal to Brooks #2424 (minimum), with hot dip galvanized covers and frames, may be used. Splices shall not be made in above or below grade pull boxes without prior approval.

Q. All field cut threads on galvanized steel conduit shall be cleaned and painted with zinc-rich paint before installing.

R. A 4-inch concrete conduit housekeeping pad shall be required for all exposed conduit stub-ups. This applies to ALL exposed conduits installed indoors and outdoors.

S. Installation of PVC coated conduit shall be performed in accordance with the Manufacturer's installation manual. To assure correct installation, the installer shall be certified by the Manufacturer to install coated conduit and provide a valid unexpired installer certification card.

T. All clamping, cutting, threading, bending and assembly should be done in accordance with the manufacturer's recommendation.

3.02 CONDUIT IDENTIFICATION

A. Exposed conduits shall be identified at the source, load, and all intermediate components of the raceway system. Examples of intermediate components include but are not limited to junction boxes, pull boxes, condulets, and disconnect switches. Identification shall be by means of an adhesive label with the following requirements:

1. Labels shall consist of an orange background with black text. Text for the label shall be the conduit number as indicated in the conduit and wire schedules.

2. In addition, at the source end of the conduit, a second line of text shall be included to indicate the load equipment name. This second line shall consist of the word "TO:" and the text in the 'TO' column of the conduit and wire schedule (e.g. TO: MCC-3). At the load end of the conduit, a second line of text shall be included to indicate the source equipment name. This second line shall consist of the word "FROM:" and the text in the 'FROM' column of the conduit and wire schedule (e.g. FROM: MCC-1). This requirement applies only to the source and load ends of the conduit, and not anywhere in between.

3. For conduits ¾" through 1½" in size, the text shall be a minimum 18 point font. For conduits 2" and larger, the text shall be a minimum 24 point font.

4. Label height shall be ¾" minimum, and length shall be as required to fit required text. The label shall be installed such that the text is parallel with the axis of the conduit. The label shall be oriented such that the text can be read without the use of any special tools or removal of equipment.

5. Labels shall be installed after each conduit is installed and, if applicable, after painting. Labels shall be printed in the field via the use of a portable label printing system. Handwritten labels are not acceptable.

6. Labels shall be made of permanent vinyl with adhesive backing as manufactured by Brady, Seton equivalent, Panduit equivalent, or equal. Labels made of any other material are not acceptable.

B. Conduits that are not exposed but installed beneath free standing equipment enclosures shall be identified by means of a plastic tag with the following requirements:

1. The tag shall be made of white Tyvek material, and have an orange label with black text, as described above, adhered to it. Text for the label shall be the conduit number as indicated in the conduit and wire schedules.

2. The tag shall be affixed to the conduit by means of a nylon cable tie. The tag shall be of suitable dimensions to achieve a minimum text size of 18 points.

3. Tags shall be White Tyvek as manufactured by Brady, Seton equivalent, Panduit equivalent, or equal.

MISCELLANEOUS

EQUIPMENT

PART 1- GENERAL

1.01 SCOPE OF WORK

A. Furnish and install all miscellaneous equipment as hereinafter specified and as shown on the Drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Unless otherwise noted, all NEMA 4 enclosures shall be 316 stainless steel. NEMA 4X push buttons and pilot lights shall be provided in all weatherproof control panels.

B. Dry Type Step Down Transformers:

1. Transformers shall be dry type, two winding with KVA and voltage ratings as shown on the Drawings.

2. Four full capacity taps shall be furnished, two 2 1/2% above and two 2 1/2% below rated primary voltage.

3. Transformers shall be built in accordance with ANSI C89 and NEMA ST1 4 with a maximum insulation temperature rise of 115° C.

4. Transformers shall be manufactured by the Square D Company, Eaton, or approved equal.

5. Provide NEMA Type 2 transformers as shown in the Electrical Rooms.

C. Equipment Mounting Stands:

1. Mounting stands shall be custom fabricated from ¼ inch 316 stainless steel plate and 3-inch stainless steel channel, unless otherwise shown on the drawings.

2. All hardware shall be 316 stainless steel.

D. Break-Glass Emergency (Shunt Trip) Stations:

1. Break-Glass Emergency Station shall be of the break glass design with a weatherproof cast metal outer case finished in fire red and have an attached chain hung "Hammer". A glass panel shall be mounted in front of the push button operator. Switch contacts shall be 1-open, 1-closed, rated 10 amps, 600 Volts.

2. Emergency stations shall be NEMA 4X stainless steel heavy-duty type.

PANELBOARDS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor materials, equipment and incidentals required and install all panelboards as hereinafter specified and as shown on the Drawings.

PART 2 – PRODUCTS

2.01 RATING

A. Panelboard ratings shall be as shown on the Drawings. All panelboards shall be rated for the intended voltage.

2.02 STANDARDS

A. Panelboards shall be in accordance with the Underwriter Laboratories, Inc. "Standard for Panelboards" and "Standard for Cabinets and Boxes" and shall be so labeled where procedures exist. Panelboards shall also comply with NEMA Standard for Panelboards and the National Electrical Code.

2.03 CONSTRUCTION (NEMA 1)

A. Interiors:

1. All interiors shall be completely factory assembled with circuit breakers, wire connectors, etc. All wire connectors, except screw terminals, shall be of the antiturn solderless type and all shall be suitable for copper or aluminum wire of the sizes indicated.

2. Interiors shall be so designed that circuit breakers can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be so designed that circuits may be changed without machining, drilling or tapping.

3. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. Branch circuits shall be numbered by the manufacturer.

4. A nameplate shall be provided listing panel type, number of circuit breakers and ratings.

B. Buses:

1. Bus bars for the mains shall be of copper. Full size neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Bussing shall be braced throughout to conform to industry standard practice governing short circuit stresses in panelboards. Phase bussing shall be full height without reduction. Cross connectors shall be copper.

2. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection.

3. Spaces for future circuit breakers shall be bussed for the maximum device that can be fitted into them.

4. Buses for 480V panelboards shall be rated for 65,000 amperes RMS symmetrical. Buses for 120/208V and 120/240V light and appliance panels shall be rated 10,000 amperes RMS symmetrical.

C. Boxes:

1. Recessed boxes shall be made from galvanized code gauge steel without multiple knockouts. Surface mounted boxes shall be painted to match the trim. Boxes shall be of sufficient size to provide a minimum gutter space of 4-inches on all sides.

2. Surface mounted boxes shall have an internal and external finish as hereinafter specified in paragraph D4.

3. At least four (4) interior mounting studs shall be provided.

4. All conduit entrances shall be field punched.

5. Panelboard installed in the Electrical Building shall be NEMA 1.

D. Trim:

1. Hinged doors covering all circuit breaker handles shall be included in all panel trims.

2. Doors shall have semi flush type cylinder lock and catch, except that doors over 48-inches in height shall have a vault handle and 3-point catch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Two keys shall be supplied for each lock. All locks shall be keyed alike; directory frame and card having a transparent cover shall be furnished on each door.

3. The trims shall be fabricated from code gauge sheet steel.

4. All exterior and interior steel surfaces of the panelboard shall be properly cleaned and finished with ANSI Z55.1, No. 61 light gray paint over a

rust-inhibiting phosphatized coating. The finish paint shall be of a type to which field applied paint will adhere.

5. Trims for flush panels shall overlap the box by at least 3/4-inch all around. Surface trims shall have the same width and height as the box. Trims shall be fastened with quarter turn clamps.

6. Panelboards shall be labeled to match drawings.

E. Manufacturer:

1. 480V, 3-phase, 3-wire panelboards shall be A series II as manufactured by the GE Energy Industrial Solutions, Square D Co., I-Line, Cutler Hammer or Siemens.

2. 120/240V, single phase, 3-wire, and 120/208V 3-phase, 4 wire panelboards shall be type NLAB as manufactured by the General Electric Company, Square D Co., Type NQOB, or approved equal.

2.04 CIRCUIT BREAKERS

A. Panelboards shall be equipped with circuit breakers with frame size and trip settings as shown on the Drawings.

B. Circuit breakers shall be molded case, bolt-in type.

C. Circuit breakers used in 120/240-volt and 120/208-volt panelboards shall have an interrupting capacity of not less than 10,000 - amperes, RMS symmetrical.

D. Three pole breakers used in 480V panelboards shall have an interrupting capacity of not less than 65,000 - amperes RMS symmetrical.

E. GFCI (ground fault circuit interrupter) shall be provided for circuits where indicated on the Drawings. GFCI units shall be 1 pole, 120 volt, molded case, bolt-on breakers, incorporating a solid state ground fault interrupter circuit insulated and isolated from the breaker mechanism. The unit shall be U.L. listed Class A Group I device (5 milliamp sensitivity, 25 millisecond trip time), and an interrupting capacity of 10,000 amperes RMS.

2.05 SURGE PROTECTION DEVICES

A. All panelboards shall be equipped with surge protection devices.

B. Surge suppressors used in 120/240V or 120/208V panelboards shall be ASCO 430 series or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Boxes for surface mounted panelboards shall be mounted so there is at least 1/2-inch air space between the box and the wall.

B. Unless otherwise noted on the Drawings, top of cabinets shall be mounted 6-feet 7-inches above the floor, properly aligned and adequately supported independently of the connecting raceways.

C. All wiring in panelboards shall be neatly formed, grouped, laced, and identified to provide a neat and orderly appearance. A typewritten directory card identifying all circuits shall be placed in the cardholder inside the front cover.

DIESEL ENGINE DRIVEN GENERATOR WITH WEATHERPROOF ENCLOSURE

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to install, put into operation, and field test the skin-tight sound attenuated aluminum enclosed diesel engine driven generator unit and appurtenances as shown on the Drawings and specified herein.

B. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, the shop testing, and delivery and complete installation and field testing, of all materials, equipment and appurtenances for the complete units as herein specified, whether specifically mentioned in these specifications or not.

C. For the unit, there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not. This installation shall incorporate the highest standards for the type of service shown on the Drawings. The Contractor is responsible for field testing of the entire installation and instruction of the regular operating personnel in the care, operation and maintenance of all equipment.

D. The equipment to be furnished under this Section includes; but shall not necessarily be limited to the following:

1. Skin-tight Weatherproof Sound Attenuated Enclosure.
2. 130 MPH wind load resistance rating.
3. Stairs for accessing the generator.
4. Two (2) 800-Amp, 3-pole 100% rated circuit breakers and protective relays.
5. All required duct for an engine driven radiator cooled unit.
6. Entire exhaust system, including lagging for interior piping.
7. Skid mounted, factory-piping, wiring and valves.
8. Flexible connectors and/or expansion joints for field piping.
9. Automatic control valves.
10. Pre-wired engine mounted control panels with engine instrumentation for gauges, controls and alarms.
11. Engine mounted electric starters with battery and battery charger.
12. Spring type vibro isolators.
13. Spare parts and special tools.
14. Services of a MANUFACTURER's representative.

15. Generator Enclosure and base mounted diesel fuel tank.

1.02 RELATED WORK

A. Field electric wiring and connections are included in Division 16.

1.03 DESCRIPTION OF SYSTEMS

A. The engine-generator set shall be mounted as shown on the installation drawings and shall be arranged for automatic starting and stopping, and load transfer upon failure of the normal source of power. The unit controls shall provide for automatic exercising on a weekly basis.

1.04 QUALIFICATIONS

A. The engine-generator set shall be the standard product, as modified by these specifications, of a Manufacturer regularly engaged in the production of this type of equipment. The unit to be furnished shall be of proven ability and shall be designed, constructed, and installed in accordance with best practices and methods. To qualify as a Manufacturer, the engine must be the principal item manufactured and the completed engine generator set shall be supplied by the Manufacturer's authorized distributor only. The distributor shall have a minimum of ten (10) years experience in the field of power generation.

B. It is the intent of this specification to secure an emergency generator system that has been prototype tested, factory built, production tested, site tested and of the latest commercial design, together with all accessories necessary for a complete installation as shown on the plans and drawings, and specifications herein. The equipment supplied and installed shall meet the requirements of the NEC, along with all applicable local codes and regulations. All equipment shall be new, of current production of a national firm which manufactures the engine/generator and controls, transfer switch, and assembles the emergency generator system as a matched unit so that there is one-source responsibility for warranty, parts, and service through a local representative with factory-trained servicemen.

C. The unit must be of such physical dimensions as to make a good installation in the opinion of the Engineer, in the space provided as indicated on the Drawings.

D. The unit shall be assembled in the U.S. with over 50% of the components such as the engine, generator, auxiliary equipment, etc., manufactured in the U.S. by a Manufacturer currently engaged in the production of such equipment.

E. The unit shall be shipped to the jobsite by an authorized engine distributor having a parts and service facility within a 50 mile radius of the jobsite. In addition, and in order not to penalize the Owner for unnecessary or prolonged periods of time for service or repairs to the emergency system, the bidding generator set supplier

must have no less than eighty percent (80%) of all engine replacement parts locally available at all times. Certified proof of this requirement shall be furnished to the Engineer upon request.

F. All materials and parts comprising the units shall be new and unused, of current manufacture, and of the highest grade, free from all defects or imperfections. Workmanship shall conform to the best modern practices. Only new and current models will be considered. The units offered under these Specifications shall be the product of a firm regularly engaged in the production of engine-generator equipment and shall meet the requirements of the Specifications set forth herein. Major exceptions to Specifications will be considered sufficient cause for rejection of the machines.

G. The Engine/Generator Unit shall be as manufactured by Caterpillar, no equal.

1.05 SUBMITTALS

A. Submittal shall include prototype test certification and specification sheets showing all standard and optional accessories to be supplied, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required for interconnection between the generator set, the transfer switch, and the switchgear panels included elsewhere in these specifications.

B. The successful bidder shall submit to the Engineer for review in accordance with other sections, complete sets of installation drawings, schematics, and wiring diagrams which shall show details of installation and connections to the work of other Sections, including foundation drawings showing location and size of foundation bolts for the spring type vibration isolators and brochures covering each item of equipment.

C. In the event that it is impossible to conform with certain details of the Specifications due to different manufacturing techniques, describe completely all nonconforming aspects.

D. The submittal data for the engine/generator set and weatherproof enclosure shall include, but not necessarily be limited to, the following:

1. Installation drawings showing plan and elevations of the complete generator unit; foundation plan; exhaust silencer; starting battery; battery charger; weatherproof enclosure and base mounted fuel tank.

2. Engine Data:

a. Manufacturer
b. MODEL

c. Number of cylinders
d. RPM
e. Bore x stroke
f. BMEP at full rated load
g. Piston speed, FPM
h. Make and model and descriptive literature of electric governor (where required)
i. Fuel consumption rate curves at various loads
j. Engine continuous pump drive duty rating (without fan) HP
k. Gross engine horsepower to produce generator standby rating (including fan and all parasitic loads) HP

3. Generator Data:

a. Manufacturer
b. Model
c. Rated KVA
d. Rated SKVA
e. Rated kw
f. Voltage
g. Temperature rise above 40 degree C ambient

1) Stator by thermometer

2) Field by resistance

3) Class of insulation

h. Generator efficiency including excitation losses and at 80 percent power factor.

1) Full load

2) 3/4 load

3) ½ Load

4. Generator Unit Control Data:

a. Actual electrical diagrams including schematic diagrams, and interconnection wiring diagrams for all equipment to be provided. Standard preprinted sheets are not acceptable.

b. Legends for all devices on all diagrams.

c. Sequence of operation explanations for all portions of all schematic wiring diagrams.

5. Engine/Generator Unit and Weatherproof Enclosure: Dimensional data shall be given for the Engine/Generator set and for the weatherproof enclosure.

a. Weight of skid mounted unit

b. Overall length

c. Overall width

d. Overall height

e. Exhaust pipe size

f. CFM of air required for combustion and ventilation

g. Heat rejected to jacket water and lubricating oil BTU/hr.

h. Heat rejected to room by engine and generator BTU/hr.

i. Weatherproof enclosure details and certification of manufacturing method per specifications.

j. Base fuel tank, venting, fuel connection points and fill cap location.

k. Data on all miscellaneous items supplied.

6. Optional System Service Contract:

a. Equipment Supplier Company
Name

Address

City/State

Phone Number

b. Attach the number of copies required of System Service Contract to submittal.

7. Furnish the number of copies required of the Manufacturer's certified shop test record of the complete engine driven generator unit.

8. Warranty information.

E. Submit to the Engineer operating and maintenance data.

F. Submit to the Engineer the equipment Manufacturer's Certificate of Installation, Testing, and Instruction.

G. Submit to the Engineer the written warranty as required in Paragraph 3.05 below.

1.06 TESTING

A. To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer and local representative shall be responsible for three separate tests: design prototype tests, final production tests, and site tests.

B. Design Prototype Tests: Components of the emergency system such as the engine/generator set, automatic transfer switch, and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes and pre-production models, which will not be sold, shall have been used for the following tests. Prototype test programs shall include the requirements of NFPA 110 and the following:

1. Maximum power (KW).

2. Maximum motor starting (KVA) instantaneous voltage dip.

3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-2240 and 16.40.

4. Governor speed regulation under steady-state and transient conditions.

5. Voltage regulation and generator transient response.

6. Fuel consumption at 1/4, 1/2, 3/4, and full load.

7. Harmonic analysis, voltage waveform deviation, and telephone influence factor.

8. Three-phase short circuit tests.

9. Alternator cooling air flow.

10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.

11. Endurance testing.

C. Final Production Tests: The generator set shall be tested under varying loads with guards and exhaust system in place. Tests shall include:

1. Single-step load pickup.

2. Transient and steady-state governing.

3. Safety shutdown device testing.

4. Voltage regulation.

5. Rated power.

6. Maximum power.

7. Upon request, arrangements to either witness this test will be made, or a certified test record will be sent prior to shipment.

D. Site Tests: An installation check, start-up and building load test shall be performed by the Manufacturer's local representative. The Engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test. The tests shall include:

1. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the Manufacturer's recommendations, under the environmental conditions present and expected.

2. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. These shall include: block heaters, battery charger, generator strip heaters, remote annunciator, etc.

3. Start-up under test mode to check for exhaust leaks, path of exhaust gases outside the building, cooling air flow, movement during starting and

stopping, vibration during running, normal and emergency line-to-line voltage, and phase rotation.

4. Automatic start-up by means of simulated power outage to test remote-automatic starting, transfer of the load, and automatic shutdown. Prior to this test, all transfer switch timers shall be adjusted for proper system coordination. Engine coolant temperature, oil pressure, and battery charge level along with generator voltage, amperes, and frequency shall be monitored throughout the test. An external load bank shall be connected to the system if sufficient building load is unavailable to load the generator to the nameplate KW rating.

1.07 SPECIAL TOOLS AND SPARE PARTS

A. The Manufacturer shall furnish two (2) complete spare replacement sets of all filter elements required for the generator unit.

PART 2 - PRODUCTS

2.01 RATINGS

A. The standby rating of the generator set shall not exceed the Manufacturer's published prime rating by more than 10%. The gross engine horsepower required to produce the standby rating shall not exceed the Manufacturer's published continuous duty rating by more than 150 percent. Continuous duty rating shall be as defined in BS649 or DIN6270 but in no case shall it exceed the Manufacturer's published continuous duty rating for the engine as used in continuous rated pump drive applications. The gross engine horsepower required for the generator set standby rating described above shall include all parasitic demands such as generator inefficiencies, fuel pumps, water pumps, radiator fan (for fan cooled models) and all accessories necessary to the unit's proper operation while operating at rated load and at a rotative speed not to exceed 1800 rpm.

B. The diesel engine driven generator set shall be capable of producing the specified standby kw rating for continuous electrical service during interruption of the normal utility source and shall be certified to this effect by the Manufacturer for the actual unit supplied.

C. The Diesel Engine/Generator Unit shall be rated for a minimum of 500KW (277/480 volts, 3-Phase, 60 Hertz) at 0.8 power factor with fan. The engine/generator set shall be suitable for all interruptible rate power schedules at rated KW without deviation. This shall include interrupting durations of any length. The Generator shall be suitable for starting and running the following loads:

Step#	Load Description
1	45KVA Lighting and Receptacle load
2	60-horsepower Well Pump (Soft Start)
3	60-horsepower Well Pump (Soft Start)
4	100-horsepower High Service Pump (VFD)
5	100-horsepower High Service Pump (VFD)

D. Manufacturer shall submit generator sizing load calculations as part of the generator shop drawing submittal.

2.02 ENGINES

A. The engine shall be full compression ignition, four cycle, single acting, solid injection engines, either vertical or "V" type. Speed shall not exceed 1800 revolutions per minute at normal full load operation. The engine governor shall be electronic type with a +/- 0.5 percent accuracy. Governor shall be by Woodward, Barber Coleman or Cummins EFC.

B. The engine shall be capable of satisfactory performance on No. 2 fuel oil (ASTM Designation D396). Diesel engines requiring a premium fuel will not be considered.

C. The engine shall be capable of operating at light loads for extended periods of time and shall provide a means to reduce carbonization. Periodic cleaning of exhaust ports shall not be required.

D. The engine shall be equipped with fuel filters, lube oil filters, intake air filters, lube oil cooler, fuel transfer pump, fuel priming pump, service meter, engine driven water pump, and unit mounted instruments. Unit mounted instruments shall include a fuel pressure gauge, water temperature gauge, and lubrication oil pressure gauge. The engine shall be provided with low oil pressure, high water temperature, and low coolant level and overspeed safety shutdowns of the manual reset type. Additional instruments and safety shutdowns shall be provided as noted herein.

E. Injection pumps and injection valves shall be a type not requiring adjustment in service and shall be of a design allowing quick replacement by ordinary mechanics without special diesel experience. The engines shall have an individual mechanical injection pump and injection valve for each cylinder, any one of which may be removed and replaced from parts stock. Fuel injection pumps shall be positive action, constant-stroke pumps, activated by a cam driven by gears from the engine crankshaft. Fuel lines between injection pumps and valves shall be of heavy seamless tubing.

F. The fuel system shall be equipped with fuel filters having replaceable elements. Filter elements shall be easily removable from their housing for replacing without breaking any fuel line connections, or disturbing the fuel pump, or any other part of the engine. All fuel filters shall be conveniently located in one accessible housing, ahead of the injection pumps so that the fuel will have been thoroughly filtered before it reaches the pump. No screens or filters requiring cleaning or replacement shall be used in the injection pump or injection valve assemblies. The engines shall be equipped with a built-in gear-type, engine-driven fuel transfer pump, capable of supplying fuel through the filters to the injection pump at constant pressure.

G. In addition to the standard fuel filters provided by the engine Manufacturer, there shall also be installed a primary fuel filter and a water separator in the fuel inlet line to the engine.

H. The engine shall be provided with removable wet-type cylinder liners of close grained alloy iron, heat treated for proper hardness as required for maximum liner life. The cylinder block shall be a one piece stress relieved gray iron casting.

I. The engine shall have a gear-type lubricating oil pump for supplying oil under pressure to main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, valve rocker mechanism and governor. Effective lubricating oil filters shall be provided and so located and connected that all oil being circulated is continuously filtered and cleaned. Filters shall be accessible, easily removed and cleaned and shall be equipped with a spring-loaded by-pass valve as an insurance against stopping of lubricating oil circulation in the event the filters become clogged. The engine shall have a suitable water cooled lubricating oil cooler.

J. The engine shall be provided with one or more engine mounted dry type air cleaners of sufficient capacity to protect effectively the working parts of the engine from dust and grit.

K. During each initial start of the engine, a system shall be provided to pre-lube at low idle speed. When the internal oil pressure reaches a predetermined safe value, the engine will then increase to generator set operation speed.

L. Mounting: The unit shall be mounted on a structural steel sub-base and shall be provided with spring type vibration isolators.

M. The engine shall meet the requirements of EPA Tier 2.

2.03 COOLING SYSTEMS

A. The engine shall be furnished with a unit mounted radiator-type cooling system having sufficient capacity for cooling the engine when the diesel generator set is

delivering full rated load in an ambient temperature not to exceed 120 degrees F. The radiator shall have heresite-coated core and galvanized steel structural frame to protect against corrosive environments. The engine shall be provided with a thermostatic valve placed in the jacket water outlet between the engine and the cooling source. This valve shall maintain the proper jacket water temperature under all load conditions. Total air restriction from the radiator shall not exceed 0.5 inches of water at both inlet and outlet. A flexible connecting section shall be provided between the radiator and discharge louver frame.

B. Closed circuit jacket water systems shall be treated with a rust inhibitor as recommended by the engine Manufacturer.

C. Provide one (1) unit mounted thermal circulation type water heater incorporating a thermostatic switch shall be furnished to maintain engine jacket water at minimum of 70 degrees F. The heater shall be 480-volt, single phase, 60 Hertz, size as required to achieve above noted ambient.

D. The expansion tank of the radiator shall be fitted with a low water level switch and wired into the safety shutdown system of the unit.

2.04 FUEL LEVEL/LEAK MONITORING EQUIPMENT

A. General

1. Furnish and install three (3) fuel level float switches. Two (2) switches shall be located in the main tank for high and low fuel level monitoring and one (1) shall be located in the secondary tank for fuel leak detection. The generator control panel shall provide audible and dry contact alarm output for tank leak alarm. Switches shall be factory wire to generator control panel.

2. Furnish and install one (1) fuel level transducer in the main fuel tank capable of a 4-20mA output for level monitoring.

2.05 GENERATOR, EXCITER AND ACCESSORIES

A. Rating: The generator shall be rated 500KW, 0.8 p.f., 1800 RPM 3 phase, 60 Hertz, 277/480 volts, 12 leads, extended stack, with a maximum temperature rise of 105 degrees C (both armature and field) by resistance at full rated load in ambient air of 40 degrees C. The generator shall conform to NEMA Standard MG-1.

B. Performance: The instantaneous voltage dip shall not exceed 20 percent of rated voltage when full load, at rated power factor, is suddenly applied. Recovery of stable operation shall occur within 5 seconds. Steady state modulation shall not exceed +1/2 percent.

C. Construction:

1. The generator and exciter shall be drip proof, with split sleeve, or ball race bearings. A shaft-mounted brushless exciter shall be a part of the assembly. The stator core shall be built up of high grade silicon steel laminations precision punched, and individually insulated. Armature lamination followers and frame ribs shall be welded integral with the frames for support of the stator core. A directional blower shall be mounted on the unit to draw cooling air from the exciter and over the rotor poles and through louvered openings on the opposite end.

2. The exciter shall be a fast response type, with a rotating 3-phase full-wave bridge. The exciter shall have a low time constant and large capacity to minimize voltage transients under severe load changes.

3. Generator stator and exciter stator windings shall be a full Class H insulated system with Class F temp rise, vacuum impregnated with epoxy resin which after curing shall have additional treatment of epoxy for resistance to an environment of moisture and salt air. Generator coils shall be random or machine wound, and precision made, with turn-to-turn and ground insulation of glass yard and mica materials. The average di-electric strength for the form wound coils of the ground and end turn insulation shall not be less than 400 volts per mil. Spacers shall be tightly secured between end turns, and the end turn assembly securely lashed to the support rings.

4. Generator rotor poles shall be built up of individually insulated silicon steel punchings. Poles shall be wound and bonded with high strength epoxy resin. Cage connections to the amortisseur rings shall be brazed for strong construction and permanent electrical characteristics. Each pole shall be securely bolted to the rotor shaft with bolts sized for the centrifugal forces on the rotor. Generator windings shall be braced for full line to ground fault currents, with solidly grounded neutral system.

D. Accessories and Attachments

1. Low Voltage Terminal Boxes: The generator shall have separate AC and DC low voltage terminal boxes with suitably numbered terminal strip for required connections.

2. All required P.T.'s, C.T.'s and protective relays shall be supplied by the engine-generator Manufacturer as required.

3. Space Heater: Space heater shall be installed on the generator frame to maintain temperature of the entire generator above the dew point while not in use. Power supply shall be 120 volts single phase. Heater will be automatically disconnected when engine starts. The magnetic starter for the heaters shall be mounted in the terminal box. Furnishing and installation of control and starter to be by engine/generator supplier.

E. Generator Associated Controls:

1. Voltage Regulator:

a. The generator Manufacturer shall furnish a hermetically sealed, silicon controlled rectifier type voltage regulator employing a zener reference with a +1 percent regulation for the generator. The regulator shall include 3-phase voltage sensing, automatic short circuit protection and shall include automatic under frequency protection to allow the generator to operate at no load at less than synchronous speed for engine start-up and shutdown procedures. Switches and/or fuses shall not be used to provide this protection. An over-voltage sensing module with manual reset shall be furnished with the regulator. A volts per Hz., sensing module shall be provided as part of the regulation system.

b. A voltage adjustment rheostat for 5 percent voltage adjustment on the unit shall be provided.

c. High voltage step-down potential transformers shall be provided for the voltage regulator power input and sensing circuits if required.

2. Sustained Short Circuit: A permanent magnetic exciter shall be provided on the unit for sustaining a current of 300 percent during a short circuit, permitting the generator breaker to trip on overload. To prevent possible overheating of the armature windings, appropriate relaying shall be supplied to limit the fault to ten seconds. All current transformers required shall be supplied by the switchgear Manufacturer.

2.06 WEATHER-PROTECTIVE ENCLOSURE

A. The generator set shall be provided with a skin-tight type, sound-attenuated aluminum construction housing which allows the generator set to operate at full rated load in the ambient conditions previously specified. The enclosure shall reduce the sound level of the generator set while operating at full rated load to a maximum of 74 dBA at any location 23 feet from the generator set in a free field environment. Housing configuration and materials used may be of any suitable design which meets application needs, except that acoustical materials used shall

be oil and water resistant. No foam materials shall be used unless they can be demonstrated to have the same durability and life as fiberglass.

B. The enclosure, including shall be certified by a Professional Engineer (P.E.) licensed in the State of Florida to be design rated for a wind load resistance up to 130 MPH. Provide two (2) original and six (6) copies the P.E. stamped certified wind load calculations report indicating compliance to the Owner's representative. The enclosure wind load rating is to be included on the Manufacturer's enclosure drawings.

C. The enclosure shall include hinged doors for access to both sides of the engine and alternator, and the control equipment. Key-locking and pad lockable door latches shall be provided for all doors. Door hinges shall be stainless steel.

D. The enclosure shall be provided with an exhaust silencer which is mounted inside of the enclosure, and allows the generator set package to meet specified sound level requirements. Silencer and exhaust shall include a raincap and rainshield.

E. The enclosure shall be primed for corrosion protection and finish painted with the Manufacturer's standard color. All surfaces of all metal parts shall be primed and painted.

F. Painting of hoses, clamps, wiring harnesses, and other non-metallic service parts shall not be acceptable. Fasteners used shall be corrosion resistant, and designed to minimize marring of the painted surface when removed for normal installation or service work.

2.07 FUEL SYSTEM

A. Base and Mounting - The generator set and enclosure shall be mounted and shipped to the jobsite on the formed steel sub-base provided by generator supplier. Provisions for crane unloading of the complete package shall be designed into the base of the unit.

B. The base and enclosure assembly shall allow room within the package to mount and maintain the specified battery charger, engine starting batteries, racks, and cables, main line circuit breaker, and engine-generator control panel, and other items as specified or as shown on the drawings.

C. The weight of the entire unit consisting of generator set, base, enclosure, and all other specified items including all liquids (i.e., fuel oil, lube oil, and cooling water) shall be calculated by the Manufacturer. The base of the unit shall be designed and manufactured as a heavy duty, formed steel construction with four (4) point lifting provision to support the calculated weight. Details and Manufacturer's certification of the base construction shall be included with the drawings submitted for approval as well as all weight calculations.

D. Base Tank - The unit shall be equipped with a double wall in-base UL142 fuel tank sized for a minimum of 3 days at 100% load. The fuel tank shall be supplied with a lockable, exterior located fill cap. All necessary fuel and vent lines with vent caps for proper engine performance shall be provided as well as a means to readily detect the fuel level in the tank without the use of a measuring stick.

E. The fuel tank base maximum length & width dimensions shall be shall be as noted on the drawings and be formed from steel of a minimum metal thickness of 0.25-inch (1/4-inch) and shall be fitted with low fuel level inner wall leak alarm contact for local and remote annunciation. The fuel tank height shall not exceed 24 inches.

F. If base mounted tank exceeds 24 inches in height, aluminum stairs and access platform shall be provided for all enclosure access doors and shall meet the requirements of the Florida Building Code. The stairs and access platform shall be provided with aluminum safety handrails and shall be landed on the same concrete pad to be provided with the generator. The stairs and access platform shall meet all OSHA requirements. Stairs and platform shall meet the following requirements listed below:

- Stairs and platform frame are to be manufactured from 7 Ga. A569 prime steel.
- Walking platform and stair tread are to be manufactured from 7Ga. Diamond Plate
- Platform to be supported by 2" x 2" x 1/8" square tubing
- Stair/Platform is to be primed with a two part polyurethane primer.
- Stair/Platform is to be finish coated with two part polyurethane enamel.
- Railings to be manufactured out of 1-1/4" round Aluminum pipe with adjustable elbows and Tees
- Aluminum Railings to be polished, but not painted"

G. Filter/Separator- In addition to the standard fuel filters provided by the engine Manufacturer, there shall also be installed a primary fuel filter/water separator in the fuel inlet line to the engine. The filter shall be a Racor simplex or duplex Model 1000, as required for proper fuel flow. It shall be supplied and installed by the enclosure supplier.

H. CONTRACTOR shall provide all fuel for generator testing. At conclusion of generator testing CONTRACTOR shall fill tank to capacity.

2.08 EXHAUST SYSTEM

A. Exhaust Silencer - A critical type, side inlet, end outlet, GT Exhaust 201-5100 Series, Maxim M-51, Nelson, or Silex JB silencer and a flexible stainless steel exhaust fitting properly sized shall be furnished and installed according to the

Manufacturer's recommendation. Mounting shall be provided by the Contractor as required. The silencer shall be mounted so that its weight is not supported by the engine nor will exhaust system growth due to thermal expansion be imposed on the engine. Exhaust pipe size shall be sufficient to ensure that exhaust back pressure does not exceed the maximum limitations specified by the engine Manufacturer.

B. The silencer shall be fitted with a tail pipe extension terminating at a 45° angle to prevent the entrance of rainwater. It shall also be fitted with an expanded metal bird screen.

C. Rain Skirt - At the point where the exhaust pipe flexible tubing penetrates the roof of the enclosure, a suitable "rain skirt" and collar shall be provided by the Manufacturer. It shall be designed to prevent the entrance of rain and allow for expansion and vibration of the exhaust piping without chafing or stress to the exhaust system. This detail must appear on the drawings submitted for approval.

2.09 AUTOMATIC STARTING SYSTEM

A. Starting Motor - A DC electric starting system with positive engagement shall be furnished. The motor voltage shall be 12 volts.

B. Automatic Control - Fully automatic engine start-stop controls in the generator control panel shall be provided. Controls shall provide shutdown for low oil pressure, high water temperature, overspeed, overcrank, and loss of engine coolant. Alarms for approaching high water temperature and impending low oil pressure shall also be included. Controls shall include a 45-second single cranking cycle limit with lockout or a cyclic crank system with lockout and overcrank protection.

C. Batteries - A lead-acid storage battery set of the heavy duty diesel starting type shall be provided. Battery voltage shall be 12 volts, and the battery set shall be rated no less than 225 ampere hours. Necessary cables and clamps shall be provided. The batteries shall be located in the generator enclosure floor mounted adjacent to the generator.

D. Battery Tray - battery tray shall be provided for the batteries and shall conform to NEC 480-7(b). It shall be constructed of fiberglass and so treated as to be resistant to deterioration by battery electrolyte. Further, construction shall be such that any spillage or boil-over of battery electrolyte shall be contained within the tray to prevent a direct path to ground.

E. Battery Charger - A current-limiting, automatic 12 volt DC charger shall be furnished to automatically recharge batteries. Charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. It shall include NFPA-110 annunciation alarm outputs and battery fault indication to provide early warning of system

faults. It shall also include overload protection, silicon diode full wave rectifiers, voltage surge suppressor, digital DC ammeter, and DC voltmeter, and fused AC input and output. AC input voltage shall be 120 volts, single phase. Amperage output shall be no less than ten (10) amperes. Charger shall be wall mounting type in NEMA 1 enclosure, and U.L.1236 listed as a Battery Charger for Charging Engine-Starter Batteries. The charger shall be as manufactured by SENS NRG Series, or equal per NFPA 110 and U.L. 1236. The charger shall be mounted and wired within the enclosure for the generator set by enclosure Manufacturer.

2.10 MAIN LINE CIRCUIT BREAKERS

A. Two (2) 800-amp generator 100% rated circuit breakers shall be provided for the generator.

B. Type - Main line, molded case circuit breakers mounted upon and sized to the output of the generator shall be installed as a load circuit interrupting and protection device. It shall operate both manually for normal switching functions and automatically during overload and short circuit conditions. The breaker shall include ground fault sensing that will provide an alarm to the generator control panel upon ground fault conditions.

C. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short circuit protection. The circuit breaker shall meet standards established by Underwriters Laboratories, National Electric Manufacturers Association, and National Electrical Code.

D. Generator exciter field circuit breakers do not meet the above electrical standards and are unacceptable for line protection.

E. Circuit breaker shall have battery voltage operated shunt trip wired to safety shutdowns to open the breaker in the event of engine failure.

F. Each circuit breaker shall be equipped with an auxiliary contact for remote annunciation of breaker position.

G. The rating of each circuit breaker shall allow the starting of full generator SKVA.

H. The circuit breaker enclosure, together with all specified circuit breakers, shall be designed for the specific generator set specified and be equipped with an isolated neutral conductor bus, rear copper stabs, or load cable lugs and be finish painted to match the generator set.

2.11 GENERATOR CONTROL PANEL

A. **Generator Control. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification. The control shall be mounted on the generator set. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered. The generator set mounted control shall include the following features and functions:**

1. Control Switches

   a. **Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or Manual position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.**

   b. **EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.**

   c. **RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.**

   d. **PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.**

2. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

   a. ***Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall***

indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 0.5%.

b. Digital metering set, 0.5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

c. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.

d. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

e. Digital metering is required. The analog and digital metering equipment shall be driven by a single microprocessor, to provide consistent readings and performance.

3. Generator Set Alarm and Status Display.

a. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

1) The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for function, color, and control action (status, warning, or shutdown).

2) The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.

3) The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common

shutdown lamp.

4) The control shall include an amber common warning indication lamp.

b. The generator set control shall indicate the existence of the following alarm and shutdown conditions on an alphanumeric digital display panel:

1) low oil pressure (alarm)
2) low oil pressure (shutdown)
3) oil pressure sender failure (alarm)
4) low coolant temperature (alarm)
5) high coolant temperature (alarm)
6) high coolant temperature (shutdown)
7) high oil temperature (warning)
8) engine temperature sender failure (alarm)
9) low coolant level (alarm or shutdown--selectable)
10) fail to crank (shutdown)
11) fail to start/overcrank (shutdown)
12) overspeed (shutdown)
13) low DC voltage (alarm)
14) high DC voltage (alarm)
15) weak battery (alarm)
16) low fuel-daytank (alarm)
17) high AC voltage (shutdown)
18) low AC voltage (shutdown)
19) under frequency (shutdown)
20) over current (warning)
21) over current (shutdown)
22) short circuit (shutdown)
23) over load (alarm)
24) emergency stop (shutdown)

c. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

d. The control shutdown fault conditions shall be configurable for fault bypass.

4. Engine Status Monitoring:

   a. **The following information shall be available from a digital status panel on the generator set control:**

      1) engine oil pressure (psi or kPA)
      2) engine coolant temperature (degrees F or C)
      3) engine oil temperature (degrees F or C)
      4) engine speed (rpm)
      5) number of hours of operation (hours)
      6) number of start attempts
      7) battery voltage (DC volts)

   b. **The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.**

5. Engine Control Functions:

   a. **The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.**

   b. **The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled.**

   c. **The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.**

   d. **The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.**

   e. **The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and**

engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

6. Alternator Control Functions:

a. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

b. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

c. Controls shall be provided to individually monitor all three control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions

provided shall be in compliance to the requirements of NFPA70 article 445.

d. **Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.**

e. **An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.**

7. **Other Control Functions:**

a. **The generator set shall allow network communication with the generator set control by remote devices. The control shall communicate all engine and alternator data, and allow starting and stopping of the generator set via the network in both test and emergency modes.**

b. **A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.**

8. Control Interfaces for Remote Monitoring:

a. The control system shall provide four programmable output relays. These relay outputs shall be configurable for any alarm, shutdown, or status condition monitored by the control. The relays shall be configured to indicate:

1) Generator set operating at rated voltage and frequency

2) Common Alarm-Provide one (1) common generator system output alarm for monitoring capabilities. Common alarm conditions shall be as follows:

- Low battery
- Low Fuel Level
- Fuel Leak Detection (Sub-base tank inner wall)
- Generator Trouble

(3)
Common shutdown

(4) Load shed command.

b. A fused 10 amp switched 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit whenever the generator set is running.

c. A fused 10 amp 24VDC power supply circuit shall be provided for customer use. DC power shall be available from this circuit at all times from the engine starting/control batteries.

d. All I/O from the generator control panel shall be available via dry contacts and discrete signals. Refer to the following require I/O points below for SCADA monitoring.

1) Generator Run
2) Generator Fail
3) Low Fuel Tank Level
4) Fuel Tank Leak
5) Low Battery
6) Fuel Tank Level (4-20mA signal)

PART 3 – EXECUTION

3.01 SERVICES

A. Furnish the services of a competent and experienced Manufacturer's field service technician who has complete knowledge of proper operation and maintenance of the equipment for a period of not less than two (2) days in two separate visits to inspect the installed equipment, supervise the initial test run, and to provide

instructions to the plant personnel. The first visit will be for checking and inspecting the equipment after it is installed.

B. At least one (1) of the two (2) days shall be allocated solely to the instruction of plant personnel in operation and maintenance of the equipment. This instruction period shall be scheduled at least ten days in advance with the Owner and shall take place during plant start-up and acceptance by the Owner.

C. Three final copies of operation and maintenance manuals specified must be delivered to the Engineer prior to scheduling the instruction period with the Owner.

3.02 PAINTING

A. The engine generator set and associated equipment shall be shop primed and finish coated in accordance with the Manufacturer's standard practice prior to shipment. An adequate supply of touch-up paint shall be supplied by the Manufacturer.

3.03 TESTING

A. The engine-generator set shall be given the Manufacturer's standard factory load test prior to shipment.

B. Prior to final acceptance of the generator set, all equipment furnished under this Section shall be field tested per NFPA 110 to show it is free of any defects and the generator set can operate satisfactorily under full load test using resistance type load banks (brine tanks not acceptable). Test shall be for four (4) continuous hours. Any defects which become evident at this time shall be corrected before acceptance.

C. An all-in-place static alignment check of all rotating components shall be made prior to first start-up, after unit is secured in place and all final connections are made.

D. A final alignment check and/or adjustment shall be made after the machine has run four (4) to six (6) hours with its normal connected load.

E. Contractor to provide fuel for load bank testing. Contractor to provide full fuel tank upon completion and acceptance of load test.

3.04 SYSTEM SERVICE CONTRACT

A. The supplier of the standby power system must provide a copy of and make available to the Owner his standard service contract which, at the Owner's option, may be accepted or refused. This contract will accompany documents, drawings, catalog cuts, specification sheets, wiring or outline drawings, etc., submitted for

approval to the designing Engineer. The contract shall be for the complete services rendered over a period of one (1) year.

3.05 WARRANTY

A. Equipment furnished under this Section shall be guaranteed against defective parts and workmanship under terms of the MANUFACTURER'S and dealer's warranty. But, in no event, shall it be for a period of less than five (5) years (comprehensive) from date of substantial completion and shall include labor, parts and travel time for necessary repairs at the job site. Submittal data received without written warranties as specified will be rejected in their entirety. Warranties requiring a deductible are not acceptable.

B. Warranty shall include manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

C. Parts and labor - comprehensive

D. All of the generator system equipment furnished shall be guaranteed against defects in material, parts, and workmanship. The generator system equipment warranty and associated coverage shall be for a period of five (5) years (60 months). The warranty shall be comprehensive covering all furnished system equipment including, but not limited to, the complete generator sets, remote annunciation equipment, and furnished diesel fuel oil sub base tank system equipment. The warranty shall commence on the date of satisfactory completion of generator system startup and load bank testing on site, and shall include labor, parts, travel time, expenses and expendable items (lubricating oil, coolant, filters, and other service items made unusable by the defect) necessary for repairs at the job site. The furnished generator set batteries are considered a consumable item and shall be warranted against defects in material and workmanship for a period of two (2) years from generator set startup, with no prorating.

E. The generator system supplier shall be directly capable, without subcontracting, and to be solely responsible to maintain and provide qualified Factory trained servicemen, the required stock and availability of replacement parts, technical assistance, and complete equipment warranty administration on direct behalf of the generator equipment Manufacturers. Subcontracting or rerouting of these services by the generator supplier is not acceptable. Generator Supplier written certification of compliance to the specified warranty requirements shall be included in the furnished generator system Submittals and equipment parts and operation manuals furnished to Engineer and Owner for review and approval.

F. The generator system Submittals and furnished generator system parts,

operation and maintenance manuals shall include written warranties and supporting documentation clearly indicating and certifying complete compliance by the generator supplier to provision to the Owner of these specified warranty requirements for all furnished generator system equipment.

G. The generator system supplier's failure to furnish the specified warranty coverage for the entire generator system shall be sufficient cause for Engineer / Owner complete rejection of the generator system supplier's submitted/furnished the generator system equipment. The CONTRACTOR and the generator system supplier shall be responsible for all project delays, costs, Engineer fees, and Owner revenue losses associated with any partial or complete rejection of the generator system supplier's submitted and/or furnished equipment.

AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.01 SCOPE OF WORK

E. Furnish all labor, materials, equipment and incidentals required to install, put into operation, and field test the Automatic Transfer Switch (ATS) and appurtenances as shown on the Drawings and specified herein.

F. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, the shop testing, and delivery and complete installation and field testing, of all materials, equipment and appurtenances for the complete units as herein specified, whether specifically mentioned in these specifications or not.

G. For the unit, there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not. This installation shall incorporate the highest standards for the type of service shown on the Drawings. The CONTRACTOR is responsible for field testing of the entire installation and instruction of the regular operating personnel in the care, operation and maintenance of all equipment.

1.02 DESCRIPTION OF SYSTEMS

B. The ATS shall be rated and mounted as shown on the Drawings and shall be arranged for automatic starting and stopping, and load transfer upon failure of the normal source of power.

C. All conduit and wire installation requirements are the responsibility of the Contractor.

PART 2 - PRODUCTS

2.01 AUTOMATIC TRANSFER SWITCH (ATS)

A. The automatic transfer switch shall be a standard product of a manufacturer regularly engaged in the manufacture of automatic transfer switches for a period of at least 10 years.

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

1. ASCO
2. Eaton
3. Lake Shore Electric Corporation

C. Transfer Switch Construction and General Product Requirements

1. The automatic transfer switch shall be rated for continuous duty and suitable for use in emergency situations. Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp load not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

2. The complete automatic transfer switch shall be listed under U.L. 1008 for use on emergency systems. The switch shall be circuit breaker type, mechanically interlocked with double actuator for center-off lockout position control, and labeled as Suitable for Use as Service Entrance Equipment.

3. A solid neutral assembly shall be provided.

4. The automatic transfer switch shall be rated for 42,000 AIC short circuit availability and the UL label shall indicate short time ratings when protected with breakers with short time settings per UL1008 8th edition. The manufacturer shall provide certification of compliance to all U.L. and NEMA Standards referred to above.

5. The automatic transfer switch shall be positively and reliably interlocked to prevent both sources from being simultaneously connected to the load unless intended.

6. The automatic transfer switch shall be mechanically held and electrically operated, energized by the source to which it is being transferred. It shall be double throw, actuated by two stored energy operators. Connection to the transfer mechanism shall be accomplished by a simple over-center toggle mechanism, which shall mechanically lock the main contacts in place. Main contacts shall be fully rated, self-wiping, and arc quenching. Separate arcing contacts with magnetic blowouts shall be provided.

   The automatic transfer switch shall be provided with a permanently attached means to manually operate the switch without the use of special tools, devices or fixtures. The manual operating means shall provide safety to operators performing transfer under load. The manual operator shall transfer the switch with the same contact-to-contact transfer speed as the electrical operator. The transfer switch shall be "Load Break" rated when manually operated. The inability to manually operate the transfer switch without first disconnecting loads will not be acceptable.

7. The cable entry area of the transfer switch shall be accessible from the top, bottom or front of the enclosure. All control components and wiring shall be front accessible. Location of ATS lugs shall be provided as follows:
   - Utility-Top
   - Generator-Bottom
   - Load-Top

8. The switch shall have a neutral position programmable time delay between opening one source and closing the other shall be provided. This shall allow residual voltages to decay before reapplying power to the load.

D. Automatic Transfer Switch Controls

1. Controls shall be microprocessor based and shall provide all necessary functions of the automatic transfer switch. The controller shall be equipped with a real time and date clock, battery backup, and non-volatile memory storage.

2. An HMI shall be provided containing a 16 character with automatic scrolling features for necessary data display, LCD display, LED indicating lights as specified herein, and a touch pads to allow access to the system.

3. The controller shall be equipped to accept power quality or condition signals from a variety of external relays or monitors connected to either the normal or emergency sources.

4. The controller shall store all timer and mode settings in non-volatile memory so that upon re-energizing the switch it will return to the previous position without loss of data.

5. The controller shall allow for five modes of operation: Off/Reset, Automatic, Load Test, Engine Start and Fault.

6. In the fault mode, the transfer switch shall be locked out and the reason for its failure shall be displayed on the HMI display.

7. The controller shall have complete diagnostic capabilities so that every input and output can be monitored for troubleshooting or maintenance purposes. Specifically, the transfer switch controller shall display 3-phase voltage and frequency values for both power sources. It shall also display timer functions as they execute in normal operation.

8. The controller shall have an operating range of -40°C to +85°C

9. The controller shall meet IEEE C62.41 surge test.

10. The controller shall be able to withstand unlimited power interruptions.

E. Automatic Transfer Switch Features

1. The transfer switch controller shall be equipped with no less than 6 timers as follows:

   a. Time Delay in Neutral: Adjustable time delay to provide delay between opening the contacts on one source and closing the contacts on the other source. This shall be the programmable time delay required when the automatic transfer switch is serving inductive loads. Timer shall be field adjustable from 0 to 300 seconds, in 1-second increments.

   b. Time Delay to Engine Start: Adjustable time delay after a failure of the Normal source before initiating an Engine-Start signal to allow for temporary short-duration fluctuations in voltage. Timer shall be field adjustable from 0 to 300 seconds, in 1-second increments.

   c. Time Delay to Emergency: Adjustable time delay after the engine has started before transferring the load from the Normal source to the Emergency source. Timer shall be field adjustable from 0 to 300 seconds, in 1-second increments.

   d. Time Delay to Return Adjustable time delay after the return of Normal power before retransferring the load from the Emergency source to the Normal source. Timer shall be field adjustable from 0.0 to 60.0 minutes.

   e. Engine Cool Down Timer: Adjustable time delay after retransferring the load from the Emergency source to the Normal source before shutting down the engine. Timer shall be field adjustable from 0.0 to 60 minutes, in 0.1-minute increments.

   f. Minimum Run Timer: Adjustable time delay after starting engine before shutting it down. Timer shall be field adjustable from 0.0 to 60 minutes, in 0.1-minute increments.

2. A Digital Plant Exerciser shall be provided to provide for the regular automatic exercising of the Emergency Power System on a pre-selected schedule at field adjustable periods. The controller shall allow exercising with load or without load. In the event of an engine-generator failure, when operating in the plant exerciser mode, the automatic transfer switch shall immediately return to the normal source, if available.

3. A Close Differential Under Voltage Relay shall be provided to continuously monitor normal voltage. The under-voltage relay shall be field adjustable from 70% (seventy percent) to 100% (one hundred percent) of nominal voltage. Factory set at 90% (ninety percent) pick-up and 80% (eighty percent) dropout.

4. The transfer switch controller shall incorporate A Loss of Phase protection for both sources. In the event of the loss of phase or under voltage of the normal source, the transfer switch shall immediately be disconnected from the normal source to present damage to connected equipment. The transfer switch shall automatically return to service when the power problem no longer exists.

5. To protect against regenerative voltages under a single-phasing condition, the transfer switch controller shall be equipped with a fault output terminal interconnected to a 24Vdc shunt trip, integral to the transfer switch and with built-in time delay that functions to disconnect the utility source from the load, should the emergency power source fail to start. The transfer switch shall automatically return to utility service when the power problem no longer exists.

6. Transfer switch controller shall include data logging feature to provide troubleshooting aid to field technicians.

7. Transfer switch assembly shall include 5 year warranty, inclusive of parts and labor.

8. A single-phase frequency and voltage-sensing relay shall be provided for protection against transferring to the Emergency source until the generator has reached both operating frequency and voltage.

9. A Customer Relay Interface Board shall be provided to allow customer interface to the transfer switch controls. All interfaces shall be voltage free contacts rated 10 amps at 120 Vac. The following interface points shall be made available.

    a. Engine start contacts consisting of one normally open and one normally closed contact.

    b. Switch Position contacts consisting of two normally open and two normally closed contacts.

    c. Trouble contacts consisting of one normally open and one normally closed contacts.

10. Light Emitting Diode (LED) pilot lights shall be provided on the HMI panel to indicate the following conditions:

    a. Normal Source Available
    b. Normal Switch Closed
    c. Emergency Source Available
    d. Emergency Switch Closed
    e. System not in Automatic (Flashing light)

11. A Maintenance Disconnect switch shall be provided to disconnect control circuitry from line for maintenance purposes.

12. A momentary Load Test Switch shall be mounted inside the enclosure for ease of servicing. This switch shall cycle the transfer switch through a complete transfer to emergency and retransfer to normal.

13. A Keypad Enable Switch shall be mounted inside the enclosure, which will inhibit use of the HMI operator interface.

14. An Override Pushbutton shall be provided, mounted on the inside of the enclosure to bypass the Time Delay to Return Timer.

15. Surge Protection Devices: Surge Protection Device (SPD) shall be provided on the Emergency source. SPD shall be integral to the ATS and rated 65ka per phase minimum.

16. Auxiliary Contacts Source Available: Dry contacts consisting of two normally open and two normally closed contacts shall be provided to indicate the following:

    - ATS In Normal
    - ATS In Emergency
    - ATS Fail

G. Enclosure

1. The automatic transfer switch shall be enclosed in a NEMA ICS 250, NEMA 1 factory painted steel enclosure, unless otherwise shown on the drawings.

2. The automatic transfer switch shall be front accessible only and suitable for wall mounting.

G. Source Quality Control

1. Factory test components assembled switches and associated equipment to ensure proper operation. Check transfer time and voltage, frequency and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.01 SERVICES

D. Furnish the services of a competent and experienced MANUFACTURER'S field service technician who has complete knowledge of proper operation and maintenance of the equipment for a period of not less than two (2) days in two separate visits to inspect the installed equipment, supervise the initial test run, and to provide instructions to the plant personnel. The first visit will be for checking and inspecting the equipment after it is installed.

E. At least one (1) of the two (2) days shall be allocated solely to the instruction of plant personnel in operation and maintenance of the equipment. This instruction period shall be scheduled at least ten days in advance with the OWNER and shall take place during plant start-up and acceptance by the OWNER.

F. Three final copies of operation and maintenance manuals specified must be delivered to the ENGINEER prior to scheduling the instruction period with the OWNER.

G. A three (3) year extended warranty shall be provided to the Owner from the date of shipment.

SITE

RESTORATION

PART 1 --GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall make repairs to landscaped and grassed areas that may be damaged by Contractor activities as specified herein.

1.02 SUBMITTALS

A. The Contractor shall submit submittals for review in accordance with Section 01300, Submittals.

B. The Contractor shall apply to NAU for and secure a permit to perform excavations for this Contract. All excavation activity on site shall conform to the permit requirements.

1.03 DEFINITIONS

A. The phrase "DOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. The DOT Specifications are referred to herein and are hereby made a part of this Contract to the extent of such references, and shall be as binding upon the Contract as though reproduced herein in their entirety.

1.04 PROTECTION OF EXISTING IMPROVEMENTS

A. The Contractor shall be responsible for the protection of all pavements and other improvements within the work area. All damage to such improvements, as a result of the Contractor's operations, beyond the limits of the work of pavement replacement shall be repaired by the Contractor at his expense.

1.05 GUARANTEE

A. The Contractor shall guarantee all trees, ground cover, or shrubs planted or replanted under this Contract for a period of one (1) year beyond acceptance of the project. In the event that any new tree, plant, or shrub dies within the guarantee period, the Contractor shall be responsible for replacement in kind. In the event that a transplanted (reused) tree dies within the guarantee period, the Contractor shall be responsible for replacement in kind, except that the maximum height of any new tree shall be eight (8) feet as measured from the ground surface, once planted, to the top of the tree.

PART 2 --PRODUCTS

2.01 SOD

A. Sod shall be replaced when removed or damaged during construction. Sod shall be FDOT Bermuda type.

2.02 REPLACEMENT TREES, GROUND COVER AND SHRUBS

A. Replacement trees, ground cover, and shrubs shall be of the same type, size and sound and shall be healthy, vigorous, well-branched, and densely foliated when in leaf. They shall have healthy, well-developed root systems and shall be free of disease and insect pests, eggs, or larvae.

2.03 MULCH

A. Mulch shall be windproof shredded eucalyptus. Mulch shall be clean, fresh, free of branches and other foreign matter. Mulch shall be used around all shrubs, ground covers, and tree trunks, and placed to a minimum depth of 2 inches extending from the tree trunk outward two (2) feet.

PART 3 --EXECUTION

3.01 GRADING AND SODDING

A. The Contractor shall regrade the work areas disturbed by his construction activities to the existing grade prior to commencement of construction.

B. Sod shall be placed on all grassed areas disturbed by construction activities, unless otherwise indicated on the Drawings.

C. Maintenance: Sufficient watering shall be done by the Contractor to maintain adequate moisture for optimum development of the sodded areas. Sodded areas shall receive no less than 1.5 inches of water per week.

D. Repairs to Lawn Areas Disturbed by Contractor's Operations: Lawn areas damaged by CONTRACTOR's operations shall be repaired at once by proper sod bed preparation, fertilization and resodding, in accordance with these specifications. Regardless of the condition of the lawn area (weed content etc.) prior to the Contractor working in the area, all repairs shall be made with sod.

3.02 TREES, GROUND COVER AND SHRUBS

A. Excavation and Plant Holes: Plant hole excavations shall be roughly cylindrical in shape, with the side approximately vertical. Plants shall be centered in the hole. Bottoms of the holes shall be loosened at least six (6) inches deeper than the required depth of excavation.

B. Holes for balled and burlapped plants shall be large enough to allow at least eight inches of backfill around the earth ball. For root balls over 18 inches in diameter, this dimension shall be increased to 12 inches. Where excess material has been excavated from the plant hole, the excavated material shall be disposed of as and where directed by NAU.

C. Setting of Plants: When lowered into the hole, the plant shall rest on a prepared hole bottom such that the roots are level with, or slightly above, the level of their previous growth and so oriented such as to present the best appearance. The Contractor, when setting plants in holes, shall make allowances for any anticipated setting of plants.

D. Palms of the sabal species may be set deeper than the depth of their original growth, provided that the specified clear trunk height is attained.

E. The backfill shall be made with planting mixture and shall be firmly rodded and watered-in, so that no air pockets remain. The quantity of water applied immediately upon planting shall be sufficient to thoroughly moisten all of the backfilled earth. Plants shall be kept in a moistened condition for the duration of the Contract.

F. Staking and Guying: Plants shall be staked in accordance with the following provisions:

1 Small Trees: For trees and shrubs of less than one-inch caliper, the size of stakes and the method of tying shall be such as to rigidly support the staked plant against damage caused by wind action or other effects. Trees larger than one inch and smaller than one and one-half inch caliper shall be staked with a two-inch stake, set at least 24 inches in the ground and extending to the crown of the plant. The plant shall be firmly fastened to the stake with two strands of 14-gauge soft wire, enclosed in rubber hose, or other approved covering. The wire shall then be nailed or stapled to the stake to prevent slippage.

2 Medium Trees: All trees, other than palm trees, larger than one and one-half inch caliper and smaller than two and one-half inch caliper shall be staked with two or more, two-inch by two-inch stakes, eight feet long, set two feet in the ground. The tree shall be midway between the stakes and held firmly in place by two strands of 12-gauge wire, applied as specified above for single stakes. The wires shall be tightened and kept tight by twisting.

3 Large Trees: All trees, other than palm trees, larger than two and one-half inch caliper, shall be braced with three or more two-inch by four-inch wood braces, toenailed to cleats which are securely banded at two points to the tree, at a point at least six feet above the ground. The trunk shall be padded with five layers of burlap under the cleats. Braces shall be approximately equidistantly spaced and secured underground with two-inch by four-inch by 24-inch stake pads. In firm rock soils, Number 4 steel reinforcing rods or one-half inch pipe is acceptable.

4 Palm Trees: Palm trees shall be braced with three or more two-inch by four-inch wood braces, toenailed to cleats which are securely banded at two points to the palm, at a point at least six feet above the ground. The trunk shall be padded with five layers of burlap under the cleats. Braces shall be approximately equidistantly spaced and secured underground with two-inch by four-inch by 24-inch stake pads. In firm rock soils, Number 4 steel reinforcing rods or one-half inch pipe is acceptable.

G. Pruning: All broken or damaged roots shall be cut off smoothly, and the tops of all trees shall be pruned in a manner complying with standard horticultural practice. At the time pruning is completed, all remaining wood shall be alive. All cut surfaces of one (1) inch or more in diameter, above the ground, shall be treated with an approved commercial tree paint.

H. Maintenance: Maintenance shall begin immediately after each plant is planted and shall continue until all work under this Contract has been completed and accepted by NAU. Plants shall be watered, mulched, weeded, pruned, sprayed, fertilized, cultivated, and otherwise maintained and protected. Settled plants shall be reset to proper grade position, planting saucer restored, and dead material removed. Guys shall be tightened and repaired.

I. Defective work shall be corrected as soon as possible after it becomes apparent. Upon completion of planting, the Contractor shall remove excess soil and debris and repair any damage to structures, etc., resulting from planting operations.

SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

A. Extent of site clearing is shown on drawings.

B. Site clearing work includes, but is not limited to:

1. Protection of existing trees.
2. Removal of trees and other vegetation.
3. Topsoil stripping.
4. Clearing and grubbing.
5. Removing above-grade improvements.
6. Removing below-grade improvements.

1.03 JOB CONDITIONS:

A. Traffic

Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements

Provide protections necessary to prevent damage to existing improvements indicated to remain in place.

1. Protect improvements on adjoining properties and on Owner's property.

2. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

C. Protection of Existing Trees and Vegetation

Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark.

1. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to Architect/Engineer. Employ licensed arborist to repair damages to trees and shrubs.

2. Replace trees which cannot be repaired and restored to full-growth status, as determined by arborist.

D. Salvable Improvements

Carefully remove items indicated to be salvaged, and store on Owner's premises where indicated or directed.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SITE CLEARING:

A. General

All site vegetation (i.e. trees and underbrush) within the planned construction areas shall be cleared, including their root systems and the surficial silty/organic topsoils. This clearing/stripping work shall be performed within and to a distance of at least five feet beyond the perimeter of the planned construction areas. The perimeter areas may then need to be graded to help direct surface water runoff away from the planned construction areas.

B. Topsoil

Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
2. Remove heavy growths of grass from areas before stripping.
3. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to the main root system.
4. Stockpile topsoil in storage piles in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust. Dispose of unsuitable or excess topsoil same as waste material, herein specified.

C. Clearing and Grubbing

Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing.

1. Completely remove all surface vegetation, debris and other deleterious materials including root systems and the surficial silty/organic topsoils.
2. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated to be left standing.
4. Clearing/stripping work shall be performed within a distance of at least 5 feet beyond the perimeter of the construction area.

D. Removal of Improvements

Remove existing above-grade and below-grade improvements necessary to permit construction, and other work as indicated.

3.02 DISPOSAL OF WASTE MATERIALS:

A. Burning on Owner's Property

Burning is not permitted on Owner's property.

B. Removal from Owner's Property

Remove waste materials and unsuitable and excess topsoil from Owner's property and dispose of off site in legal manner.

EARTHWORK AND SITE GRADING

PART 1 - GENERAL

1.01 SCOPE:

A. The work under this section includes the furnishing of all labor, materials, tools and equipment necessary to complete the earthwork shown on the drawings and specified herein including clearing and grubbing, stripping topsoil and grading.

1.02 GENERAL REQUIREMENTS:

A. The Owner has made borings at the site. Such boring data, including groundwater elevations or conditions are available from the Engineer's office or included in the specifications. They are presented only as information that is available which indicates certain conditions found and limited to the exact locations and on the dates indicated. The inclusion of such data shall not be interpreted as an indication of conditions that may actually be developed through the period of construction.

B. Earthwork shall be in accordance with the recommendations of the Geotechnical Report for the project and as specified herein.

C. All suitable material resulting from excavation shall be used where needed on the job site.

D. In the event that excavated material does not meet the full requirements of the job in either quality or quantity, the Contractor shall be required to furnish any necessary fill.

E. Contractor shall examine the site of the work and make his own determination of the character of materials and the conditions to be encountered on the work, and his proposal shall be based upon his own investigations. Neither the Owner nor his representatives shall be held responsible for variations found to exist between the data above referred to and actual field conditions that develop through the period of construction.

F. Underground structures and utilities shown on the drawings are located according to the best available records. However, it shall be the Contractor's responsibility to acquaint himself with all information and to locate all underground structures and utilities along the line of work in order to avoid conflict with existing facilities. Should uncharted, or incorrectly charted, piping or other utilities be

encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner. Neither the Owner nor the Engineer shall be held accountable for inaccuracies or omissions in the location or grade of facilities of this type.

G. Where actual conflicts are unavoidable, work shall be performed so as to cause as little interference as possible with the service rendered by the facility disturbed. Facilities or structure damaged in the prosecution of the work shall be repaired immediately at the Contractor's expense, in conformance with the best standard practice, to the satisfaction of the facility owner and to the extent required including replacement.

H. Benchmarks and other reference points shall be carefully maintained and, if disturbed or destroyed, shall be replaced to the satisfaction of the Engineer and at no additional cost to the Owner. Location of benchmarks and other reference points not shown on the drawings but used during construction shall be recorded on the Contractor's "As-Builts" of the Contract Drawings.

I. The use of explosives is not permitted.

1.03 PROTECTION OF EXISTING PROPERTY:

A. The Contractor shall inform himself concerning the location of existing pipelines, utilities, and structures of every type below, on or above ground which may interfere with his operations. He shall enter into the contract in full responsibility of the conditions that may be encountered and his responsibility in connection therewith. Upon award of the Contract, the Contractor shall inform the Owners of any such utilities and structures that his plan or operations may affect, in sufficient time to arrange for the work of removing, relocating or reconstructing, as may be necessary. The Contractor shall pay for the relocation of any existing overhead or underground utilities, unless otherwise shown on the drawings or authorized by the Engineer.

B. All existing pipes, poles, wires, fences, curbing, property lines, markers and other structures, which must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the Contractor. Should such items be damaged, they shall be restored at the expense of the Contractor to at least as good condition as that in which they were found immediately before the work was begun.

C. On paved surfaces, the Contractor shall attempt to avoid the use of tractors, bulldozers or other power-operated equipment which would damage such surfaces. All surfaces which have been damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they were found

immediately before work was begun. Suitable materials and methods shall be used for such restoration.

D. No charge or claim for additional compensation shall be made by the Contractor for any delay or hindrance regardless of duration, caused by the failure of the owners of structures on, under, or over the project to adjust their facilities during the progress of any portion of the contract work.

1.04 PROTECTION OF EXISTING TREES AND SHRUBS:

Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark.

A. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to Architect/Engineer. Employ licensed arborist to repair damages to trees and shrubs.

B. Replace trees which cannot be repaired and restored to full-growth status, as determined by arborist.

C. The Contractor shall inform the plant operator of the areas that will be required for construction prior to commencing operations so that the affected shrubs, plant, etc., may be removed if so desired; otherwise, said plants and shrubs shall be removed by the Contractor and replaced or replanted in kind by the Contractor upon completion of construction at no additional cost.

D. The Contractor will be required to replant or replace in kind any sod, shrubs, plants, etc., removed during construction. He will be required to block out sod in neat squares provided it is to be replanted within 48 hours, wrap root area of plants, shrubs, etc. with burlap bags, wet down, and keep in good condition for replanting. The Contractor will also be required to replace the topsoil within the limit of the construction in non-pavement areas.

PART 2 – PRODUCTS

2.01 UNSUITABLE MATERIALS:

A. Material classified as A-5, A-6, or A-7 as set forth by the latest AASHTO Soil Classification Standards shall be deemed unsuitable. All other material shall have a maximum plasticity index of 10 and a maximum liquid limit of 40.

2.02 SUITABLE MATERIAL

A. Suitable backfill and fill material shall be as defined in the Geotechnical Report for the project.

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING:

A. Clearing and grubbing shall be performed in the areas as required and where required to provide adequate work space including space for control stakes and hubs for pipeline work; and including ditches, areas where fill will be placed, and where structures will be erected. Trees and permanent structures in construction areas shall be removed as shown on the drawings or as directed. Removal of valuable trees or shrubs, if required, shall be done in cooperation with the Owner in order that they may be replanted, if so desired, by the Owner. In areas where working room is restricted, the Contractor shall protect privately owned trees and shrubs bordering the construction areas from damage and take full responsibility for such damages.

B. All trees, brush, logs, snags, leaves, sawdust, bark, weeds, rubbish and all other obstructions resting on or protruding through the surface of the existing ground shall be collected and satisfactorily disposed of in compliance with all applicable laws and regulations. All such material shall be removed to a depth of one foot below natural grade. All stumps including the major root systems shall be removed, and the area grubbed as specified herein.

C. Where excavation is done within the areas to be cleared and grubbed, all stumps and roots over one-half (1/2) inches in diameter and deleterious material thereby exposed shall be removed to a depth of one (1) foot below the excavated surface.

D. Where stumps are removed from areas other than those where subsequent excavation, filling and grading will be done, no depressions shall be left, but the resulting holes shall be filled and neatly graded to conform to the grades indicated on the drawings.

E. All material removed during clearing and grubbing shall be disposed of at a suitable City, County or private dump, and in accordance with all applicable laws and regulations. All dumping charges are to be paid by the Contractor.

F. The use of herbicides or blasting in clearing and grubbing is specifically prohibited.

3.02 BACKFILL AND FILL

A. Place specified soil material in layers to required subgrade elevations:

1. In excavations, use satisfactory excavated or borrow material.

2. Under grassed areas, use satisfactory excavated or borrow material.

3. Under walks and pavements, use subbase material, or satisfactory

3.02 STRIPPING TOPSOIL:

A. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

B. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

C. Remove heavy growth of grass from areas before stripping.

D. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.

E. Stockpile topsoil in areas shown, or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust. Dispose of unsuitable or excess topsoil same as waste material.

3.03 REMOVAL OF IMPROVEMENTS

A. Remove existing above-grade and below-grade improvements necessary to permit construction, and other work as indicated.

3.04 DUST CONTROL:

A. If, in the opinion of the Owner, it is necessary to control dust from time to time during the progress of the work, the Contractor shall furnish and spread calcium chloride at the site of the work as directed at no additional cost to the Owner.

3.05 EXCESS MATERIAL:

A. Remove waste materials and unsuitable and excess topsoil from Owner's property and dispose of off-site in legal manner.

B. Burning is not permitted on Owner's property.

C. Place excess topsoil and suitable excavated material in berm as indicated on the drawings.

3.06 GRADING:

A. Grade all areas as indicated. Fill shall be brought to finish grades shown and shall be graded to drain water away from structures.

B. Within the limits of construction and outer limits of clearing and grubbing, all holes and other depressions shall be filled, all mounds and ridges cut down, and the area brought to sufficiently uniform contour that the Owner's subsequent mowing operations will not be hindered by irregular terrain. This work shall be done regardless of whether the irregularities were the result of the Contractor's operations or originally existed.

3.07 SILTATION AND EROSION:

A. The Contractor shall take steps and make provisions to minimize siltation and erosion which may result from, or as a result of, his operations during the course of construction of this project.

STRUCTURAL EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work specified herein and elsewhere:

1. Work under this Section includes:

a. Excavation and backfill for structures.

b. Structural fill.

c. Granular bedding and fill under concrete slabs.

d. Disposal of excess excavated material.

1.02 CLASSIFICATION:

A. Excavation will be unclassified regardless of the nature of the materials encountered.

1.03 SUBMITTALS:

A. Submit product data and an 8 inch by 10 inch sample of proposed filter fabric. If requested by the Engineer, furnish certification that filter fabric meets specified chemical and physical requirements.

1.04 DELIVERY AND STORAGE:

A. During shipment and storage, protect plastic filter fabric from direct sunlight, ultraviolet rays and temperatures over 140 degrees F.

PART 2 - PRODUCTS

2.01 STRUCTURAL FILL:

A. Structural fill shall be a coarse aggregate complying with the following gradation:

U.S. Standard Sieve Size	Percent Passing By Weight
1-1/2 Inch	100
1 Inch	90 - 100
1/2 Inch	60 - 90
No. 4	35 - 55
No. 16	10 - 40
No. 200	4 - 12

2.02 GRANULAR FILL:

A. Granular fill shall consist primarily of sand and gravel, free from vegetation or other deleterious material. Any coarse aggregate contained in the material shall pass the 1-1/2 inch sieve. Not more than 15% of fines shall pass the No. 200 sieve.

2.03 BACKFILL:

A. Backfill may be previously excavated materials free from cinders, construction debris, vegetation, or other extraneous material and suitable for the intended purpose and compaction requirements.

2.04 GRANULAR DRAINAGE BLANKET:

A. Granular drainage blanket material shall be coarse aggregate complying with the following gradation:

U.S. Standard Sieve Size	Percent Passing by Weight
3 Inch	100
1 Inch	90 - 100
No. 4	50 - 100
No. 16	30 - 80
No. 50	0 - 20

No. 200

0 - 4

2.05 PLASTIC FILTER FABRIC:

A. Plastic filter fabric shall be woven or non-woven fabric consisting of monofilament strands of nylon, polypropylene, vinylidene, chloride, or other approved material. Plastic filter fabric shall be free of defects or flaws which significantly affect its physical properties. Filter fabric shall have the following properties:

Equivalent Opening Size (EOS) Max. .004 in.

Min. .001 in.

Weight (ASTM D1910)

Min. 4.0 oz./sq. yd.

Absorption (Water)

Max. 1% by weight

Grab Strength, Wet (ASTM D1682) Min. 80 lbs./in.

Elongation (ASTM D1682)

Min. 10%

2.06 GRANULAR FILTER:

A. Granular filter material shall be coarse aggregate complying with the following gradation:

U.S. Standard Sieve Size	Percent Passing by Weight
3/4 Inch	100
1/2 Inch	94 - 100
3/8 Inch	75 - 95
No. 4	20 - 50
No. 16	0 - 6

PART 3 - EXECUTION

3.01 STRUCTURAL EXCAVATION:

A. Excavate to the depth and dimensions necessary for the construction; maintain excavations in good order; and provide barricades and warning lights as required. If underground utilities and/or structures not shown on the Drawings are encountered, notify the Engineer and do not proceed until instructions are obtained. Notify the Engineer if running water is encountered.

B. The bottom of all excavations shall be undisturbed earth unless otherwise noted, and shall be approved before subsequent work is started.

C. If the bottom of excavations consists of material unstable to such a degree that, in the opinion of the Engineer, it cannot adequately support the structure, overexcavate and backfill with well-compacted granular fill or lean (2500 psi) concrete. Where excavation and backfill below the Limits of Excavation defined on the Drawings is ordered in writing by the Engineer, such additional excavation and backfill will be paid for as Extra Work. Where the Limit of Excavation is not defined, the Limit shall be taken as the base of the footing.

D. Dewatering: The contractor is solely responsible for the design, installation, operation and subsequent removal of dewatering systems and their safety and conformity with local codes and regulations. The system shall be subject to approval by the Engineer. Prevent surface and subsurface water and ground water from flowing into excavations. At all times maintain excavations free from any accumulation of water. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations. Locate sumps outside of load bearing areas. Maintain groundwater elevation at least 2 feet below the excavation subgrade during fill, backfill and compaction work. Allow groundwater table to rise gradually as the fill/backfill work proceeds. The method of disposing of water pumped from the excavation shall be approved by the Engineer prior to actual disposal.

E. Do not excavate for any structure until that structure is scheduled for construction. If the bearing capacity of the foundation soils is reduced because the excavation is allowed to remain open prior to commencing work, the weathered soil shall be removed and replaced with lean (2500 psi) concrete or compacted granular fill at the expense of the Contractor.

F. Excavations carried below depths indicated on the Drawings without the previous approval of the Engineer shall be filled with lean (2500 psi) concrete or compacted granular fill to the correct elevation at the expense of the Contractor.

G. Side forms on footings will not be required if the soil is stable and square corners and straight sides are maintained until concrete is placed; otherwise, excavate outside the foundation lines to allow for installation and removal of formwork and for inspection.

3.02 FILLING, BEDDING, AND BACKFILLING:

A. General:

1. Obtain the Engineer's approval of existing conditions before starting filling operations. Remove all vegetation, formwork, rubbish, and other debris. Excavate muddy subgrade.

2. Place backfill material in 4 inch loose depth layers and compact with hand tampers or by hand-operated mechanical tampers.

3. Compact top 12 in. of subgrade and each layer of backfill material to not less than 95 percent maximum dry density for cohesive material determined in accordance with ASTM D 1557; and 95 percent relative density for cohesionless material determined in accordance with ASTM D 2049.

B. Structural Fill:

1. Provide structural fill under all water containing structures and tanks or where otherwise indicated on the drawings to achieve necessary lines and grades under foundations.

C. Granular Fill:

1. Provide granular fill where indicated on the Drawings to achieve necessary grades under non water containing structure concrete slabs and elsewhere, as indicated.

D. Granular Drainage Blanket:

1. Provide granular drainage blanket as indicated on the Drawings under slabs and against walls to provide for the free movement of water to the weep holes.

E. Filter Fabric:

1. Provide filter fabric as indicated on the Drawings.

F. Granular Filter:

1. Provide a cubical deposit of material as indicated on the drawings.

G. Backfilling:

1. Do not backfill until new concrete has properly cured and any required tests have been accepted.

2. Exercise care during backfilling operations.

3. Where backfilling is required on both sides of structures, backfill and compact simultaneously on opposite sides in even layers. Other backfilling sequences shall be as specifically indicated.

3.03 DISPOSAL OF EXCAVATED MATERIAL:

A. Excess excavated material not suitable or required for backfilling or site grading, and all materials containing slag, cinders, foundry slag, debris, and rubble shall be removed from the site and legally disposed.

3.04 COMPACTION CONTROL AND TESTING:

A. Employ, at Contractor's expense, a testing laboratory to perform soil testing and inspection service for quality control testing.

B. Testing service to inspect and approve subgrades and fill layers before further construction work is performed.

C. Perform field density tests in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method) or ASTM 2922 and ASTM 3017 (Nuclear Testing Method) as applicable.

1. Footing Subgrade: For each subgrade conduct one test to verify required design bearing capacities.

a. Water Containing Structure and Building Slab Subgrade: One field density test of subgrade for each 2,000 sq. ft. of overlaying concrete covered area, minimum 3 tests. One field density test for each layer of compacted fill, for each 2,000 sq. ft. of overlaying concrete covered area, minimum 3 tests each layer.

b. Foundation Wall Backfill: 2 field density tests, at locations and elevations as directed.

D. If in the opinion of the Engineer, based on the testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing until satisfactory results are obtained.

DEWATERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

7. Provide all labor, materials, necessary equipment and services to complete the dewatering Work, as indicated on the Drawings, as specified herein or both.

1.03 RELATED WORK:

A. Section 31 22 19 - Earthwork and Site Grading

B. Section 31 23 16 - Strutural Excavation and Backfill

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. Dewatering, where required, may include the use of temporary reservoirs and diking, well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment must be maintained on the job site and operate within any local noise ordinance limits. All safety requirements, fencing, etc. shall be installed and maintained by the Contractor.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

A. The Contractor shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.

C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations, Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with pea rock at no additional cost to the Owner.

F. The Contractor shall maintain the water level below the bottom of excavation in all Work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.

G. The Contractor shall prevent flotation by maintaining a positive and continuous removal of water. The contractor shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand-packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

I. The Contractor shall dispose of water from the Work in a suitable manner without damage to adjacent property. Contractor shall be responsible for

obtaining any permits that may be necessary to dispose of water. No water shall be drained into Work built or under construction without prior consent of the Engineer. Water shall be filtered using a silt box or another approved method to remove sand and fine-sized soil particles before disposal into any drainage system. The Engineer prior to being used shall approve dewatering disposal points. Storm drains used by the Contractor for dewatering shall be cleaned by a jet vac, or other method approved by the Engineer after dewatering is complete.

J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

K. Dewatering of trenches and other excavations shall be considered, as incidental to the construction of the Work and all costs thereof shall be included in the various Contract prices in the Bid Forms, unless a separate Bid item has been established for dewatering.

L. The Contractor shall submit a dewatering plan to the Engineer for review. The Contractor is advised that the FDEP and/or SJWMD may require that a dewatering plan, prepared by a State of Florida licensed Professional Engineer or Registered Professional Geologist, be submitted and approved prior to issuance of a dewatering permit.

M. The Contractor is advised that the FDEP may have identified contaminated sites within 1/4-mile radius of the Project site. The Contractor may be required to provide testing and monitoring of the dewatering operations, and to institute dewatering methods and controls, as required by FDEP.

3.02 QUALITY CONTROL:

A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished Project and shall be the responsibility of the Contractor.

C. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement, which may develop. The responsibility for conducting the dewatering operation in a manner, which will protect adjacent structures and facilities, rests solely with the Contractor. The

cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

3.03 CONTRACTOR SUBMITTALS:

A. Prior to commencement of excavation, the Contractor shall submit a detailed plan and operation schedule for dewatering of excavations. The Contractor may be required to demonstrate the system proposed and to verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times. The Contractor's dewatering plan is subject to review by the Engineer and regulatory agencies.

3.04 Measurement and Payment

A. There shall be no special measurement or payment for the Work under this Section. It shall be included in the appropriate lump sum price Bid.

SOIL COMPACTION CONTROL

PART 1 - GENERAL

1.01 GENERAL:

A. Section Summary

1. This section applies to control of soil compaction.

2. All work this section shall be performed in accordance with the requirements of the Owner's Geotechnical Engineer.

1.02 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General, Special and Supplementary Conditions and Divisions 00 and 01 Specification Sections, apply to this section.

1.03 COMPACTION REQUIREMENTS:

A. The percent compaction of maximum dry density as specified under Section 1.03, and required for fill and embankment areas within the scope of the project, unless otherwise defined in other Sections, are as follows:

1. General Fill Areas not located under roads, buildings, or other structures, 90% compaction, with reference to Standard Proctor.

2. Fill Sections required for construction of roads and drives, 95% compaction, with reference to Standard Proctor.

3. Backfill for underground utilities not falling under roads, or structures, including electrical conduit and duct banks, sewers, and general piping, 90% compaction, with reference to Standard Proctor.

4. Backfill for underground utilities, as listed above, but falling under roads, drives or structures, 95% compaction, with reference to Standard Proctor.

5. Fill materials supporting roadways, parking areas, sidewalks, structures, and buildings and backfill around structures shall be compacted to 95 percent of the maximum dry density in accordance with ASTM D 698. The top 12-inches of fill materials supporting structures or pavement shall be compacted to 98 percent of the maximum dry density. The moisture content of the fill shall be as required in order to attain the degree of compaction specified. The fill materials shall be placed in layers which, before compaction, shall not exceed 8 in., unless otherwise specified. Each layer shall be spread uniformly and evenly and shall be thoroughly blade mixed during the spreading to insure uniformity of material in each layer.

6. The filling operation shall be continued as specified above until the fill has been brought to the slopes and grades as shown on the contract drawings, making proper allowances for thickness of topsoil, payment, floor slab, etc.

7. The fill shall be constructed in such a manner that the surface will be sloped to drain at all times and all fill shall be deposited to prevent excessive moisture accumulation from rain water. When the work is interrupted by rain, fill operations shall not be resumed until field tests indicate that the moisture content and density of the top 6 in. of fill is within the limits hereinbefore specified.

8. Where fills are made on hillsides or slopes, the slope of the original ground upon which the fill is to be placed shall be plowed or scarified deeply or where the slope ratio of the original ground is steeper than 5.0 horizontal to 1.0 vertical, the bank shall be stepped or benched, when considered necessary by the Engineer, in order that the placement of the fill be accomplished in horizontal layers.

1.04 COMPACTION RESULTS:

A. The soils technician is to advise the Engineer immediately of any compaction tests failing to meet the specified minimum requirements. The Engineer will inform the soils technician of any retesting required. Formal reports of all test results will be submitted.

B. The soils technician is also to advise the Contractor's superintendent immediately of any compaction tests failing to meet the specified minimum

requirements. No additional lift is to be placed on a lift with any portion failing test unless authorized by the Engineer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

EARTHWORK FOR

UTILITIES

PART 1) - GENERAL

1.01 DESCRIPTION:

i) The work includes excavating, trenching, backfilling, compacting, grading and testing for the construction and installation of pipelines and related utilities for electric, telephone, fire, potable water and sewer services.

ii) Excavation will be open-cut unless otherwise shown on the drawings.

iii) Include clearing and grubbing, construction of cribbing and cofferdams, dewatering and incidental work.

iv) Whenever any piping, cable, telephone lines or other utility is encountered in excavation or other work, the Contractor shall notify the Owner, Engineer and applicable utility company immediately.

1.02 JOB CONDITIONS:

i) Obtain all required approvals, permits and licenses before installing pipelines under existing roads and follow the rules and requirements of the authority having jurisdiction,

ii) If unauthorized overexcavation occurs, repair the area by backfilling with approved select material and compacting to required density.

1.03 EXCAVATION CLASSIFICATION:

i) Regardless of the nature of material excavated, all excavation will be considered unclassified.

PART 2) - PRODUCTS

2.01 GENERAL:

i) Backfill material shall be approved before use and shall be free of roots, brush, debris and other objectionable material.

ii) Excavated Materials: Use only approved material for backfill and provide additional material from approved sources. Excess excavated material for backfill may be transported and used in areas of deficiency.

2.02 SELECT BACKFILL:

i) Utility Lines: Use suitable material in which all material passes a 3/8 inch sieve with not more than 10 percent passing a No. 200 sieve. Excavated material which meets this grading requirement may be used for select backfill.

PART 3) - EXECUTION

3.01 TRENCH EXCAVATION:

i) General: Excavate trenches to lines, grades and elevations indicated or staked in the field. Fine grade the trench bottom throughout and excavate to accommodate joints and connections so the barrel of the pipe will receive bearing pressure throughout the trench bottom.

ii) Trenching Guidelines: For excavation, trench width and depth shall be as follows: ample width to allow a minimum free working space; width of hand excavated trenches may be reduced providing approval is given, stability of soil is consistent with depth of trench required and pipe can be satisfactorily installed to line and grade and properly backfilled. Hand excavate placements for thrust blocks, grade and trim sides straight upward to original ground; pump off water which has accumulated in low ground and keep excavation drained of water.

iii) If water is allowed to stand and the earth is softened, the earth shall be completely dried or replaced with firm material and the proper back-fill placed before construction can proceed.

3.02 SHORING AND SHEETING:

i) Construct and maintain all shoring and sheeting necessary to protect the excavation and as required by applicable State and Federal laws.

ii) Do not disturb or remove timber or other sheeting driven to a depth below the elevation of the top of the pipe.

iii) Remove all other sheeting and shoring when safe to do so. Any portion wholly buried by earth and at least 18 inches from any timber members of permanent structures need not be stripped.

3.03 BACKFILL:

i) General: Where placed in the road shoulder, the top 12 inches of back-fill shall be limerock, clay or suitable material mixture compacted to 95 percent density. Prior to final inspection and acceptance, level areas of fill to surrounding ground surface. Do not backfill until all piping has been inspected, tested and approved for backfilling.

ii) Trench Backfill:

(1) Backfill trenches immediately after approval of the line construction.

(2) Utility Line Backfill: Where lines are placed in the road shoulder, the top 12 inches of the backfill shall be limerock, clay or suitable material mixture compacted to 95 percent density. Use select backfill carefully placed in uniform layers not exceeding 6 inches in thickness to a depth of 1 foot over the top of the pipe. Place material and fill the area under the pipe haunches. Place each layer, moisten, then uniformly compact by use of hand, pneumatic, or mechanical tampers exercising care to prevent lateral displacement. Areas of backfill 1 foot to 4 feet over top of pipe or 1 foot over top of pipe to top of trench, whichever is less, shall be backfilled with a select material containing rocks no larger than 8 inches in the greatest dimension and shall be free of material with an exceptionally high void content. Backfill for more than 4 feet over top of pipe, as approved, meeting above requirements, except size of rocks, will not be limited. Moisten backfill above 1 foot over the top of the pipe and place in 8-inch layers. Puddling or flooding of trench for consolidation of backfill or use of wheel rolling by construction equipment shall not be done. Compact each layer with hand, pneumatic, or mechanical compactor.

(3) Electric Conduit Trench: The same requirements shall apply for electric conduit as specified above except that select backfill is only required 4 inches above the top of the cable. Sharp rocks which could cut the conduit coating shall not be used.

3.04 CLEANUP:

i) Finish grade all disturbed areas with no abrupt changes in grade or irregularities that will hold water. Prior to final inspection and acceptance, remove all rubbish and excess material and leave area in a neat, satisfactory condition.

As-Builts Requirements

Nassau County Engineering Services Department
96161 Nassau Place
Yulee, Florida 32097

AS-BUILT REQUIREMENT CHECKLIST:

The following list is intended to highlight the majority of the as-built requirements for Construction projects in Nassau County. This list should not be considered to be all-inclusive as each project is unique in nature and may require additional information that can only be determined during the course of the project's completion. Generally, however, the AS-BUILT information shall contain the following:

1. AS-BUILTS should be based on the design plans as approved through the DRC process. The submitted as-builts should be at the same scale and have the same orientation as the design files.

2. AS-BUILTS should have the same page numbering as the design plans, and the cover of the AS-BUILT plans should have all sheets from the design plans listed with sheets not "AS-BUILTED" stricken through.

3. AS-BUILTS should display the original design information as displayed on the plan sheets with the design information stricken through and the as-built information displayed in bold adjacent to the design information.

4. AS-BUILTS shall be accompanied by an "Engineer's Certification" form from the Engineer of Record. (Exhibits 3 & 4)

5. Three {3) sets of fully signed and sealed AS-BUILTS should be submitted along with CD containing the PDF file(s) and CADD file(s) of the AS-BUILT information. CADD files should be in State Plane coordinates (NAD 83) with a vertical datum of NAVD88 or NGVD 1929 (with the datum shift noted). Furthermore, CADD files should only be submitted in ACAD version 2013 or later.

6. Northing and Easting of all drainage structures should be included.

7. The plans should be clearly legible, and all structure notes, distances, angles and elevations should be clearly readable.

8. If the plan represents a phase of a development, then that phase should be clearly identified for clarity and avoid confusion with future phases.

9. There should be a north arrow and scale on each sheet.

10. A legend should be included explaining the symbols used in the plans.

11. ALL sheets must be signed and sealed by a surveyor licensed in the State of Florida.

Phone (904) 530-6225 Fax (904) 491-3611

12. There should be sufficient "plan" and "as-built" elevations shown to verify that the streets were constructed substantially in accordance with the approved construction plans. Generally, the County will review all low points and high points in the street and verify that the minimum grade exists for each street. On straight sections between high and low points elevations should be taken every 200 feet.

13. All street curve radii should be shown on the plans or in a table.

14. Street widths and curb type should be identified for each street on each sheet.

15. Whenever there are islands within the streets the as-builts should include dimensions for these islands.

16. The paved radii of all Cui-de-Sacs should be listed and Cul-De-Sac center and edge of pavement or gutter elevations at quarter points shall be shown.

17. All underdrains should be shown with size, lengths, inverts and cleanouts all shown.

18. Where swales are utilized there should be sufficient flow line elevations and ditch cross sections to verify capacity of the channel.

19. There should be a comparison table of design and as-built pipe sizes, lengths, invert elevations, and pipe slopes.

20. The as-built surface area of the pond(s) at Normal Water Level (design) and Top of Bank (as-built) should be included.

21. The bottom elevation and area should be shown (2 locations min. per pond).

22. The surveyor shall certify by note (for each pond) that no slope is greater than 1:4 above the design NWL, unless the pond is fenced.

23. All structures in the pond (overflow weirs, etc.) should be included.

24. All water main and sewer main locations, size, lengths, inverts, etc.

25. All easements required (or on a plat) should be shown on the "As- Builts" and improvement located so as to verify improvements are within the easement. Easement not recorded as part of the recorded plat including drainage and right-of-way easements shall also be identified as "as-built". For these easements the book and page of their record, property to whom easement is dedicated and date of filing should be shown on as the "as-built". All improvements intended to be within these easements shall be shown as the "as-builts" to verify the improvements are within the easement. Wetlands are not reviewed by Nassau County and need not be shown.

26. Depict all storm drain and utility repair locations and methods.

Attachment “D”

Plans/Drawings

NASSAU COUNTY - AMELIA ISLAND WWTP
GENERATOR REPLACEMENT PROJECT

Prepared For:

96135 NASSAU PLACE
SUITE 1
YULEE, FL 32097

Prepared By:

gai consultants

1301 RIVERPLACE BOULEVARD
SUITE 900
JASKSON, FLORIDA 32207
PHONE: (904) 363-1110

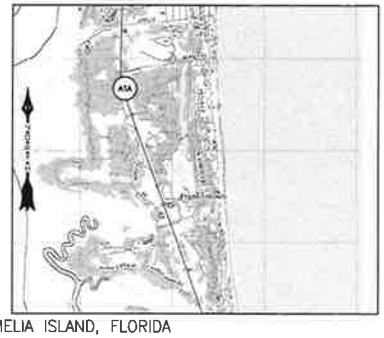
MARCH, 2020

NASSAU PROJECT NO.
PROJECT BID NUMBER.

NASSAU COUNTY OFFICIALS

COMMISSION CHAIRMEN	DANIEL B. LEEPER
COMMISSION VICE CHAIR:	PAT EDWARDS
COMMISSIONER:	JUSTIN M. TAYLOR
COMMISSIONER:	AARON C. BELL
COMMISSIONER:	THOMAS R FORD
COUNTY MANAGER:	MICHAEL S MULLIN

LOCATION MAP



AMELIA ISLAND, FLORIDA

BASE MAP USGS, AMELIA NASSAU COUNTY 7.5 MINUTE QUADRANGLE

CONTACT LIST

OWNER'S REPRESENTATIVE	CIVIL ENGINEERS
NASSAU COUNTY ENGINEERING SERVICES	GAI CONSULTANTS, INC.
96161 NASSAU PLACE	1301 RIVERPLACE BOULEVARD
YULEE, FLORIDA 32097	SUITE 900
(904) 530-6225	JACKSONVILLE, FLORIDA 32801
ATTN: .	(561) 465-8001
	ATTN: JULES JAY AMENO, P.E.

=== BID SET ===

THE SCALE OF THESE PLANS DEC HAVE CHANGED DUE TO REPRODUCTION

INDEX OF DRAWINGS

DWG. NO.	TITLE
-	COVER SHEET
G-1	INDEX OF DRAWINGS / GENERAL SITE MAP
G-2	GENERAL NOTES
G-3	STANDARD ABBREVIATIONS AND SYMBOLS

DWG. NO.	TITLE
	ELECTRICAL
E-01	ELECTRICAL NOTES, SYMBOLS AND ABBREVIATIONS
E-02	ELECTRICAL SITE PLAN
E-03	EXISTING SINGLE LINE DIAGRAM
E-04	PROPOSED SINGLE LINE DIAGRAM
E-05	EXISTING MCC-1 FRONT VIEW AND LOAD TABULATION
E-06	STEP 1-ELECTRICAL PLAN
E-07	STEP 2-ELECTRICAL PLAN
E-08	STEP 3-ELECTRICAL PLAN
E-09	PANEL SCHEDULES AND ELECTRICAL DETAILS

DWG. NO.	TITLE
	STRUCTURAL
S-01	GENERATOR PAD DESIGN

===BID SET===

REVISIONS

SCALE	N.T.S
DATE	MARCH 2020
DRAWN	SAH
CHECKED	JJA
APPROVED	JJA

INDEX OF DRAWINGS / GENERAL SITE MAP

GENERATOR REPLACEMENT
NASSAU COUNTY

gal consultants

PROJECT NO./DASH NO.
A170003.04

SHEET
G-1

GENERAL NOTES

GENERAL

1. EXISTING UTILITY LOCATIONS AS SHOWN ARE APPROXIMATE AND WERE BASED ON RECORD DRAWINGS AND HAVE NOT BEEN FIELD-VERIFIED. THE EXISTING UTILITIES SHOWN SHALL NOT BE CONSTRUED AS BEING ALL-INCLUSIVE OF UTILITIES IN THE AREA. ANY INTERRUPTION OF SERVICE SHALL BE COORDINATED WITH THE OWNER OF THE UTILITY.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY SUPPORT OF UTILITIES POLES AND COORDINATION OF SUCH WITH UTILITIES OWNERS. IF IT IS DETERMINED THAT UTILITY POLES REQUIRE HOLDING OR RELOCATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXPENSES ASSOCIATED WITH THEIR HOLDING AND/OR RELOCATION.
3. PIPE LENGTHS ARE MEASURED CENTER LINE TO CENTER LINE FOR MANHOLES AND INLETS AND FROM THE END OF THE PIPE FOR MITERED END SECTIONS.
4. ALL PIPE AND FITTINGS SHALL BE PRESSURE TESTED AS SPECIFIED.
5. THE CONTRACTOR SHALL PROVIDE TEMPORARY THRUST RESTRAINT, BRACING, TEST PLUGS AND/OR OTHER DEVICES AS NECESSARY TO SUCCESSFULLY COMPLETE PRESSURE TESTING OF ALL PRESSURE PIPING SYSTEMS.
6. PIPE LENGTHS SHOWN REPRESENT SCALED DISTANCES. THE LENGTHS ARE FOR INFORMATIONAL PURPOSES AND THE CONTRACTOR SHALL DETERMINE THE ACTUAL CONSTRUCTION QUANTITIES.
7. UNDERGROUND WATER MAINS CROSSING ANY EXISTING OR PROPOSED GRAVITY OR VACUUM-TYPE SANITARY SEWER OR STORM SEWER SHALL BE LAID SO THE OUTSIDE OF THE WATER MAIN IS AT LEAST SIX INCHES, AND PREFERABLY 12 INCHES, ABOVE OR AT LEAST 12 INCHES BELOW THE OUTSIDE OF THE OTHER PIPELINE. THE WATER MAIN SHALL BE CONSTRUCTED ABOVE OTHER PIPELINE WHEN POSSIBLE.
8. UNDERGROUND WATER MAINS CROSSING ANY EXISTING OR PROPOSED PRESSURE-TYPE SANITARY SEWER, WASTEWATER OR STORMWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER SHALL BE LAID SO THE OUTSIDE OF THE WATER MAIN IS AT LEAST 12 INCHES ABOVE OR BELOW THE OUTSIDE OF THE OTHER PIPELINE. THE WATER MAIN SHALL BE CONSTRUCTED ABOVE OTHER PIPELINE WHEN POSSIBLE.
9. WHERE SANITARY SEWERS, FORCE MAINS AND SEWER LATERALS MUST CROSS A WATER MAIN WITH LESS THAN THE REQUIRED VERTICAL DISTANCE, BOTH THE SEWER AND THE WATER MAINS SHALL BE CONSTRUCTED OF DUCTILE IRON PIPE (DIP) AT THE CROSSING. SUFFICIENT LENGTHS OF DIP MUST BE USED TO PROVIDE A MINIMUM SEPARATION OF 10 FEET BETWEEN ANY TWO JOINTS. ALL JOINTS ON THE WATER MAIN WITHIN 20 FEET OF THE CROSSING MUST BE MECHANICALLY RESTRAINED. A MINIMUM VERTICAL CLEARANCE OF 6 INCHES MUST BE MAINTAINED AT ALL CROSSINGS.
10. ALL CROSSINGS SHOULD BE ARRANGED SO THAT THE SEWER MAIN PIPE JOINTS AND THE WATER MAIN PIPE JOINTS ARE EQUAL DISTANCE FROM THE POINT OF CROSSING (PIPES CENTERED ON THE CROSSING).
11. WHERE A NEW PIPE CONFLICTS WITH AN EXISTING PIPE WITH LESS THAN THE REQUIRED VERTICAL CLEARANCE, THE NEW PIPE SHALL BE CONSTRUCTED OF DIP AND THE NEW PIPE SHALL BE ARRANGED TO MEET THE CROSSING REQUIREMENTS ABOVE.
12. A MINIMUM 3 FOOT HORIZONTAL SEPARATION SHALL BE MAINTAINED BETWEEN ANY TYPE OF SEWER AND WATER MAIN IN PARALLEL INSTALLATIONS WHENEVER POSSIBLE.
13. WHERE IT IS NOT POSSIBLE TO MAINTAIN A 3 FOOT HORIZONTAL SEPARATION, THE WATER MAIN MUST BE LAID IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF LOCATED ON ONE SIDE OF THE SEWER OR THE FORCE MAIN AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER.
14. WHERE IT IS NOT POSSIBLE TO MAINTAIN A VERTICAL DISTANCE OF 18 INCHES IN PARALLEL INSTALLATIONS, THE WATER MAIN SHALL BE CONSTRUCTED OF DIP AND THE SEWER OR THE FORCE MAIN SHALL BE CONSTRUCTED OF DIP WITH A MINIMUM VERTICAL DISTANCE OF 6 INCHES. THE WATER MAIN SHOULD ALWAYS BE ABOVE THE SEWER. JOINTS ON THE WATER MAIN SHALL BE LOCATED AS FAR APART AS POSSIBLE FROM JOINTS ON THE SEWER OR FORCE MAIN (STAGGERED JOINTS).
15. VERTICAL TRANSITION FITTINGS DEC NOT BE SHOWN ON YARD PIPING PLANS. ALL SUCH FITTINGS SHALL BE PROVIDED BY THE CONTRACTOR TO AVOID PIPING CONFLICTS AND TO PROVIDE ADEQUATE COVER AT NO ADDITIONAL COST TO OWNER.
16. ALL DIP USED IN UTILITY SEPARATION SITUATIONS SHALL BE CLASS 50 OR HIGHER AND DUCTILE IRON FITTINGS SHALL BE CLASS 350. ADEQUATE PROTECTIVE MEASURES AGAINST CORROSION SHALL BE USED.
17. ALL PIPING SHALL HAVE 3 FEET MINIMUM COVER UNLESS OTHERWISE NOTED. CONTRACTOR SHALL TAKE CARE TO PROVIDE PROPER GRADE ELEVATIONS AND ALIGNMENTS.
18. ALL AREAS WHERE LANDSCAPE OR SOD HAS BEEN REMOVED BY CONTRACTOR'S OPERATIONS SHALL BE REPLACED TO MEET NASSAU COUNTY STANDARDS.
19. FITTINGS DEC BE USED FOR PIPE ALIGNMENT CHANGES RATHER THAN DEFLECTING JOINTS AT THE CONTRACTOR'S EXPENSE.
20. DEWATERING DEC BE REQUIRED IN SOME PIPING AREAS TO ACHIEVE THE NECESSARY EXCAVATION AND SUBSEQUENT CONSTRUCTION, BACKFILLING, AND COMPACTING. NO EXTRA COMPENSATION FOR DEWATERING WILL BE AUTHORIZED.
21. ALL DEWATERING COSTS ASSOCIATED WITH THE INSTALLATION AND CONSTRUCTION OF THE UNDERGROUND UTILITIES, STORMWATER PIPES, MANHOLES, AND STORMWATER MANAGEMENT SYSTEMS AS WELL AS ALL OTHER STRUCTURES AT THE WTP SHALL BE INCLUDED AS PART OF THE CONSTRUCTION COSTS.
22. PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST BE FAMILIAR WITH THE OVERALL SITE CONDITIONS AND PERFORM ADDITIONAL INVESTIGATIONS AS HE DETERMINES NECESSARY TO UNDERSTAND THE LIMIT AND DEPTH OF EXPECTED ORGANIC SILT PEAT AREAS, ADEQUACY OF EXISTING MATERIALS AS FILL, DEWATERING REQUIREMENTS, CLEAN FILL REQUIRED FROM OFF SITE, AND MATERIALS TO BE DISPOSED OF OFF SITE, ALL OF WHICH WILL AFFECT PRICING. ANY DELAY, INCONVENIENCE, OR EXPENSE CAUSED TO THE CONTRACTOR DUE TO INADEQUATE INVESTIGATION OF EXISTING CONDITIONS SHALL BE INCIDENTAL TO THE CONTRACT AND NO EXTRA COMPENSATION WILL BE AUTHORIZED.
23. ALL PAVING, STABILIZED EARTH, DRIVEWAYS, CURBS, CULVERTS, SIDEWALKS, FENCES, SOD, LANDSCAPING, ETC. DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED WITH MATERIAL TO MATCH EXISTING. ALL CULVERTS THAT ARE REPLACED AND ARE RELOCATED WITHIN THE RIGHT-OF-WAY SHALL HAVE THE INVERT ELEVATIONS DETERMINED BY THE ENGINEER OF RECORD.
24. ALL DRAINAGE AREAS THAT ARE CROSSED BY PIPELINES SHALL BE LEFT OPEN AT ALL TIMES EXCEPT FOR SHORT PERIODS AS DEC BE NECESSARY DURING ACTUAL CONSTRUCTION HOURS.

GENERAL CONT.

25. THE CONTRACTOR SHALL OBTAIN THE SERVICES OF A REGISTERED PROFESSIONAL LAND SURVEYOR FOR RESTORING ALL MONUMENTS AND PROPERTY CORNERS DISTURBED DURING CONSTRUCTION. PROOF OF REGISTRATION SHALL BE SUBMITTED TO THE ENGINEER.
26. THE CONTRACTOR SHALL LOCATE ALL WATER, WASTEWATER, AND GRAVITY MAINS AT PROPOSED TIE-IN LOCATIONS TO VERIFY ACTUAL LOCATION, SIZE, ELEVATION, AND MATERIAL PRIOR TO ORDERING NEW MATERIALS.
27. ALL POTABLE WATER MAINS EITHER INSTALLED OR DISTURBED DURING CONSTRUCTION SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C-651 LATEST EDITION, SUBSECTION 4.6, AND SECTION 9. SUCH WATER MAINS SHALL THEN BE BACTERIOLOGICALLY TESTED IN ACCORDANCE WITH STATE AND LOCAL REQUIREMENTS. A REPRESENTATIVE FROM THE UTILITY MUST BE PRESENT DURING THE TAKING OF ALL WATER SAMPLES. PRESSURE TESTS, FLUSHING, ETC.
28. LABOR, MATERIALS, AND METHODS OF CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE MINIMUM ENGINEERING AND CONSTRUCTION STANDARDS ADOPTED BY NASSAU COUNTY, THE CONSTRUCTION DRAWINGS, AND CONSTRUCTION SPECIFICATIONS. WHERE CONFLICTS OR OMISSIONS EXIST, NASSAU COUNTY'S STANDARDS SHALL DICTATE. SUBSTITUTIONS AND DEVIATION FROM PLANS AND SPECIFICATIONS SHALL BE PERMITTED ONLY WHEN WRITTEN APPROVAL HAS BEEN ISSUED BY THE ENGINEER.
29. DURING CONSTRUCTION IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM THE WORK IN ACCORDANCE WITH O.S.H.A. REQUIREMENTS. THE CONTRACTOR'S SIGNATURE AFFIXED TO THE CONTRACT AGREEMENT WITH THE OWNER IS CONSIDERED CERTIFICATION OF CONFORMANCE TO SUCH REQUIREMENTS.
30. SHOP DRAWINGS OF MATERIALS USED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND APPROVAL SHALL BE GIVEN PRIOR TO INSTALLATION.
31. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT REQUIRED PERMITS ARE OBTAINED AND IN HAND BEFORE BEGINNING ANY CONSTRUCTION. NO CONSTRUCTION OR FABRICATION OF ANY ITEM SHALL BEGIN UNTIL THE CONTRACTOR HAS RECEIVED ALL PLANS AND ANY OTHER DOCUMENTATION FROM ALL OF THE PERMITTING AND ANY OTHER REGULATORY AUTHORITIES. ANY PENALTIES, STOP WORK ORDERS ON ADDITIONAL WORK RESULTING FROM THE CONTRACTOR BEING IN VIOLATION OF THE REQUIREMENTS ABOVE SHALL BE FULLY BORNE BY THE CONTRACTOR.
32. A PRECONSTRUCTION MEETING IS TO BE HELD BETWEEN THE JURISDICTIONAL ENTITY OF NASSAU COUNTY UTILITIES, ENGINEER OF RECORD, AND CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.
33. THE SEQUENCE OF CONSTRUCTION SHALL BE SUCH THAT UNDERGROUND INSTALLATIONS, INCLUDING SPRINKLERS, SHALL BE PLACED BENEATH THE PAVEMENT AND ITS EDGES PRIOR TO THE CONSTRUCTION OF THE PAVEMENT. THE PAVEMENT SHALL NOT BE CUT WITHOUT PRIOR APPROVAL OF THE ENGINEER.
34. CONSTRUCTION INSPECTION WILL BE PROVIDED BY THE CONTRACTOR AND HE SHALL NOTIFY THE ENGINEER AT LEAST 48 HOURS PRIOR TO BEGINNING CONSTRUCTION AND AT LEAST 48 HOURS BEFORE REQUIRING INSPECTION ON EACH AND EVERY PHASE OF WORK. THE CONTRACTOR SHALL NOTIFY THE ENGINEER A MINIMUM OF 48 HOURS NOTICE PRIOR TO SCHEDULED TESTING. NO BACTERIOLOGICAL TESTING, PRESSURE TESTING, OR FINAL TESTING WILL BE ACCEPTED UNLESS WITNESSED BY THE ENGINEER'S REPRESENTATIVE.
35. CONTRACTORS, NASSAU COUNTY REPRESENTATIVES, AND UTILITY COMPANIES ARE RESPONSIBLE FOR THEIR RESPECTIVE SURVEYING AND LAYOUT FROM BENCHMARK PROVIDED ON CONSTRUCTION PLANS. SURVEY MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE REPLACED UPON COMPLETION OF THE WORK BY A REGISTERED LAND SURVEYOR.
36. THE CONTRACTOR SHALL MAINTAIN A CURRENT SET OF CONSTRUCTION PLANS AND PERMITS ON THE JOB SITE DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE TWO (2) SETS OF RECORD DRAWINGS TO THE ENGINEER OF RECORD WITHIN ONE MONTH AFTER CONSTRUCTION HAS BEEN COMPLETED.
37. PLANS AND SPECIFICATIONS REQUIRE THAT COMPACTED BACKFILL BE PLACED ALONG SIDE OF AND OVER ALL UTILITIES. THE ENGINEER DEC REQUIRE THAT COMPACTION TESTS BE TAKEN TO VERIFY BACKFILL COMPACTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE NECESSARY TESTING TO ASSURE THAT THE PROPER COMPACTION HAS BEEN ACHIEVED ON THE SUBGRADE, BASE, AND ALL OTHER PERTINENT AREAS THAT HAVE BEEN COMPLETED. THE CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED WITH TESTING AND RETESTING OF THE AREAS AND SHALL PROVIDE THE OWNER AND THE ENGINEER WITH COPIES OF THE CERTIFICATION OF COMPACTION FROM THE TESTING COMPANIES.
38. ALL EXCESS FILL FROM SITE SHALL BE STOCKPILED BY THE CONTRACTOR, IN A LOCATION DETERMINED BY THE OWNER OR THE OWNER'S REPRESENTATIVE AND THE ENGINEER.
39. CONCRETE SIDEWALKS SHALL CONFORM TO FDOT INDEX 310.
40. BENCHMARK FOR CONSTRUCTION HAS BEEN PROVIDED ON SITE PLAN.
41. ALL SITE DATUMS ARE IN NAVD 88, EXCEPT WHERE OTHERWISE NOTED.

SITE WORK

1. THE CONTRACTOR SHALL CLEAR AND GRUB THE SITE, AS REQUIRED, TO REMOVE ROOTS, BRANCHES, ROCKS, ETC. AT NO TIME SHALL CONSTRUCTION, CLEARING, OR WORK TAKE PLACE OUTSIDE THOSE AREAS SHOWN ON THE PLANS FOR CONSTRUCTION. ALL UNSUITABLE MATERIAL SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
2. THE CONTRACTOR SHALL GRADE THE SITE TO PROVIDE POSITIVE SURFACE DRAINAGE AS INDICATED ON THE PLANS. ANY AREAS BEING FILLED TO ACHIEVE PROPER DRAINAGE FLOW SHALL BE COMPACTED TO A MINIMUM NINETY-FIVE (95%) MODIFIED PROCTOR MAXIMUM DENSITY (AASHTO T-180).
3. ALL GRASSED AREAS WITHIN THE RIGHT OF WAY DISTURBED BY CONSTRUCTION SHALL BE RESTORED BY SODDING. SEEDING AND MULCHING IS NOT ACCEPTABLE.

EROSION AND SEDIMENTATION CONTROL

1. THE CONTRACTOR SHALL TAKE ALL MEASURES NECESSARY TO INSTALL, OPERATE, AND MAINTAIN EROSION, SEDIMENT, AND TURBIDITY CONTROL DEVICES AND STRUCTURES AT ALL LOCATIONS WHERE THE POSSIBILITY OF TRANSFERRING SUSPENDED SOLIDS INTO THE RECEIVING WATERBODY EXISTS DUE TO THE PROPOSED WORK. THE EROSION, SEDIMENT, AND TURBIDITY CONTROL DEVICES SHALL BE IN ACCORDANCE WITH FDOT ROADWAY AND TRAFFIC DESIGN STANDARDS INDEX #102, LATEST VERSION. AT NO TIME SHALL THERE BE AN OFFSITE DISCHARGE WHICH VIOLATES THE WATER QUALITY STANDARDS IN CHAPTERS 62-302 AND 62-4, FLORIDA ADMINISTRATIVE CODE.
2. THE CONTRACTOR, AT HIS OWN EXPENSE, SHALL OPERATE AND MAINTAIN EROSION AND SEDIMENT CONTROL DEVICES IN ACCORDANCE WITH THE REGULATIONS SET FORTH IN THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES), AS SHOWN ON THE STORMWATER POLLUTION PREVENTION PLAN. (SWPPP)
3. THE CONTRACTOR SHALL INSTALL SILT FENCES AROUND THE PERIMETER OF THE WORK TO PREVENT TRANSPORTATION OF SEDIMENT TO OFFSITE PROPERTIES.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROJECT COMPLYING WITH APPLICABLE STATE WATER QUALITY STANDARDS DURING CONSTRUCTION AS SPECIFIED IN THE PERMITS. ALL WATER AND WIND EROSION, SHALL BE MINIMIZED AS DEFINED IN THE SPECIFICATIONS AND PERMITS. THE SPECIFICATIONS PROVIDE ONLY A MINIMUM REQUIREMENT FOR EROSION AND SEDIMENTATION CONTROL. IT IS THE CONTRACTORS RESPONSIBILITY TO IMPLEMENT CONTROL MEASURES NOT SHOWN IN SPECIFICATIONS. ALL COSTS ASSOCIATED WITH TURBIDITY CONTROL AND SEDIMENT STABILIZATION SHALL BE BORNE BY THE CONTRACTOR.
5. THE REMOVAL OF DEBRIS AND ANY OTHER MATERIAL INCLUDING PIPES, CONCRETE STRUCTURES AND PAVEMENT LAYERS FROM CLEARING AND GRADING OPERATIONS SHALL BE HAULED AWAY BY THE CONTRACTOR IN A LEGAL FASHION TO AN AUTHORIZED DUMPING FACILITY.
6. THE CONTRACTOR MUST INSTALL AND MAINTAIN SOD ON EXPOSED SLOPES WITHIN 48 HOURS OF COMPLETED FINAL GRADES, AND AT ANY OTHER TIME AS NECESSARY TO PREVENT EROSION, SEDIMENTATION OR TURBID DISCHARGES TO ANY DOWNSTREAM WATER BODY, WETLAND, OR OFFSITE PROPERTY. SODDING ON SLOPES 3:1 AND STEEPER SHALL BE STAKED.
7. THE CONTRACTOR MUST MAINTAIN CONTINUOUS RESTORATION BEHIND THE UTILITY WORK ON A DAILY BASIS.

DEMOLITION

1. THE CONTRACTOR SHALL OBTAIN NECESSARY PERMITS AND LICENSES FOR PERFORMING ANY DEMOLITION WORK AND SHALL FURNISH A COPY OF SAME TO THE ENGINEER PRIOR TO COMMENCING THE WORK. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE PERMITS.
2. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES OR LOCAL AUTHORITIES FURNISHING GAS, WATER, ELECTRICAL, TELEPHONE, OR SEWER SERVICE SO THEY CAN REMOVE, RELOCATE, DISCONNECT, CAP OR PLUG THEIR EQUIPMENT IN ORDER TO FACILITATE DEMOLITION.
3. THE CONTRACTOR SHALL PROTECT ALL UTILITIES AND OTHER IMPROVEMENTS SHOWN ON THESE PLANS AND UTILITIES AND OTHER IMPROVEMENTS NOT SHOWN. THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR REPAIRS OF UTILITIES AND OTHER IMPROVEMENTS DAMAGED DURING CONSTRUCTION AND SHALL MAINTAIN SUFFICIENT PROTECTION FOR ALL UTILITIES REQUIRED TO PROTECT THEM FROM DAMAGE AND TO PROTECT THE PUBLIC DURING CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL TREES, STRUCTURES, AND UTILITIES NOT MARKED FOR REMOVAL OR DEMOLITION AND SHALL PROMPTLY REPAIR ANY DAMAGE AS DIRECTED BY THE ENGINEER AT NO COST TO THE OWNER.
5. THE CONTRACTOR SHALL REMOVE BUILDING STRUCTURES MARKED FOR DEMOLITION WHICH INCLUDES FOOTERS ASSOCIATED WITH THE STRUCTURE, WATER LINES TO THE METER LOCATION, LATERALS TO THE RIGHT-OF-WAY LINE (CAP PRIOR TO BACKFILLING THE TRENCH), AND UNDERGROUND ELECTRICAL WIRING NOT ASSOCIATED WITH THE APPROPRIATE POWER COMPANY.
6. THE CONTRACTOR SHALL REMOVE PAVING MARKED FOR DEMOLITION WHICH INCLUDES ALL ASPHALT, CONCRETE, BASE, AND RETAINING WALLS (INCLUDING THE FOOTERS).
7. THE CONTRACTOR SHALL REMOVE TREES MARKED FOR REMOVAL WHICH INCLUDES THE ROOTS ASSOCIATED WITH THE TREE. TREES NOT MARKED FOR REMOVAL SHALL BE PROTECTED IN ACCORDANCE WITH NASSAU COUNTY REGULATIONS.
8. THE CONTRACTOR SHALL REMOVE UNSALVAGEABLE MATERIALS AND YARD WASTE FROM THE SITE IMMEDIATELY AND DISPOSE OF IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
9. THE CONTRACTOR SHALL SAW-CUT A SMOOTH STRAIGHT EDGE ON ANY PAVEMENT PROPOSED FOR DEMOLITION PRIOR TO ITS REMOVAL PRIOR TO CONNECTING PROPOSED PAVEMENT TO EXISTING PAVEMENT. THE CONTRACTOR SHALL ENSURE THAT THE EDGE OF THE EXISTING PAVEMENT IS STRAIGHT AND UNIFORM.

= = = BID SET = = =

REVISIONS

DESCRIPTION	BY	DATE

SCALE:	N.T.S
DATE:	MARCH 2020
DRAWN:	SAH
CHECKED:	JJA
APPROVED:	JJA

GENERAL NOTES

GENERATOR REPLACEMENT
NASSAU COUNTY

N/A

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PROJECT NO./DASH NO.
A170003.04

SHEET
G-2

PIPING LEGEND

FITTING/APPURTENANCE	UNIVERSAL – SINGLE-LINE		FLANGED – DOUBLE-LINE		MECHANICAL-JOINT – DOUBLE-LINE	
	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED
BEND						
TEE						
WYE						
CONCENTRIC REDUCER						
CAP/BLIND FLANGE						
PLUG (PLUGGED VALVE)						
BUTTERFLY VALVE						
BALL VALVE						
CHECK VALVE						
GATE VALVE						
PLUG VALVE						
MOTORIZED CONTROL VALVE						
PLASTIC BALL VALVE						

REFERENCE SYMBOLS

TITLE

SECTION — A / M-1 — DENOTES SECTION LETTER IDENTIFICATION — DENOTES DRAWING NO SECTION TAKEN FROM

SECTION TITLE

DENOTES SECTION LETTER IDENTIFICATION — A / M-1 — DENOTES DRAWING NO WHERE SECTION IS LOCATED

SECTION REFERENCE

1 / M-12 — DENOTES DETAIL NUMBER IDENTIFICATION — DENOTES DRAWING NO WHERE DETAIL IS LOCATED

DETAIL REFERENCE

A — A

SECTIONAL CUT

LIST OF STANDARD ABBREVIATIONS

A

AAP	ALARM ANNUNCIATION PANEL
ADJ	ADJUSTABLE OR TELESCOPING ARM/JOINT
ADV	AUTOMATIC AIR RELEASE VALVE/JOINT
AB	ANCHOR BOLT
ABAN	ABANDONED
ABV	ABOVE
ABS	ACRYLONITRILE BUTADIENE STYRENE
ASV	ASSOC
AC	ALTERNATING CURRENT
ACSR	ASPHALT-COATED CORRUGATED METAL PIPE
AC	ASBESTOS CEMENT PIPE
ADDN	ADDENDUM
ADH	ADHESIVE
ADJ	ADJUSTED
ADMIN	ADMINISTRATION
AF	ABOVE FINISHED FLOOR
AFC	ABOVE FINISHED GRADE
AFS	ABOVE FINISHED SLAB
AHU	AHOO
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
ANSI	ANSI/
APPROX	APPROXIMATELY
ARCH	ARCHITECTURAL
ASPH	ASPHALT
ASSY	ASSEMBLY
AV	AVENUE
AVC	AIR CONDITIONING
AVV	AIR VALVE

B

BAL	BALANCE
BAV	BALL CHECK VALVE
BV	BURIED ELECTRIC
BF	BLIND FLANGE
BFP	BACK FLOW PREVENTER
BFV	BUTTERFLY VALVE
BG	BIOGRAPH
BHP	BRAKE HORSEPOWER
BI	BLACK IRON
BIT.V	BITUMINOUS COATED PLASTIC
BL	BASELINE
BLDG	BUILDING
BLK	BLOCK
BLVD	AQUA-VAVO
BM	BEAM - MAIN
BO	BLOW OFF
BOC	BACK OF CURB
BOT	BOTTOM
BP	BASE - PLATE
BRG	BEARING
BSL	BASELINE OR GRADE SHAPE - LOCATION
BTS	BUILDING TO SCALE
BW	BUILDING WALL
BY	BY - PASS
BW	BACKWASH WATER

C

CAP	CAPACITY
CAV	CONTROL ENHANCEMENT
CB	CHECK - VALVE
CFV	CHECK FIRE FLOW VALVE
CF.S	CUBIC FEET PER SECOND
CHV	CHILD VALVE
CI	CAST IRON
CIP	CAST IRON PIPE
CIPP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CKT	CIRCUIT
CL	CENTER LINE
CLF	CHLORINE GAS
CLR	CLEAR OR CLEARANCE
CLS	CLASS OR CLOSURE
CMP	CORRUGATED METAL PIPE
CMPA	CORRUGATED METAL PIPE ARCH
CMU	CONCRETE MASONRY UNIT
CND	CONDUIT
CO	CLEANOUT
COL	COLUMN
COP	COPPER
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONTR	CONTRACTOR
CONT	CONTINUOUS
CONTR	CONTRACTOR
COORD	COORDINATE
CP	COMPANY
CPP	CORRUGATED POLYPROPYLENE PIPE
CR	CONCRETE REINFORCED
CS	CARBON STEEL
CSA	CORRUGATED STEEL ARCH
CSP	CORRUGATED STEEL PIPE
CTV	CABLE TELEVISION
CU	CUBIC
CV	CHECK VALVE
CVP	CHECK VALVE
CY	CUBIC YARD
CYL	CYLINDER

D

DAT	DATUM
DB	DOUBLE
DC	DIRECT CURRENT
DEMO	DEMOLITION
DET	DETAIL
DF	DRAIN FLANGE
DI	DUCTILE IRON
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DIR	DIRECTION
DM	DRAIN MAIN
DMH	DUCTILE IRON PIPE
DN	DISCHARGE
DNP	DROP MANHOLE
DNT	DRAIN TILE
DN	DOWN
DOT	DEPARTMENT OF TRANSPORTATION
DR	DRAIN
DW	DRIVEWAY
DWG	DRAWING
DWV	DRAIN WASTE AND VENT

E

E	EAST
EA	EACH
EC	ELECTRIC
ECC	ELECTRICAL CONTRACTOR
ECI	ELECTRICAL INSTALLATION
EJ	EXPANSION JOINT
EJMA	EXPANSION JOINT MANUFACTURERS ASSOCIATION
EL	ELEVATION
ELEC	ELECTRICAL
EMER	EMERGENCY
ENG	ENGINEER
ENC	ENCLOSURE
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQUIP	EQUIPMENT
ESC	ESCALATOR
EST	ESTIMATE
EW	EACH WAY
EXC	EXCAVATION
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR

F

F	FAHRENHEIT
FAC	FACILITY
FAI	FIRE ALARM
FCV	FLOW CONTROL VALVE
FD	FLOOR DRAIN
FDN	FOUNDATION
FDT	FLOOR DRAIN TILE
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FLOOR
FFE	FINISH FLOOR ELEVATION
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FIN	FINISH
FLG	FLANGE
FLR	FLOOR
FM	FORCE MAIN
FOC	FACE OF CURB
FOM	FACE OF MASONRY
FOS	FACE OF STUD
FOW	FACE OF WALL
FP	FIRE PROTECTION
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
FS	FLOW SWITCH
FT	FOOT OR FEET
FTG	FOOTING
FUT	FUTURE
FV	FIELD VERIFY
FW	FIRE WATER
FWV	FIRE WATER VALVE
FXT	FACTORY MIXED PAINT
FYI	FACTORY PAINTED

G

GA	GAGE
GAL	GALLON(S)
GALV	GALVANIZED
GAS	GALVANIZED CAP
GIP	GALVANIZED IRON PIPE
GJ	GROOVED JOINT
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GROUND POINT SURVEY
GR	GRADE
GRTG	GRATING
GS	GALVANIZED STEEL
GSA	GALVANIZED SHEET METAL
GSH	GALVANIZED STEEL HANGER
GST	GALVANIZED STEEL TANK
GTV	GATE VALVE

H

HH	HAND HOLE
HDPE	HIGH DENSITY POLYETHYLENE
HEX	HEXAGON
HDPE	HIGH-DENSITY POLYETHYLENE
HEP	HORIZONTAL
HDR	HEADER
HEC	HEC
HGL	HYDRAULIC GRADE LINE
HORIZ	HORIZONTAL
HP	HORSEPOWER
HR	HOUR
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HW	HOT WATER
HWH	HOT WATER HEATER
HZ	HERTZ

I

ID	INSIDE DIAMETER
IF	INSIDE FACE
IN	INCH(ES)
INF	INFLUENT
INT	INTERSECTION
INV	INVERT
IRR	IRRIGATION
ISA	INTERNATIONAL PIPE STANDARD
ISS	INOX-STEEL
IW	INFILTRATION WATER

J

JB	JUNCTION BOX
JT	JOINT

K

K	KELVIN
KPA	KPA
KV	KILOVOLT
KVA	KILOVOLT-AMPERE
KW	KILOWATT
KWH	KILOWATT-HOUR

L

L	LITER
LAH	LABORATORY
LAM	LAMINATE OR LAMINATION
LAV	LAVATORY
LB	LB
LBS	LBS
LD	LOADING
LF	LINEAR FEET
LG	LONG
LS	LUMP SUM
LT	LIGHT
LW	LOW WATER

M

M	MILLION
MAINT	MAINTENANCE
MAN	MANHOLE
MAU	MAKE-UP AIR UNIT
MAS	MASONRY
MAT	MATERIAL
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MB	MACHINE BOLT
MCS	MITERED CLAD SECTION
MECH	MECHANICAL
MFR	MANUFACTURER(S)
MG	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MI	MILE(S)
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MJD	MECHANICAL JOINT DUCTILE IRON
MLD	MILLION GALLONS PER DAY
MM	MILLIMETER
MMBTU	MILLION BRITISH THERMAL UNITS
MOD	MODIFIED
MOV	MOTOR OPERATED VALVE
MP	MOTOR PUMP
MPT	MALE PIPE THREAD
MS	MOTOR STARTER
MSL	MEAN SEA LEVEL
MTD	MOUNTED
MTG	MOUNTING
MW	MONITORING WELL

N

N	NORTH
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
NPSH	NET POSITIVE SUCTION HEAD
NPT	NATIONAL PIPE THREAD
NPW	NON POTABLE WATER
NRS	NON RISING STEM
NTS	NOT TO SCALE
NV	NOT VERIFIED
NVT	NOT APPLICABLE

O

OA	OVERALL DIMENSION
OC	ON CENTER
OD	OUTSIDE DIAMETER
ODP	OPEN DRIP PROOF
OE	OVERHEAD ELECTRIC
OH	OVERHEAD
OH	OUTSIDE HOSE
OHD	OVERHEAD DOOR
OPP	OPPOSITE
OPT	OPTIONAL
OSY	OUTSIDE SCREW AND YOKE
OBM	OPERATION AND MAINTENANCE

P

PB	PULL BOX
PC	POINT OF CURVE
PCM	PHOTOGRAPHIC CONTROL MONUMENT
PE	PLAIN END
PG	PRESSURE GAGE
PH	POINT OF INTERSECTION
PL	PLATE
PP	POLYPROPYLENE
PSB	PORTLAND BLENDING
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PSF	POUNDS PER SQUARE FOOT
PSFA	POUNDS PER SQUARE FOOT ABSOLUTE
PSFG	POUNDS PER SQUARE FOOT GAUGE
PT	POINT OF TANGENCY
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PWM	PREVENTIVE MAINTENANCE
PW	PROPERTY WATER
PWR	POWER

Q

Q	FLOW
QTY	QUANTITY

R

RAD	RADIUS
RAS	RETURN ACTIVATED SLUDGE
RC	REINFORCED CONCRETE
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RCPA	REINFORCED CONCRETE PIPE ARCH
RD	ROAD
RDWY	ROADWAY
REQMT	REQUIREMENT
RF	RAISED FACE
RJ	RESTRAINED JOINT
RJG	RESTRAINED JOINT GASKET
RJP	RESTRAINED PIPE
RJS	RESTRAINED SLEEVE
RO	RUBBER OIL
ROW	RIGHT OF WAY
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
RPZD	REDUCED PRESSURE ZONE DETECTOR
RTU	ROOF TOP UNIT
RW	RAW WATER
RWM	RAW WATER MAIN
RWV	RECYCLED WATER VALVE
RWW	RECYCLED WASTEWATER

S

S	SOUTH
SA	SANITARY
SAN	SANITARY
SCHED	SCHEDULE
SD	STORM DRAIN
SF	SQUARE FOOT
SFCT	SECTION
SF	SQUARE FOOT OR FEET
SHT	SHEET OR SHEETS
SIG	SIGNAL
SIM	SIMILAR
SL	SLOPE
SLD	SOLID
SM	SMOOTH WALL
SMH	SANITARY MANHOLE
SP	SPOT
SPEC	SPECIFICATION
SPHT	SPHERE
SQ	SQUARE
SW	SANITARY SEWER
SS	SANITARY SEWER
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STHWY	STATE HIGHWAY
STD	STANDARD
STR	STAIR
STR	STRUCTURE
SUB	SUBSTRUCTURE
SV	SOLENOID VALVE
SVC	SERVICE
SW	SIDEWALK
SWD	SIDEWALK DRAIN
SWPP	SURFACE WATER POLLUTION PREVENTION
SWV	SWING VALVE
SYM	SYMMETRICAL
SYS	SYSTEM

T

TAN	TANGENT
TBE	TAPERED BEVEL END
TBM	TEMPORARY BENCH MARK
TBW	TOTAL DYNAMIC HEAD
TC	TOTALLY CLOSED
TC	TOTAL INDICATED CONDITION
TD	TOTAL DYNAMIC HEAD
TDH	TOTAL DYNAMIC HEAD
TE	TOTALLY ENCLOSED
TEFC	TOTALLY ENCLOSED FAN COOLED
TEL TELE	TELEPHONE
TEL	TELEPHONE
TEMP	TEMPERATURE
TEW	TOTALLY ENCLOSED WATER
TF	TOP OF FOOTING
TFE	TEFLON
TG	TOP OF GRATE
TH	THICK
THD	THREAD
THRD	THREADED
TIG	TUNGSTEN INERT GAS
TL	TOP OF LEDGE
TM	TOP OF MASONRY
TOC	TOP OF CURB
TOP	TOP OF PIPE
TOS	TOP OF SLAB
TOW	TOP OF WALL
TP	TOP OF PIPE
TPW	TEMPORARY POTABLE WATER
TR	TRANSFORMER
TRANS	TRANSFORMER
TS	TOP OF STEM
TSP	TOP AND SIDE PORT
TSS	TOTAL SUSPENDED SOLIDS
TV	TELEVISION
TW	TOP OF WALL
TYP	TYPICAL

U

UB	UNDERWRITERS LABORATORIES CABLE OR CONDUIT
UC	UNDERGROUND ELECTRIC DUCT
UG	UNDERGROUND
UGC	UNDERGROUND TELEPHONE
UL	UNDERWRITERS LABORATORIES
UNO	UNLESS OTHERWISE NOTED
UPC	UNIFORM PLUMBING CODE
UTIL	UTILITY

V

V	VOLT(S)
VAC	VACUUM
VAR	VARIABLE
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VLV	VALVE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VGL	VACUUM
VIF	VERIFY IN FIELD

W

W	WEST
WAS	WASTE ACTIVATED SLUDGE
WLD	WELDED
WP	WATER PROOF
WPC	WATER PROOF CEMENT
WR	WATER REDUCER
WSM	WELDED WIRE MESH
WWTP	WASTEWATER TREATMENT PLANT
WW	WITH
WM	WATER METER
WO	WITHOUT

X

XFER	TRANSFER

Y

YD	YARD(S)
YR	YEAR PROPANE
YP	YEARS

CIVIL LEGEND

	EXISTING STA. XX	PROPOSED STA. XX
BASELINE		
PROPERTY LINE	℄	℄
RIGHT OF WAY	R/W	R/W
EASEMENT LINE	℄	℄
SPOT ELEVATION	+	+ EL
CONTOUR		EL
JURISDICTIONAL WETLAND BOUNDARY LINE		
EMBANKMENT	TOP / BOTTOM	TOP / BOTTOM
SURFACE DRAINAGE		
FENCE	X X X	X X X
TEMPORARY CONSTRUCTION EASEMENT	TCE	TCE
TOP OF BANK	TOB	TOB
EDGE OF PAVEMENT	EOP	EOP
EDGE OF WATER	EOW	EOW
SILT FENCING		
MISCELLANEOUS UTILITY	XX*	XX*
PIPE LINE	WM*	WM*

TREES	EXISTING	PROPOSED
DECIDUOUS	TYPE	TYPE
EVERGREEN	TYPE	TYPE
PALM	TYPE	TYPE
CITRUS	TYPE	TYPE
OAK	TYPE	TYPE

- ELECTRIC BOX (EB)
- FIRE HYDRANT (FH)
- POWER POLE
- GUY POLE
- LIGHT POLE
- BENCH MARK
- GUY ANCHOR
- MAIL BOX
- MANHOLE
- SIGN/LOCATOR POLE
- SPRINKLER HEAD
- TELEPHONE RISER
- TRAFFIC SIGNAL CONTROL BOX
- CONTROL ELEVATION (EL XX)
- TELEPHONE MANHOLE (TM)
- MONITOR WELL (MW)
- WATER METER (WM)
- WATER VALVE
- GAS VALVE (GV)
- WELL (W)
- MONITORING WELL (M)
- MONUMENT (XX EL)

* SEE LIST OF STANDARD ABBREVIATIONS

=== BID SET ===

REVISIONS				
NO.	BY	CHKD	APPD	DESCRIPTION

SCALE: N.T.S
DATE: MARCH 2020
DRAWN: SAH
CHECKED: JJA
APPROVED: JJA

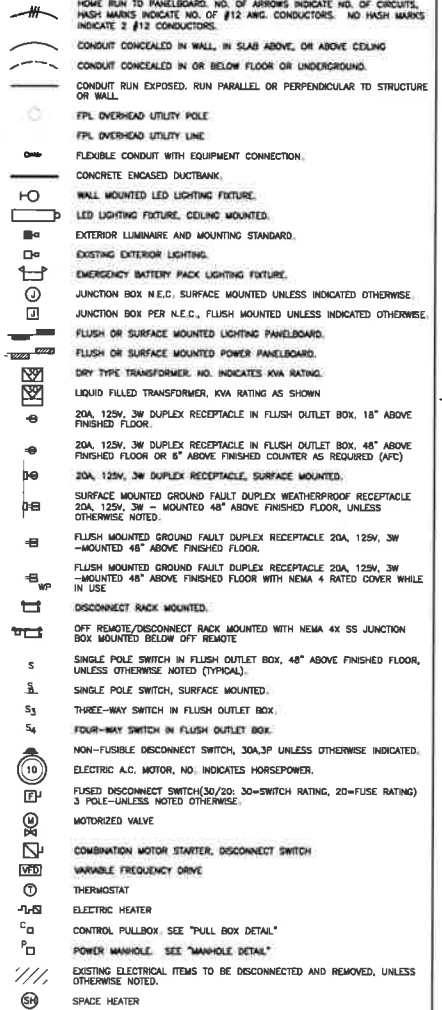
STANDARD ABBREVIATIONS AN SYMBOLS
GENERATOR REPLACEMENT
NASSAU COUNTY

gai consultants
1801 RIVERPLACE BLVD, SUITE 800
JACKSONVILLE, FLORIDA 32207
PHONE: (904) 423-8398

PROJECT NO./DASH NO.
A170003.04

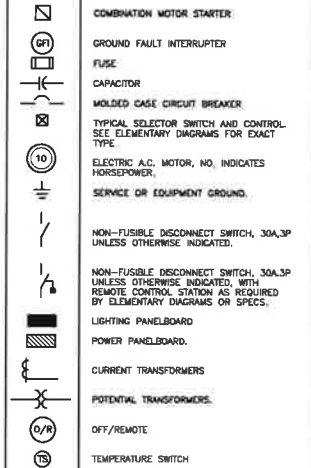
SHEET
G-3

PLAN SYMBOLS



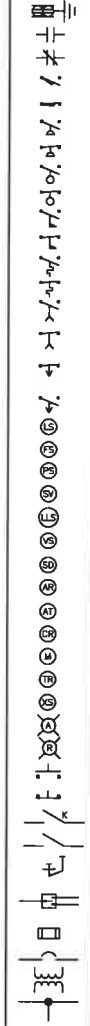
- HOME RUN TO PANELBOARD. NO. OF ARROWS INDICATE NO. OF CIRCUITS, HASH MARKS INDICATE NO. OF #12 AWG. CONDUCTORS. NO HASH MARKS INDICATE 2 #12 CONDUCTORS.
- CONDUIT CONCEALED IN WALL, IN SLAB ABOVE, OR ABOVE CEILING
- CONDUIT CONCEALED IN OR BELOW FLOOR OR UNDERGROUND.
- CONDUIT RUN EXPOSED. RUN PARALLEL OR PERPENDICULAR TO STRUCTURE OR WALL.
- FPL OVERHEAD UTILITY POLE
- FPL OVERHEAD UTILITY LINE
- FLEXIBLE CONDUIT WITH EQUIPMENT CONNECTION.
- CONCRETE ENCASED DUCTBANK.
- WALL MOUNTED LED LIGHTING FIXTURE.
- LED LIGHTING FIXTURE, CEILING MOUNTED.
- EXTERIOR LUMINAIRE AND MOUNTING STANDARD.
- EXISTING EXTERIOR LIGHTING.
- EMERGENCY BATTERY PACK LIGHTING FIXTURE.
- JUNCTION BOX N.E.C., SURFACE MOUNTED UNLESS INDICATED OTHERWISE.
- JUNCTION BOX PER N.E.C., FLUSH MOUNTED UNLESS INDICATED OTHERWISE.
- FLUSH OR SURFACE MOUNTED LIGHTING PANELBOARD.
- FLUSH OR SURFACE MOUNTED POWER PANELBOARD.
- DRY TYPE TRANSFORMER. NO. INDICATES KVA RATING.
- LIQUID FILLED TRANSFORMER, KVA RATING AS SHOWN
- 20A, 125V, 3W DUPLEX RECEPTACLE IN FLUSH OUTLET BOX, 18" ABOVE FINISHED FLOOR.
- 20A, 125V, 3W DUPLEX RECEPTACLE IN FLUSH OUTLET BOX, 48" ABOVE FINISHED FLOOR OR 6" ABOVE FINISHED COUNTER AS REQUIRED (AFC)
- 20A, 125V, 3W DUPLEX RECEPTACLE, SURFACE MOUNTED.
- SURFACE MOUNTED GROUND FAULT DUPLEX WEATHERPROOF RECEPTACLE 20A, 125V, 3W – MOUNTED 48" ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
- FLUSH MOUNTED GROUND FAULT DUPLEX RECEPTACLE 20A, 125V, 3W –MOUNTED 48" ABOVE FINISHED FLOOR.
- FLUSH MOUNTED GROUND FAULT DUPLEX RECEPTACLE 20A, 125V, 3W –MOUNTED 48" ABOVE FINISHED FLOOR WITH NEMA 4 RATED COVER WHILE IN USE
- DISCONNECT RACK MOUNTED.
- OFF REMOTE/DISCONNECT RACK MOUNTED WITH NEMA 4X SS JUNCTION BOX MOUNTED BELOW OFF REMOTE
- SINGLE POLE SWITCH IN FLUSH OUTLET BOX, 48" ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED (TYPICAL).
- SINGLE POLE SWITCH, SURFACE MOUNTED.
- THREE-WAY SWITCH IN FLUSH OUTLET BOX.
- FOUR-WAY SWITCH IN FLUSH OUTLET BOX.
- NON-FUSIBLE DISCONNECT SWITCH, 30A,3P UNLESS OTHERWISE INDICATED.
- ELECTRIC A.C. MOTOR, NO. INDICATES HORSEPOWER.
- FUSED DISCONNECT SWITCH(30/20: 30=SWITCH RATING, 20=FUSE RATING) 3 POLE-UNLESS NOTED OTHERWISE.
- MOTORIZED VALVE
- COMBINATION MOTOR STARTER, DISCONNECT SWITCH
- VFD — VARIABLE FREQUENCY DRIVE
- THERMOSTAT
- ELECTRIC HEATER
- C — CONTROL PULLBOX. SEE "PULL BOX DETAIL"
- P — POWER MANHOLE. SEE "MANHOLE DETAIL"
- EXISTING ELECTRICAL ITEMS TO BE DISCONNECTED AND REMOVED, UNLESS OTHERWISE NOTED.
- SH — SPACE HEATER

SINGLE LINE DIAGRAM SYMBOLS



- COMBINATION MOTOR STARTER
- GFI — GROUND FAULT INTERRUPTER
- FUSE
- CAPACITOR
- MOLDED CASE CIRCUIT BREAKER
- TYPICAL SELECTOR SWITCH AND CONTROL. SEE ELEMENTARY DIAGRAMS FOR EXACT TYPE.
- 10 — ELECTRIC A.C. MOTOR, NO. INDICATES HORSEPOWER.
- SERVICE OR EQUIPMENT GROUND.
- NON-FUSIBLE DISCONNECT SWITCH, 30A,3P UNLESS OTHERWISE INDICATED.
- NON-FUSIBLE DISCONNECT SWITCH, 30A,3P UNLESS OTHERWISE INDICATED, WITH REMOTE CONTROL STATION AS REQUIRED BY ELEMENTARY DIAGRAMS OR SPECS.
- LIGHTING PANELBOARD
- POWER PANELBOARD.
- CURRENT TRANSFORMERS
- POTENTIAL TRANSFORMERS.
- O/R — OFF/REMOTE
- TS — TEMPERATURE SWITCH

CONTROL DIAGRAM SYMBOLS



- DUPLEX RECEPTACLE
- NORMALLY OPEN CONTACT
- NORMALLY CLOSED CONTACT
- LIMIT SWITCH, NORMALLY OPEN
- LIMIT SWITCH, NORMALLY CLOSED
- PRESSURE SWITCH, NORMALLY OPEN
- PRESSURE SWITCH, NORMALLY CLOSED
- FLOAT SWITCH, NORMALLY OPEN
- FLOAT SWITCH, NORMALLY CLOSED
- FLOW SWITCH, NORMALLY OPEN
- FLOW SWITCH, NORMALLY CLOSED
- TEMPERATURE SWITCH, NORMALLY OPEN
- TEMPERATURE SWITCH, NORMALLY CLOSED
- NORMALLY OPEN, TIMED TO CLOSE CONTACT
- NORMALLY CLOSED, TIMED TO OPEN CONTACT
- NORMALLY CLOSED, TIMED TO CLOSE CONTACT
- NORMALLY OPEN, TIMED TO OPEN CONTACT
- LS — LIMIT SWITCH
- FS — FLOW SWITCH
- PS — PRESSURE SWITCH
- SV — SOLENOID VALVE
- LLS — LIQUID LEVEL SWITCH
- VS — VIBRATION SWITCH
- SD — SMOKE DETECTOR
- AR — ALARM RELAY
- AT — ALARM TIMER
- CR — CONTROL RELAY
- M — MOTOR STARTER
- TR — TIMING RELAY
- XS — TORQUE SWITCH
- A — ALARM INDICATING LIGHT
- G — RUN INDICATING LIGHT
- MOMENTARY CONTACT PUSHBUTTON
- MOMENTARY BREAK PUSHBUTTON OR RESET
- KEYED SWITCH
- MAINTAINED CONTACT ON-OFF SWITCH
- START/STOP(S/S) CONTROL SWITCH MAINTAINED CONTACT
- THREE POSITION MAINTAINED CONTACT SELECTOR SWITCH
- FUSE
- MOLDED CASE CIRCUIT BREAKER
- CONTROL POWER TRANSFORMER
- REMOTE TERMINAL BLOCK POINT

ABBREVIATIONS

A	AMPERES
ACCU	AIR COOLED CONDENSING UNIT
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AIC	AMPS INTERRUPTING CURRENT
BKR	BREAKER
BLDG	BUILDING
CPT	CONTROL POWER TRANSFORMER
CU	CONDENSING UNIT
CT	CURRENT TRANSFORMER
DH	DATA HIGHWAY
DISC	DISCONNECT
EFF	EFFLUENT
ELEC	ELECTRICAL
EM	EMERGENCY
ENCL	ENCLOSURE
ETM	ELAPSED TIME METER
EXH	EXHAUST
FPL	FLORIDA POWER & LIGHT
FVNR	FULL VOLTAGE NON-REVERSING
GCP	GENERATOR CONTROL PANEL
GEN	GENERATOR
GFR	GROUND FAULT RECEPTACLE
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
GST	GROUND STORAGE TANK
HOA	HAND-OFF-AUTOMATIC
HOR	HAND-OFF-REMOTE
HP	HORSEPOWER
HSP	HIGH SERVICE PUMP
KVA	KILO VOLT-AMPERES
KW	KILOWATT
LTG	LIGHTING
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MFR	MANUFACTURER
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MOV	MOTORIZED OPERATING VALVE
MSC	MANUFACTURER'S SUPPLIED CABLE
MTD	MOUNTED
MTS	MANUAL TRANSFER SWITCH
NEC	NATIONAL ELECTRICAL CODE
N	NEUTRAL
NTS	NOT TO SCALE
OH	OVERHEAD
OIT	OPERATIONAL INTERFACE TERMINAL
P	POLE
PCP	PROCESS CONTROL PANEL
PM	PHASE MONITOR
PNL	PANEL
PVC	POLYVINYL CHLORIDE
SH	SHIELDED
SPD	SURGE PROTECTION DEVICE
SS	STAINLESS STEEL
STR	STARTER
SW	SWITCH
TBR	TO BE REMOVED
TC	TERMINATION CABINET
TYP	TYPICAL
UG	UNDERGROUND
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLT
VFD	VARIABLE FREQUENCY DRIVE
W	WATT
W/	WITH
WP	WEATHERPROOF
WTP	WATER TREATMENT PLANT
ø	PHASE

NOTES

1. ELECTRICAL CONTRACTOR SHALL SUPPLY AND INSTALL ALL NEW ELECTRICAL WORK INDICATED.
2. ELECTRICAL CONTRACTOR SHALL VISIT JOB SITE AND FAMILIARIZE HIMSELF WITH ALL CONDITIONS AFFECTING ELECTRICAL INSTALLATION AND MAKE PROVISIONS AS TO THE COST THEREOF. EXISTING CONDITIONS OF ELECTRICAL EQUIPMENT, LIGHT FIXTURES, ETC... THAT ARE PART OF THE FINAL SYSTEM SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO SUBMITTING HIS BID.
3. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE 2014 NATIONAL ELECTRICAL CODE, 2017 FLORIDA BUILDING CODE, 2014 NATIONAL FIRE PROTECTION AGENCY, AND SHALL COMPLY WITH ALL LOCAL RULES AND ORDINANCES.
4. MINIMUM WIRE SIZE SHALL BE #12 A.W.G. EXCLUDING CONTROL WIRING, UNLESS OTHERWISE NOTED.
5. IT IS NOT THE INTENT OF THESE PLANS TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL ITEMS FOR A COMPLETE ELECTRICAL SYSTEM AND PROVIDE ALL REQUIREMENTS NECESSARY FOR THE EQUIPMENT TO BE PLACED IN PROPER WORKING ORDER.
6. ELECTRICAL SYSTEM SHALL BE COMPLETE AND EFFECTIVELY GROUNDED AS REQUIRED BY THE LATEST EDITION OF THE N.E.C. OR LOCAL CODES. ALL CONDUITS SHALL HAVE A BOND WIRE SIZED PER TABLE 250-122 OF THE NATIONAL ELECTRICAL CODE.
7. ALL MATERIALS SHALL BE NEW AND BEAR UNDERWRITERS' LABELS WHERE APPLICABLE.
8. ALL WORK SHALL BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR IN A FIRST CLASS WORKMANLIKE MANNER. THE COMPLETED SYSTEM SHALL BE FULLY OPERATIVE AND ACCEPTED BY ENGINEER/OWNER.
9. CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FREE FROM DEFECTS FOR A PERIOD OF NOT LESS THAN TWO YEARS FROM DATE OF ACCEPTANCE.
10. CORRECTION OF ANY DEFECTS SHALL BE COMPLETED WITHOUT ADDITIONAL CHARGE AND SHALL INCLUDE REPLACEMENT OR REPAIR OF ANY OTHER PHASE OF THE INSTALLATION WHICH MAY HAVE BEEN DAMAGED.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING REQUIRED OF HIS WORK.
12. ELECTRICAL CONTRACTOR SHALL LABEL ALL PANELS W/ TYPE WRITTEN DIRECTORIES (NEW & EXISTING).
13. ALL ELECTRICAL WIRING SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
14. DO NOT SCALE THE ELECTRICAL DRAWINGS. REFER TO THE MECHANICAL DRAWINGS & THE APPROVED MANUFACTURER'S SHOP DRAWINGS FOR THE EXACT LOCATION OF ALL EQUIPMENT.
15. NON-SHADED TEXT DENOTES NEW EQUIPMENT, STRUCTURES AND WORK. SHADED TEXT DENOTES EXISTING EQUIPMENT OR STRUCTURES.
16. ALL CONTROL PANELS SHALL BE UL LISTED AND SHALL COMPLY WITH ARTICLE 409 OF THE NEC.
17. ALL EMPTY CONDUITS TO BE INSTALLED WITH PULLSTRING.
18. FURNISH AND INSTALL NAMEPLATE FOR ALL DISCONNECT SWITCHES INCLUDING STATEMENT "DO NOT OPERATE UNDER LOAD".

BIDSET

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PHONE: (954) 448-7938
C.O.A. NO. 6763
Stephen C. Bailey, P.E.
Florida P.E. No. 42481

REVISIONS

NO	DESCRIPTION	DRN	CHKD	APPVD

SCALE: AS NOTED
DATE: FEB 2020
DRAWN: DRM
CHECKED: JPL
APPROVED: SEB

ELECTRICAL NOTES, SYMBOLS AND ABBREVIATIONS

WTP GENERATOR INSTALLATION
NASSAU COUNTY

Stephen C. Bailey P.E.
Florida Registration #42481

GAI CONSULTANTS
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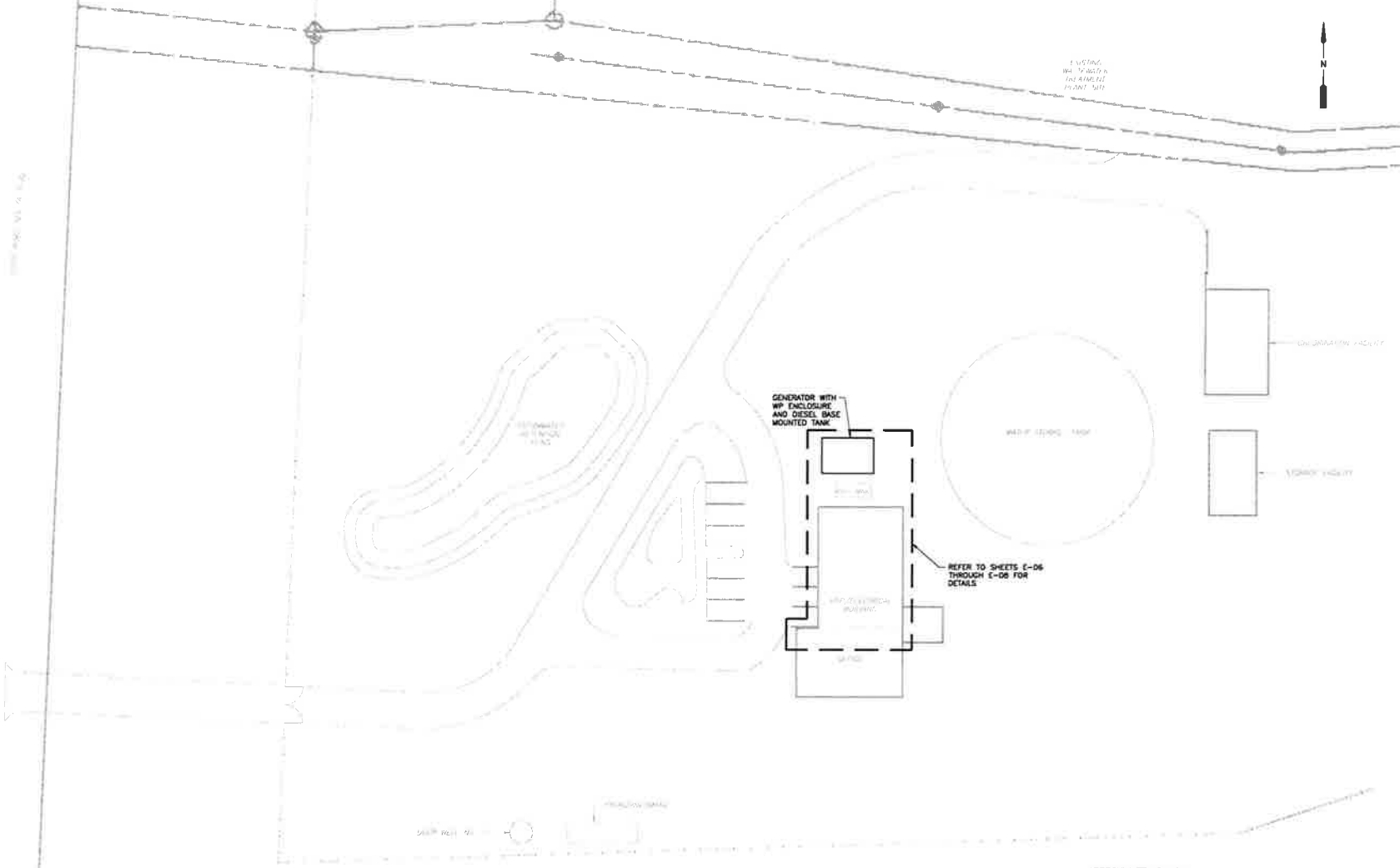
1301 RIVERPLACE BLVD, SUITE 820
JACKSONVILLE, FLORIDA 32207
PHONE: (407) 423-8398

PROJECT NO./DASH NO.
—

SHEET
E-01



ELECTRICAL SITE PLAN

SCALE: 1"=20'-0"

20 10 0 20'

APPROXIMATE ADDRESS
3300 1ST COAST HIGHWAY
FERNANDINA BEACH, FL 32034

BIDSET

REVISIONS

SCALE: AS NOTED
DATE: FEB 2020
DRAWN: DRM
CHECKED: JPL
APPROVED: SEB

ELECTRICAL SITE PLAN

WTP GENERATOR INSTALLATION
NASSAU COUNTY

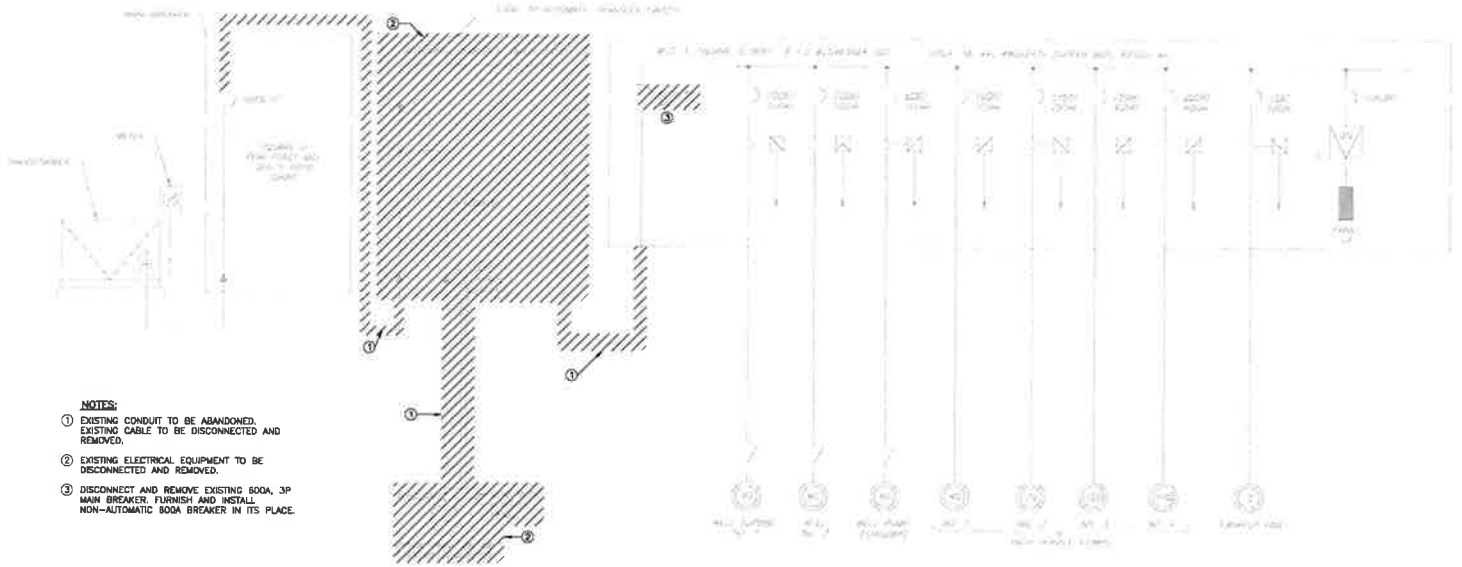
Stephen E. Bailey P.E.
Florida Registration #62481

Nassau-Amelia Utilities

GAI CONSULTANTS

PROJECT NO./DWSH NO.

SHEET
E-02



NOTES:

1. EXISTING CONDUIT TO BE ABANDONED. EXISTING CABLE TO BE DISCONNECTED AND REMOVED.
2. EXISTING ELECTRICAL EQUIPMENT TO BE DISCONNECTED AND REMOVED.
3. DISCONNECT AND REMOVE EXISTING 600A, 3P MAIN BREAKER. FURNISH AND INSTALL NON-AUTOMATIC 600A BREAKER IN ITS PLACE.

EXISTING SINGLE LINE DIAGRAM

(SEE PLAN VIEW FOR STEPS AND SEQUENCE OF CONSTRUCTION ON THIS SHEET)

SEQUENCE OF CONSTRUCTION (SEE PLAN VIEWS FOR ADDITIONAL REQUIREMENTS)

1. INSTALL NEW OWNER PROVIDED GENERATOR, TEST AND LOAD BANK GENERATOR.
2. DISCONNECT EXISTING GENERATOR FROM EXISTING ATS AND CONNECT NEW GENERATOR TO EXISTING ATS.
3. INSTALL NEW ATS.
4. INSTALL ASSOCIATED CONDUIT AND WIRE FROM NEW ATS TO EXISTING MAIN BREAKER, NEW GEN AND EXISTING MCC. DO NOT TERMINATE. TEST CABLES
5. OPERATE PLANT ON EXISTING GENERATOR WHILE NEW ATS IS BEING INSTALLED
6. CONNECT EXISTING MAIN BREAKER TO NORMAL SIDE OF NEW ATS. CONNECT NEW GENERATOR TO NEW ATS
7. RE-ENERGIZE PLANT.
8. DISCONNECT EXISTING MCC FROM EXISTING ATS, RECONNECT TO NEW ATS. OPERATE ALL HSPs ON NEW SERVICE AND EXISTING CONTROLS.
9. COMPLETE INSTALLATION.

BIDSET

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Stephen E. Bailey, P.E.
Florida P.E. No. 42461

REVISIONS

SCALE:	AS NOTED
DATE:	FEB 2020
DRAWN:	DRM
CHECKED:	JPL
APPROVED:	SEB

EXISTING SINGLE LINE DIAGRAM

WTP GENERATOR INSTALLATION
NASSAU COUNTY

SEAL

Stephen E. Bailey P.E.
Florida Registration #42461

Nassau-Amelia Utilities

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(3 #9)
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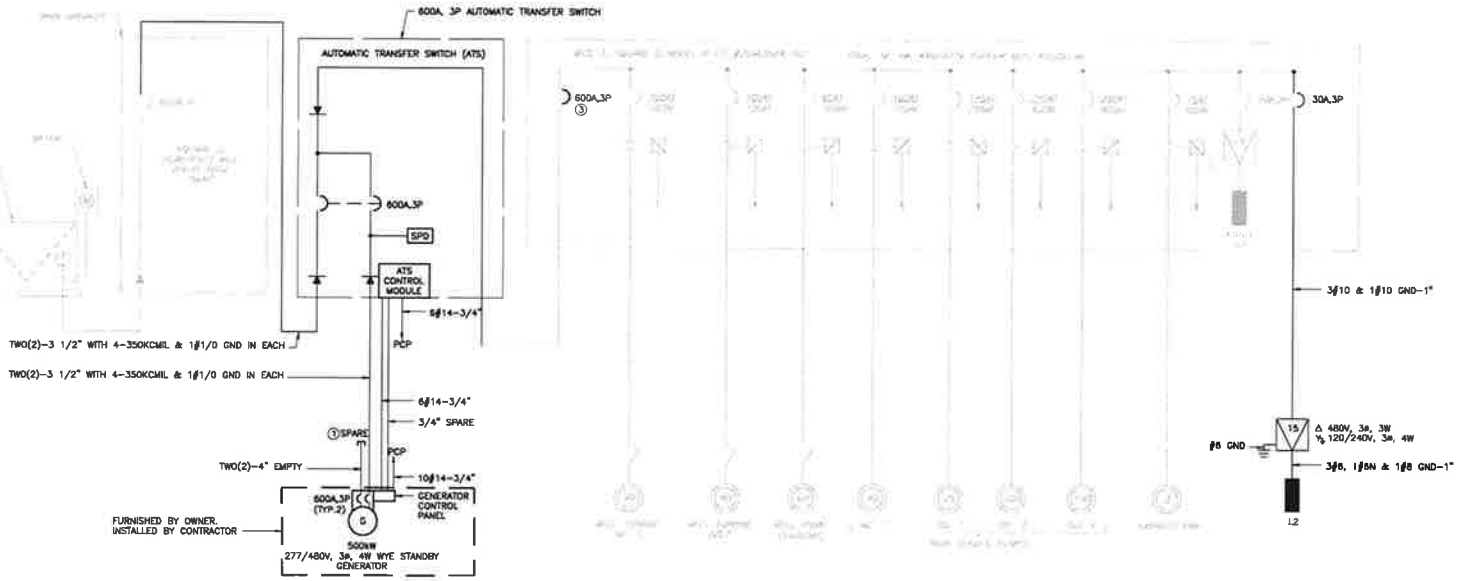
JACKSONVILLE, FLORIDA 32207
PHONE: (407) 423-8398

PROJECT NO./DASH NO.
-

SHEET
E-03



NOTES:

1. REFER TO ELECTRICAL PLAN VIEW FOR STUB UP LOCATION.
2. GENERATOR NEUTRAL SHALL BE BONDED AT EXISTING MAIN BREAKER. DO NOT BOND GENERATOR GROUND IN GENERATOR ENCLOSURE.
3. NON-AUTOMATIC BREAKER.

PROPOSED SINGLE LINE DIAGRAM

(SEE PLAN VIEWS FOR STEPS AND SEQUENCE OF CONSTRUCTION ON SHEET E-07)

BIDSET

REVISIONS

SCALE:	AS NOTED
DATE:	FEB 2020
DRAWN:	DRM
CHECKED:	JPL
APPROVED:	SEB

PROPOSED SINGLE LINE DIAGRAM

WTP GENERATOR INSTALLATION
NASSAU COUNTY

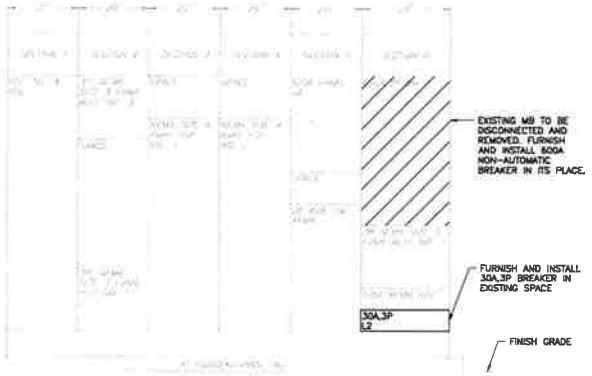
Nassau-Aroello Utilities

GAI CONSULTANTS

PROJECT NO./DASH NO.

SHEET

E-04



EXISTING MCC-1 FRONT VIEW

SCALE: 3/4"=1'-0"

6" 0 1 2'

BIDSET

REVISIONS

SCALE:	AS NOTED
DATE:	FEB 2020
DRAWN:	DRM
CHECKED:	JPL
APPROVED:	SEB

EXISTING MCC-1 FRONT VIEW AND LOAD TABULATION

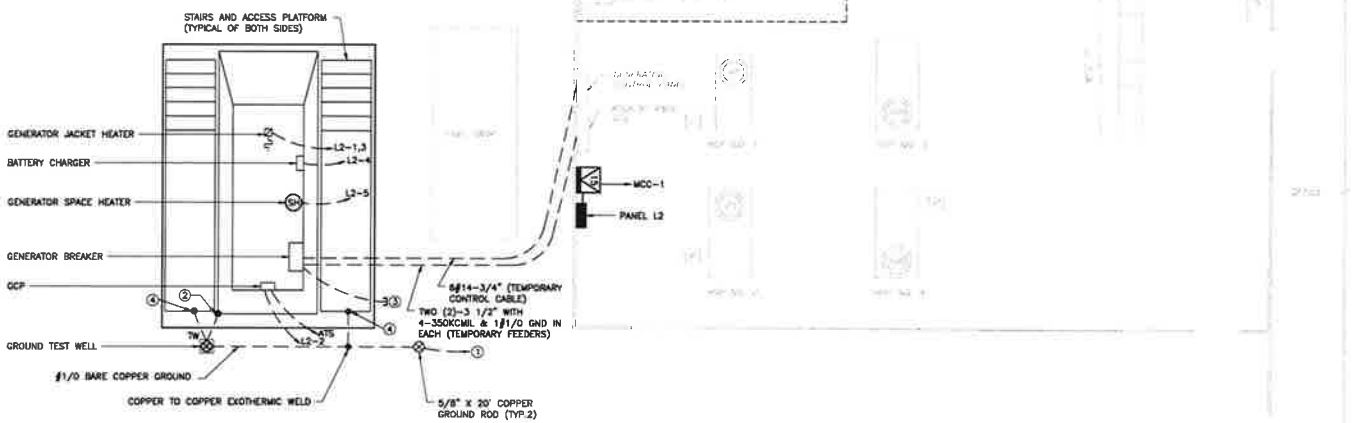
WTP GENERATOR INSTALLATION
NASSAU COUNTY

GAI CONSULTANTS

PROJECT NO./DASH NO.

SHEET

E-05



STEP 1–ELECTRICAL PLAN

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

1 0 1 2 3 7'

NOTES:

1. TIE INTO EXISTING GROUND GRID.
2. BOND TO FUEL TANK GROUNDING LUGS.
3. STUB UP FOR FUTURE CONNECTION.
4. BOND TO STAIRS/PLATFORM.

BIDSET

REVISIONS					
NO.	DATE	BY	CHKD	APPD	DESCRIPTION

SCALE: AS NOTED
DATE: FEB 2020
DRAWN: DRM
CHECKED: JPL
APPROVED: SEB

STEP 1–ELECTRICAL PLAN

WTP GENERATOR INSTALLATION
NASSAU COUNTY

SEAL

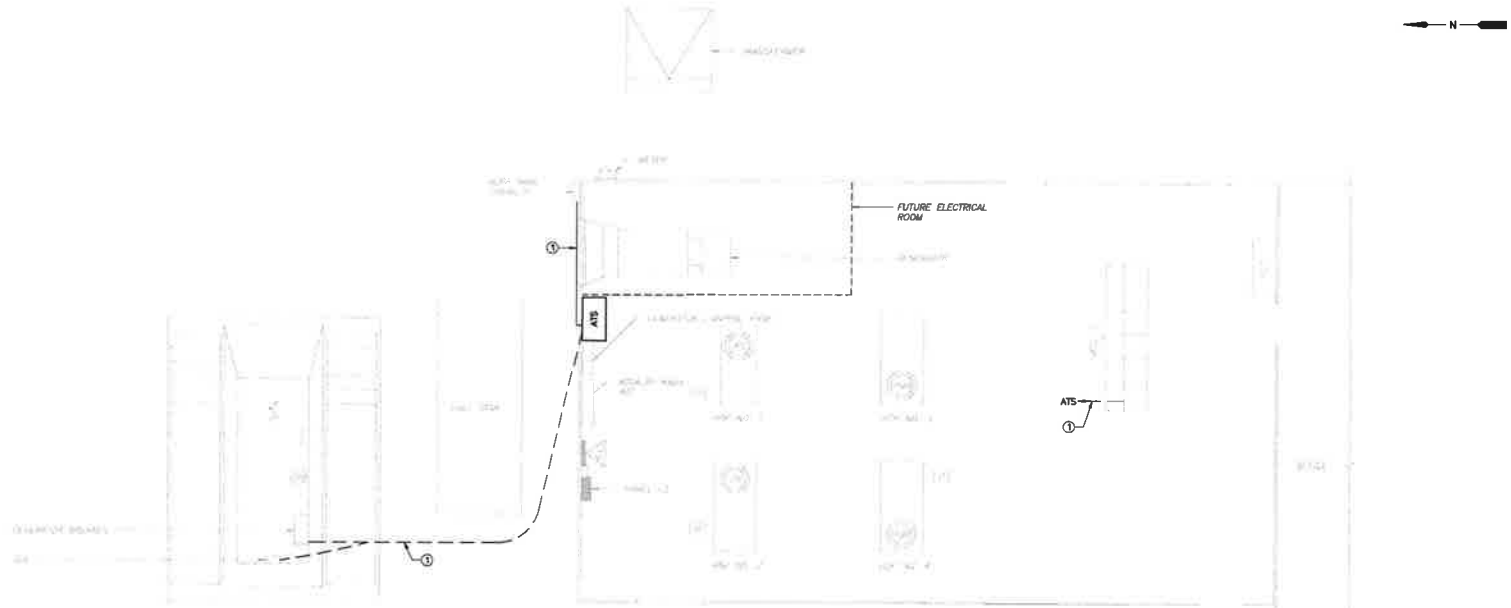
Stephen E. Bailey, P.E.
Florida Registration #62461

Nassau Amelia Utilities

GAI CONSULTANTS

PROJECT NO./DASH NO.

SHEET
E-06



NOTES:

1. REFER TO SHEET E-05 FOR PERMANENT CONDUIT AND WIRE REQUIREMENTS. DO NOT TERMINATE UNTIL EXISTING ATS HAS BEEN DISCONNECTED FROM EXISTING MAIN BREAKER, EXISTING MCC AND NEW GENERATOR

STEP 2–ELECTRICAL PLAN

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

1 0 1 2 3 7'

BIDSET

10620 GRIFFIN ROAD, SUITE 202
COOPER CITY, FLORIDA 33328
PHONE: (954) 448-7930
C.O.A. NO. 6763
Stephen E. Bailey, P.E.
Florida P.E. No. 43481

REVISIONS

SCALE:	AS NOTED
DATE:	FEB 2020
DRAWN:	DRM
CHECKED:	JPL
APPROVED:	SEB

STEP 2–ELECTRICAL PLAN

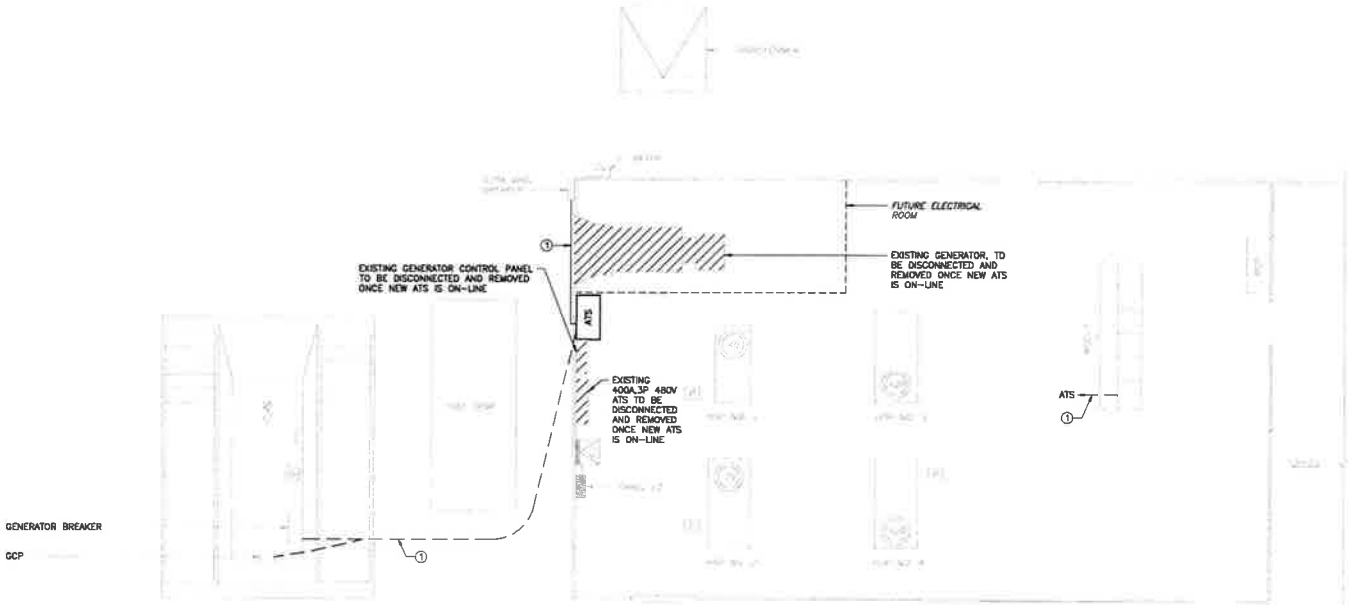
WTP GENERATOR INSTALLATION
NASSAU COUNTY

GAI CONSULTANTS

PROJECT NO./DASH NO.

SHEET

E-07



NOTES:

1. REFER TO SHEET E-04 FOR PERMANENT CONDUIT AND WIRE REQUIREMENTS. TEST AND TERMINATE CABLES FOR FINAL, COMPLETE INSTALLATION

STEP 3-ELECTRICAL PLAN

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

1 0 1 2 3 7'

BIDSET

REVISIONS

NO.	DESCRIPTION	DATE	BY

SCALE: AS NOTED
DATE: FEB 2020
DRAWN: DRM
CHECKED: JPL
APPROVED: SEB

STEP 3-ELECTRICAL PLAN

WTP GENERATOR INSTALLATION
NASSAU COUNTY

SEAL

Stephen E. Bailey, P.E.
Florida Registration #42481

Nassau Amelia Utilities

GAI CONSULTANTS

1301 RIVERPLACE BLVD. SUITE 600
JACKSONVILLE, FLORIDA 32207
PHONE: (407) 423-8398

10830 GRIFFIN ROAD, SUITE 302
COOPER CITY, FLORIDA 33328
PHONE: (954) 448-7630
C.O.A. NO. 8763
Stephen E. Bailey, P.E.
Florida P.E. No. 42481

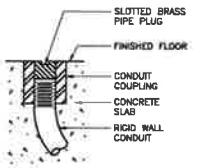
PROJECT NO./DASH NO.
-

SHEET
E-08

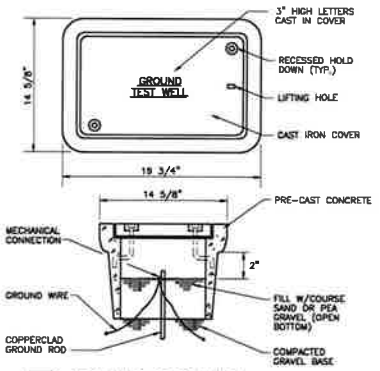
PANEL: L2						BUS: 100 AMP					VOLT: 208Y/120V,3Φ,4W					
LOCATION: ELECTRICAL ROOM						MAINS: 80 AMP 3 POLE BREAKER					REMARKS: PROVIDE SURGE SUPPRESSOR					
MOUNTING: SURFACE						POLES: 30					A.I.C. SYMM: 10,000 AIC					
AMPS	POLE	WIRE	GND.	COND.	LOAD SERVED	BUS KVA A	BUS KVA B	BUS KVA C	BUS A B C	BUS KVA A	BUS KVA B	BUS KVA C	LOAD SERVED	WIRE	GND.	COND.	POLE	AMPS
30	2	10	10	1"	GEN JACKET HEATER	1.25			1 — 2	0.20			GEN CP	12	12	3/4"	1	20
–	–	–	–	–	–		1.25		3 — 4		0.20		GEN BATTERY CHARGER	12	12	3/4"	1	20
20	1	12	12	3/4"	GEN SPACE HEATER			0.20	5 — 6			–	SPARE	–	–	–	1	20
20	1	–	–	–	SPARE	–			7 — 8	–			SPARE	–	–	–	1	20
20	1	–	–	–	SPARE		–		9 — 10		–		SPARE	–	–	–	1	20
20	1	–	–	–	SPARE			–	11 — 12			–	SPARE	–	–	–	1	20
20	1	–	–	–	SPARE	–			13 — 14	–			SPARE	–	–	–	1	20
20	1	–	–	–	SPARE		–		15 — 16		–		SPARE	–	–	–	1	20
20	1	–	–	–	SPARE			–	17 — 18			–	SPARE	–	–	–	1	20
20	1	–	–	–	SPARE	–			19 — 20	–			SPACE	–	–	–	–	–
20	1	–	–	–	SPARE		–		21 — 22		–		–	–	–	–	–	–
20	1	–	–	–	SPARE			–	23 — 24			–	–	–	–	–	–	–
30	2	–	–	–	SPARE	–			25 — 26	–			SPD	8	10	–	3	40
–	–	–	–	–	–		–		27 — 28		–		–	–	–	–	–	–
–	–	–	–	–	SPACE			–	29 — 30			–	–	–	–	–	–	–
TOTAL (PHASE):						1.25	1.25	0.20		2.10	2.10	0.10	NOTES:					
TOTAL KVA:									7.00									
TOTAL AMPS:									19.45									
TOTAL DEMAND AMPS:									19.45									

SPD

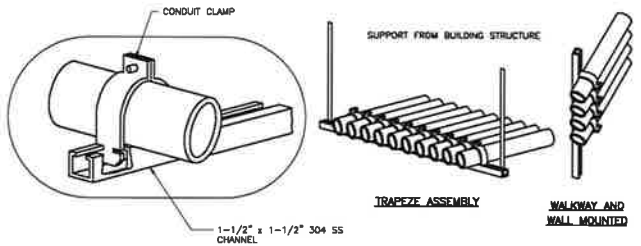
ASCO 430 SERIES RATED 100KA PER PHASE



1 E-09 DETAIL OF CONDUIT TERMINATION STUB OUT
N.T.S.



2 E-09 GROUND TEST WELL
N.T.S.



3 E-09 CONDUIT PIPE STRAP MOUNTING DETAILS
N.T.S.

REVISIONS

NO.	DESCRIPTION	DATE

SCALE: AS NOTED
DATE: FEB 2020
DRAWN: DRM
CHECKED: JPL
APPROVED: SEB

PANEL SCHEDULES AND ELECTRICAL DETAILS

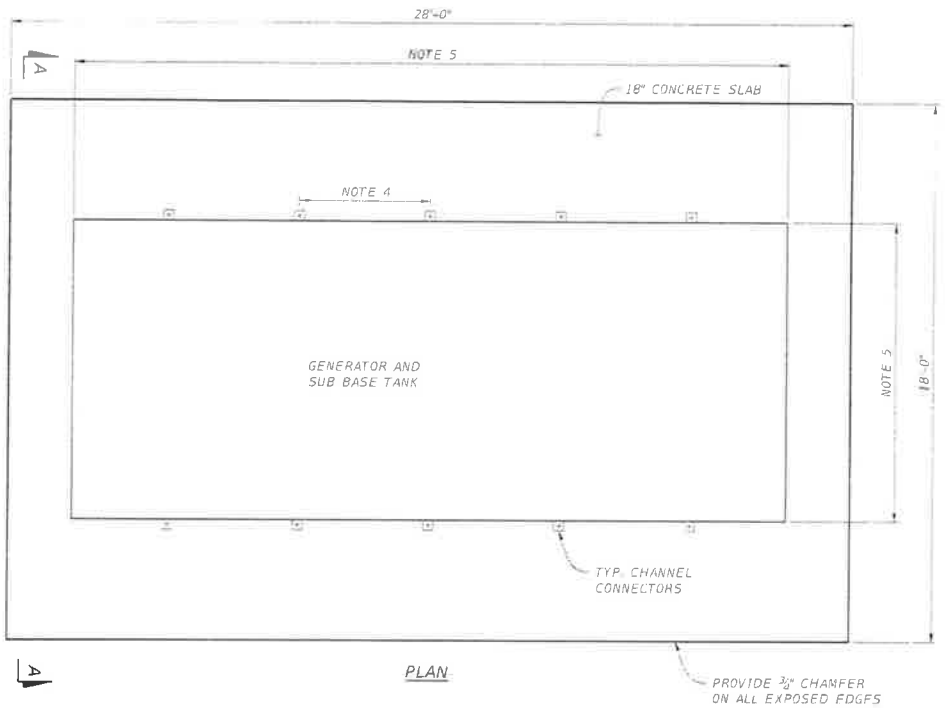
WTP GENERATOR INSTALLATION
NASSAU COUNTY

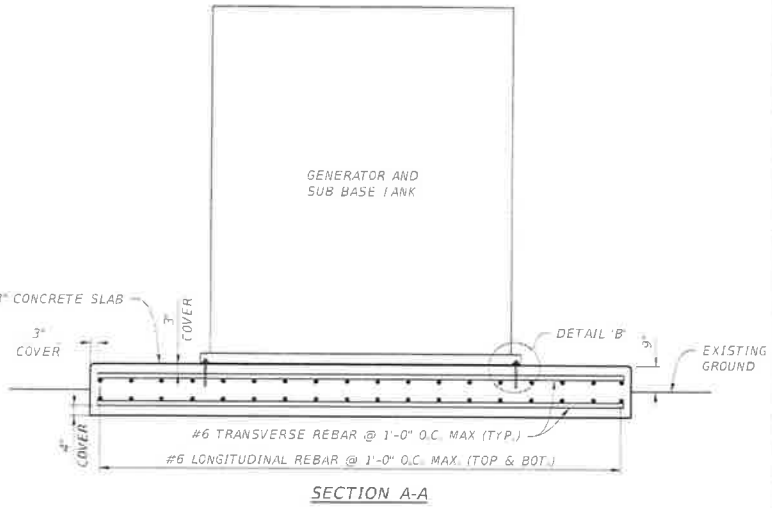
GAI CONSULTANTS

PROJECT NO./DASH NO.
–

SHEET
E-09

BIDSET





SECTION A-A

NOTES

1. ALL CONSTRUCTION TO BE DONE PER FLORIDA BUILDING CODE 6TH EDITION (2017).

2. WIND LOADS:

WIND SPEED =	140 MPH
EXPOSURE	D
CATEGORY	III
DESIGN PRESSURE=	+ 50.5 PSF

3. GENERATOR AND SUB BASE TANK CHANNEL SUPPORT ACCORDING TO MANUFACTURER. CONNECT WITH (1) - 3/4" Ø STAINLESS STEEL EPOXY ANCHORS WITH 9" EMBEDMENT AT EACH CHANNEL CONNECTOR.

4. NUMBER OF CHANNEL CONNECTORS AND SPACING SHALL BE PER MANUFACTURER'S DETAILS. DESIGN ASSUMES MINIMUM 5 CONNECTORS ON EACH SIDE. IF NUMBER OF CONNECTORS IS LESS THAN 5 FOR THE SELECTED GENERATOR BRAND, PROVIDE SHOP DRAWINGS FOR A NEW ANCHOR BOLT DESIGN.

5. GENERATOR AND THE SUB BASE TANK SHALL BE CENTERED ON THE CONCRETE PAD.

6. GENERATOR PAD DIMENSIONS WERE SET WITH THE FOLLOWING GENERATOR AND SUB BASE TANK DIMENSIONS:

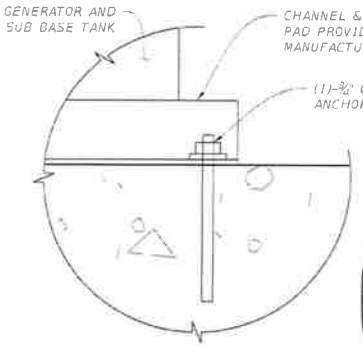
   285"X120"X128" (LENGTH X WIDTH X HEIGHT).

   IF THE SELECTED GENERATOR AND SUB BASE TANK DIMENSIONS ARE LARGER THAN THIS ASSUMPTION, COORDINATE WITH THE ENGINEER.

7. CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3,000 PSI AND A SLUMP OF 4" (+/- 1"). CONCRETE WORK SHALL CONFORM TO ACI 318-14 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.

8. REINFORCING SHALL CONFORM TO ASTM 615 GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A1064 AND SHALL BE LAPPED MINIMUM ONE MESH + 2" WHERE SPLICED. ALL REINFORCING SHALL BE DOMESTICALLY PRODUCED.

9. ANCHOR SHALL BE HILTI HIT-Z-R 316 SS OR APPROVED EQUAL. INSTALLATION SHALL BE PER MANUFACTURER RECOMMENDATION



DETAIL 'B'

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

M. SINAN BUYUKAKSAKAL, P.E.
P.E. LICENSE NUMBER 56929
GAI CONSULTANTS, INC.
618 E. SOUTH STREET - SUITE 700
ORLANDO, FL 32801
CERTIFICATE OF AUTHORIZATION 9951

DESIGNED BY	AJ 12/19
DRAWN BY	KSB 12/19
CHECKED BY	KSB 12/19
CHECKED BY	CJB 12/19

NASSAU COUNTY
NASSAU AMELIA UTILITIES
1500 FIRST COAST HIGHWAY
FERNANDINA BEACH, FL 32034

WORK AUTHORIZATION NUMBER: CM2452-WA08

GENERATOR PAD DETAIL

WATER TREATMENT PLANT EMERGENCY STANDBY GENERATOR REPLACEMENT

REF. DWG. NO.

SHEET NO. S-1

Attachment "E"

Contractor's Bid/Proposal

NASSAU-AMELIA UTILITIES (NAU) GENERATOR REPLACEMENT PROJECT

BID NO. NC20-017

BID COMPLIANCE CHECK LIST:

BIDDER: COGBURN BROS., INC.

- ☑ Bid Bond (Section 00-43-15) UNSIGNED BY BIDDER
- ☑ Signed Bid Form (page 6, 7, or 8) CORPORATION
- ☑ Required Attachments
  - ☑ 00-41-15 Bid Form (8 pages)
  - ☑ 00-43-35 Tabulation of Subcontractors & Suppliers (1 page)
  - ☑ 00-44 55 Florida Trench Safety Act Certification (1 page)
  - ☑ 00-45-13 Statement of Bidder's Qualifications (4 pages) BLANK BUT SIGNED.
  - ☑ 00-45-19 Noncollusion Affidavit (2 pages)
  - ☑ 00-45-20 Drug Free Workplace Certificate (2 page)
  - ☑ 00-45-30 Sworn Statement - Public Entity Crimes (2 pages)
  - ☑ 00-45-35 Disputes-Litigation Statement (1 page)
  - ☑ 00-45-40 E-Verify Affidavit of Compliance (1 page)
  - ☑ Certificate of Insurance EXP. 1/2021
- ☑ Addendums(s)
  - ☑ Addendum No. 1
- ☑ Bid Tab Amount (Items 1.0-2.1) $120,000.00

Verified by: _____ Date: 11/2/2020

Printed Name/Title: Brian Simmons, Procurement Manager

COPY

SECTION 00 41 15

BID FORM

PROJECT IDENTIFICATION:	**Nassau-Amelia Utilities (NAU) Generator Replacement** **Bid Number NC20-017** **Nassau County, Florida**
BID DEADLINE:	**Tuesday, OCTOBER 13, 2020 at 4:00 PM**
THIS BID IS SUBMITTED TO:	**Board of County Commissioners, Nassau County** **Judicial Annex** **Office of the Ex-Officio Clerk** **76347 Veterans Way, Suite 456** **Yulee, Florida 32097**

1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with the County in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

Company Name (typed or printed): Cogburn Bros., Inc.
Business address: 3300 Faye Road, Jacksonville, FL 32226
Phone No.: 904-358-7344 Fax No.: 904-358-2805
Contact Name: Mike Gibbons
Contact Title: Project Manager
Contact email address: mgibbons@cogburnbros.com

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of the County.

COPY

3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged:

Addendum No.	Addendum Date
1	October 12, 2020

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of a Hazardous Environmental Condition, if any, which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies. and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect costs, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of the work to be performed by the County and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

I. Bidder has given Engineer of Record written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer of Record is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4.01 Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over the County.

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BID					
Item No	**Pay Item Description**	**Units**	**Quantity**	**Cost Per Unit**	**Total Cost**
Item 1.0 General					
1.1	Mobilization/Demobilization/General Requirements (Each Not to Exceed 5% of the Total Bid Price)	LS	1	6,000.00	$ 12,000.00
1.2	Indemnification	LS	1	Included	$ 0.00
1.3	Bonds and Insurance	LS	1	3.78	$ 2,640.00
1.4	Maintenance of Traffic (MOT)	LS	1	N/A	$ 0
Subtotal					**$** 14,640.00
Item 2.0 Generator					
2.1	General Site Work and Installation of an Emergency Generator with Stairs as Necessary, Electrical, Controls, Instrumentation, and Appurtenances				$ 105,360.00
Subtotal					**$** 105,360.00
TOTAL BID LUMP SUM (ITEMS 1.0 to 2.0)					**$** 120,000.00

one hundred twenty thousand dollars and no cents

(Total –Written)

Lump sum price has been computed in accordance with Paragraph 11.01 of the General Conditions.

All specific cash allowances are included in the price(s) set forth above and have been computed in accordance with paragraph 11.02 of the General Conditions.

Unit prices have been computed in accordance with Paragraph 11.03B of the General Conditions.
Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids. Final payment of all Unit Price Bid Items will be based on actual quantities as determined in the Contract Documents.

6.01 Bidder agrees that the Work will be substantially complete within 90 calendar days after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions within 30 calendar days from the date of substantial completion. Total contract time shall be 120 calendar days; for everyday the work goes beyond substantial completion, a day will be removed from final completion so the total days equal 120 calendar days.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified above, which shall be stated in the Agreement.

7.01 The following documents are attached to and made a condition of this Bid:

A. Bid Security in the form of a certified check of Bid Bond (Section 00 43 15)
B. Tabulation of Subcontractors & Suppliers (Section 00 43 35)
C. Florida Trench Safety Act Certification (Section 00 44 55)
D. Bidder's Qualification Statement (Section 00 45 13)
E. Non-collusion Affidavit (Section 00 45 19)
F. Drug-Free Workplace Certificate (Section 00 45 20)
G. Public Entity Crimes Statement
H. Statement of Disputes, Litigation & Surety Completion
I. E-Verify Affidavit of Compliance (Section 00 45 40)
J. Certificate of Insurance (See Exhibit 1 for requirements)

8.01 The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

SUBMITTED on October 28, 20 20.

State Contractor License No. EC0001120/CMC056960.

If Bidder is:

An Individual N/A

Name (typed or printed): _____

By: _____

(*Individual's Signature*)

Doing business as: _____

Business address: _____

_____

Phone No.: _____ Fax No.: _____

A Partnership N/A

Partnership Name: _____

By: _____

(*Signature of general partner - attach evidence of authority to sign*)

Name (typed or printed): _____

Business address: _____

_____

Phone No.: _____ Fax No.: _____

A Corporation

Corporation Name: Cogburn Bros., Inc. (SEAL)

State of Incorporation: Florida

Type (General Business, Professional, Service, Limited Liability): General Business

By: _____

(Signature - attach evidence of authority to sign)

Name (typed or printed): Doug Cogburn

Title: Vice President (CORPORATE SEAL)

Attest _____

(Signature of ~~Corporate Secretary~~) Vice President

Business address: 3300 Faye Road
Jacksonville, FL 32226

Phone No.: 904-358-7344 Fax No.: 904-358-2805

Date of Qualification to do business is 6/6/1977

A Joint Venture N/A

Joint Venturer Name: _____

By: _____

(*Signature of joint venture partner - attach evidence of authority to sign*)

Name (typed or printed): _____

Title: _____

Business address: _____

_____

Phone No.: _____ Fax No.: _____

Joint Venturer Name: _____

By: _____

(*Signature - attach evidence of authority to sign*)

Name (typed or printed): _____

Title: _____

Business address: _____

_____

Phone No.: _____ Fax No.: _____

Phone and FAX Number, and Address for receipt of official communications:

_____

_____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in a manner indicated above.)

END OF SECTION

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SECTION 00 43 15

BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address): Cogburn Bro., Inc.
3300 Faye Road
Jacksonville, FL 32226

SURETY (Name and Address of Principal Place of Business): Western Surety Company
151 N Franklin St.
Chicago. IL 60606

OWNER (Name and Address): Nassau-Amelia Utilities
5390 East Coast Highway
Fernandina Beach, FL 32034

BID

Bid Due Date: October 28, 2020
Project (Brief Description Including Location): Replace and Relocate Generator

BOND

Bond Number: n/a
Date (Not later than Bid due date): October 28, 2020
Penal Sum: Five Per Cent of Amount Bid----------(5%)----------
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

Cogburn Bros., Inc. (Seal)
Bidder's Name and Corporate Seal

By: _____
Signature and Title

Attest: _____
Signature and Title

SURETY

Western Surety Company (Seal)
Surety's Name and Corporate Seal

By: [signature]
Signature and Title Terry F. Vliek, Attorney-in-Fact
(Attach Power of Attorney)

Witness: ~~Attest:~~ Jeanne M. Vliek
Signature ~~and Title~~

Note: Above addresses are to be used for giving required notice.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to the County upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder who submitted a responsive Bid as determined by the County for the work required by the Contract Documents, provided that:

1.1. If there is no such next Bidder, and the County does not abandon the Project, then Bidder and Surety shall pay to the County the penal sum set forth on the face of this Bond, and

1.2. In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the race of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the County) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. The County accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the County) the executed Agreement required by the Bidding Documents arid any performance and payment bonds required b) the Bidding Documents, or

3.2. All Bids are rejected by the County, or

3.3. The County fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph *5* hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from the County, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount clue.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by the County and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent

jurisdiction located in the slate in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

END OF SECTION

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to the County upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder who submitted a responsive Bid as determined by the County for the work required by the Contract Documents, provided that:

1.1. If there is no such next Bidder, and the County does not abandon the Project, then Bidder and Surety shall pay to the County the penal sum set forth on the face of this Bond, and

1.2. In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the race of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the County) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. The County accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by the County) the executed Agreement required by the Bidding Documents arid any performance and payment bonds required b) the Bidding Documents, or

3.2. All Bids are rejected by the County, or

3.3. The County fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph *5* hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from the County, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount clue.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by the County and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent

jurisdiction located in the slate in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

END OF SECTION

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SECTION 00 43 35

TABULATION OF SUBCONTRACTORS & SUPPLIERS

The undersigned states that the following is a full and complete list of the proposed subcontractors and suppliers on this Project and the class of work to be performed by each, and that such list will not be added to nor altered without written consent to the Owner through the Engineer.

	SUBCONTRACTOR OR SUPPLIER AND ADDRESS	CLASS OF WORK OR MATERIAL
1.	Sterett Crane 11075 Blasius Rd., Jacksonville, FL 32226	Crane
2.		
3.		
4.		
5.		
6.		
7.		

BIDDER: Cogburn Bros., Inc.

By: [signature]

Name: Doug Cogburn

Title: Vice President

Date: October 28, 2020

END OF SECTION

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SECTION 00 44 55

FLORIDA TRENCH SAFETY ACT CERTIFICATION

Bidder acknowledges that included in the various items of the proposal and in the Total Bid Price are costs for complying with the Florida Trench Safety Act (90-96, Laws of Florida) as modified October 1, 2008. The Bidder further identifies the costs to be summarized below:

	Cost
1. Trench Safety Act Compliance	$ N/A
2. Special Shoring	$ N/A

Identify method of compliance for Item #1: _____

_____

Identify or attach a copy of Special Shoring requirements for Item #2: _____

_____

The undersigned certifies that he/she is the Contractor who will perform the trench excavation for this project, and hereby gives written assurance that Contractor will comply with the applicable trench safety standards specifically set forth in Florida's Trench Safety Act, Laws of Florida, 90-96.

BIDDER: Cogburn Bros., Inc.

By: _____

Name: Doug Cogburn

Title: Vice President

Sworn to and subscribed before me this 28th day of October, 20 20.

_____
Notary Public

Notary Public State of Florida
KATHRYN HAYES
My Commission GG 156035
Expires 02/11/2022

My Commission Expires: 02/11/22

END OF SECTION

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Presently on well sites 10 & 29 for NAU.

SECTION 00 45 13 N/A

STATEMENT OF BIDDER'S QUALIFICATIONS

To: _____ Project: _____

Date: _____ _____

The following experience record, as of date shown, shall be submitted to the County with the Bid Form. All questions shall be answered fully. Bidders who have qualified to bid on other projects for this County within the last 12 months need not resubmit this form unless specifically requested by the County. The contents of this form will be considered confidential to the extent allowed by applicable laws and regulations.

Name of Bidder: _____

Business Address: _____
Street

_____
City State Zip Code

1. Number of years in business as a Contractor under the present:

   Business Name _____

   As Principal Contractor _____ As a Sub-Contractor _____

2. Class of work you are equipped to perform: _____

3. Class of work you usually sublet: _____

4. Have any members of your concern ever operated under any other business name? _____.
   If so, give details: _____

   _____

5. Have you ever failed to qualify as a responsible bidder? _____. If so, give details.

   _____

   _____

6. Have you ever refused to enter into a contract after the award is made to you? _____.
   If so, give details. _____

   _____

7. Have you ever failed to complete any work? _____. If so, give details:

   _____

   _____

8. Has any surety or financial institution ever experienced loss on your concern? _____.

If so, give details: _____

_____

9. Give name and address of the County, type of work, and the contract amount of at least three projects completed in the last three years:

	(1)	(2)	(3)
Project Owner:	_____	_____	_____
Owner Project Manager:	_____	_____	_____
Email:	_____	_____	_____
Phone No:	_____	_____	_____
Address:	_____	_____	_____
City, State, Zip:	_____	_____	_____
Type of Work:	_____	_____	_____
Contract Amt:	$_____	$_____	$_____

10. Give name and address of the County, type of work, and contract amount of projects now in process of construction:

	Name	Address	Type of Work	Contract Amount
A.	_____	_____	_____	$_____
B.	_____	_____	_____	$_____
C.	_____	_____	_____	$_____
D.	_____	_____	_____	$_____
E.	_____	_____	_____	$_____

11. Indicate your experience in the construction of work similar to this project (if not demonstrated by Questions 9 and 10, above):

_____

_____

_____

12. Give construction experience of principal individuals of your organization:

	Name	Position	Years of Experience	Size and Type of Work
A.	_____	_____	_____	_____
B.	_____	_____	_____	_____
C.	_____	_____	_____	_____

D. _____ _____ _____ _____

E. _____ _____ _____ _____

13. Are there any judgments, suits, or claims pending against you? _____. If so, give details:

_____

14. Does your organization operate as a corporation, partnership, or individual? _____

_____

A. If a corporation, when incorporated: _____

In which state incorporated: _____

List name, title, and address of all officers:

	Name	Title	Address
(1)	_____	_____	_____
(2)	_____	_____	_____
(3)	_____	_____	_____
(4)	_____	_____	_____
(5)	_____	_____	_____

B. If a partnership, date of organization: _____

General, Limited, or Associated? _____

List name, address, and proportional interest of parties:

	Name	Address	Proportional Interest
(1)	_____	_____	_____
(2)	_____	_____	_____
(3)	_____	_____	_____
(4)	_____	_____	_____
(5)	_____	_____	_____

15. If requested prior to award of contract, provide to the County an accurate, up-to-date, condensed financial statement on a separate sheet attached to these qualifications of the individual, co-partnership, or corporation.

The undersigned hereby declares and certifies that the foregoing is a true statement of the experience and condition of the organization, therein first given and that any agency or individual herein named authorized to supply any information as may be deemed necessary to verify this statement.

Signed _____

Title Vice President

Subscribed and sworn to before me this 28th

day of October, 20 20

_____ Notary Public

_____ County, Duval

My Commission expires 02/11/22

END OF SECTION

Notary Public State of Florida
KATHRYN HAYES
My Commission GG 156035
Expires 02/11/2022

SECTION 00 45 19

NONCOLLUSION AFFIDAVIT

TO: The Nassua-Amelia Utilities, herein called the "County."

Pursuant to bidding requirements for the work titled "Nassua-Amelia Utilities (NAU) Generator Replacement Project, Bid No. NC20-017,"

the enclosed contract documents shall be provided to the County.

State of Florida

County of Duval

Doug Cogburn, being first duly sworn, deposes, and says that:

A. He is Vice President (officer's title) of Cogburn Bros., Inc. (company name), the Bidder that has submitted the attached bid;

B. He is fully informed respecting the preparation and contents of the attached bid and of all pertinent circumstances respecting such bid;

C. Such bid is genuine and is not a collusive or sham bid;

D. Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly with any other Bidder, firm, or person to submit a collusive or sham bid in connection with the contract for which the attached bid has been submitted or to refrain from bidding in connection with such contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm, or person to fix the price or prices in the attached bid or of any other Bidder, or to fix any overhead, profit, or cost element of the bid price or the bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance, or unlawful agreement any advantage against the "County" or any person interested in the proposed contract; and

E. The price or prices quoted in the attached bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners: employees, or parties in interest, including this affiant.

(Signed)

Subscribed and sworn to before me
this 28th day of October, 20 20.

Notary Public

02/11/22
My commission expires

END OF SECTION

SECTION 00 45 20

DRUG FREE WORKPLACE CERTIFICATE

I, the undersigned, in accordance with Florida Statute 287.087, hereby certify that _____
Cogburn Bros., Inc. (print or type name of firm)

- Publishes a written statement notifying that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance in the workplace named above, and specifying actions that will be taken against violations of such prohibition.

- Informs employees about the dangers of drug abuse in the workplace, the firm's policy of maintaining a drug free working environment, and available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug use violations.

- Gives each employee engaged in providing commodities or contractual services that are under bid or proposal, a copy of the statement specified above.

- Notifies the employees that as a condition of working on the commodities or contractual services that are under bid or proposal, the employee will abide by the terms of the statement and will notify the employer of any conviction of, plea of guilty or nolo contendere to, any violation of Chapter 1893, or any controlled substance law of the State of Florida or the United States, for a violation occurring in the work place, no later than five (5) days after such conviction, and requires employees to sign copies of such written statement to acknowledge their receipt.

- Imposes a sanction on, or requires the satisfactory participation in, a drug abuse assistance or rehabilitation program, if such is available in the employee's community, by any employee who is so convicted.

- Makes a good faith effort to continue to maintain a drug free work place through the implementation of a drug free work place program.

"As a person authorized to sign a statement, I certify that the above named business, firm, or corporation complies fully with the requirements set forth herein."

Authorized Signature

October 28, 2020

Date Signed

State of: Florida

County of: Duval

Sworn to and subscribed before me this 28th day of October, 2020.

Personally known x or Produced Identification _____

(Specify type of Identification)

Notary Public

02/11/22

My commission expires

Notary Public State of Florida
KATHRYN HAYES
My Commission GG 156035
Expires 02/11/2022

END OF SECTION

SECTION 00 45 30
SWORN STATEMENT UNDER SECTION 287.133(3)(a), FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

(To be signed in the presence of a notary public or other officer authorized to administer oaths.)

STATE OF Florida
COUNTY OF Duval

Before me, the undersigned authority, personally appeared Doug Cogburn, who being by me first duly sworn, made the following statement:

1. The business address of Cogburn Bros., Inc. (firm name of Bidder/Contractor) is 3300 Faye Road, Jacksonville, FL 32226

2. My relationship to Cogburn Bros., Inc. (firm name of Bidder/Contractor) is Vice President (relationship such as sole proprietor, partner, president, vice president)

3. I understand that a public entity crime as defined in Section 287.133 of the Florida Statutes includes a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity in Florida or with an agency or political subdivision of any other state or with the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or such an agency or political subdivision and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

4. I understand that "convicted" or "conviction" is defined by the statute to mean a finding of guilt or a conviction of a public entity crime, with or without adjudication or guilt, in any federal or state trial of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

5. I understand that "affiliate" is defined by the statute to mean (1) a predecessor or successor of a person or a corporation convicted of a public entity crime; or (2) an entity under control of any natural person with is active in management of the entity and who has been convicted of a public entity crime; (3) those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate; or (4) a person or corporation who knowingly entered into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months.

6. Neither the Bidder/Contractor nor any officer, director, executive, partner, shareholder, employee, member or agent who is active in the management of the Bidder/Contractor, nor any affiliate of the Bidder/Contractor, has been convicted of a public entity crime subsequent to July 1, 1989.

(Draw a line through Paragraph 6 if Paragraph 7 below applies.)

7. There has been a conviction of a public entity crime by Bidder/Contractor, or an officer, director, executive, partner, shareholder, employee, member or agent of the Bidder/Contractor who is active in the management of the Bidder/Contractor or an affiliate of the Bidder/Contractor. A determination has been made pursuant to 287.133(3) by order of the Division of Administrative Hearings that it is not in the public interest of the name of the convicted person or affiliate to appear on the convicted vendor list.
The name of the convicted person or affiliate is _____.

A copy of the order of the Division of Administrative Hearings is attached to this statement.

(Draw a line through Paragraph 7 if Paragraph 6 above applies.)

_____
(Signature)

Sworn to and subscribed before me in the State and County first mentioned above on the 28th day of October, 2020.

_____
Notary Public

02/11/22
My commission expires

Notary Public State of Florida
KATHRYN HAYES
My Commission GG 156035
Expires 02/11/2022

(affix seal)

END OF SECTION

SECTION 00 45 35

BIDDER'S STATEMENT OF DISPUTES, LITIGATION, ARBITRATION, AND SURETY COMPLETION, LAST THREE (3) YEARS

Project	Name and Address of Owner or Engineer	Name and Phone of Owner or Engineer Representative	Date of Contract	Amount	Status
N/A					

(Signed) _____

Print Name Doug Cogburn

Subscribed and sworn to before me by means of _ physical presence or _ online notarization this 28th day of October, 2020

_____
Notary Public

02/11/22
My commission expires

Notary Public State of Florida
KATHRYN HAYES
My Commission GG 156035
Expires 02/11/2022

SECTION 00 45 40

State of Florida)

County of Duval)

AFFIDAVIT OF COMPLIANCE

The undersigned, being first duly sworn, deposes and states as follows:

This is to certify that Cogburn Bros., Inc. (Company Name) is a party to a Memorandum of Understanding with the Department of Homeland Security to use the E-Verify system for all new hires. Our Company's E-Verify participation number is 131146. In keeping with our Memorandum of Understanding, all new hires are verified through the E-Verify system.

Print Name: Doug Cogburn

October 28, 2020
Date

Sworn to and subscribed before me
This 28th day of October, 2020.

Notary Public

My Commission Expires: 02/11/22

Notary Public State of Florida
KATHRYN HAYES
My Commission GG 156035
Expires 02/11/2022

Client#: 1636613 COGBUBRO

ACORD™

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 10/26/2020

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

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

PRODUCER	CONTACT NAME: Kathy Harper
USI Insurance Services, LLC 4600 Touchton Rd Ste 275 Jacksonville, FL 32246 904 351-7450	PHONE (A/C, No, Ext): 904 450 4702 FAX (A/C, No): E-MAIL ADDRESS: kathy.harper@usi.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Travelers Indemnity Co of America	25666
INSURER B : Travelers Property Casualty Ins	36161
INSURER C : Philadelphia Insurance Company	32204
INSURER D : Travelers Casualty and Surety Company	19046
INSURER E : Berkley Assurance Company	39462
INSURER F : Travelers Property Cas. Co of America	25674

INSURED
Cogburn Bros., Inc.
3300 Faye Road
Jacksonville, FL 32226

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

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

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR X XCU Included X Contractual Liab GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC [ ] OTHER:			CO9H467963	01/01/2020	01/01/2021	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$1,000,000 $300,000 $5,000 $1,000,000 $2,000,000 $2,000,000
A	AUTOMOBILE LIABILITY X ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS X HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY X Drive Oth Car			8109N587372	01/01/2020	01/01/2021	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000 $ $ $
B	X UMBRELLA LIAB [X] OCCUR			CUP3P94238320	01/01/2020	01/01/2021	EACH OCCURRENCE	$25,000,000
C	[ ] EXCESS LIAB [ ] CLAIMS-MADE			PHUB703109	01/01/2020	01/01/2021	AGGREGATE	$25,000,000
D	[ ] DED X RETENTION $10,000			ZUP41N20433	01/01/2020	01/01/2021		$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y / N [N] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		UB9H49610A	01/01/2020	01/01/2021	X PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$1,000,000 $1,000,000 $1,000,000
E	Poll/Prof Legal Liability			CADB50105440120	01/01/2020	01/01/2021	$10M Pollution Ea/Agg $2M Professional Ea/Agg	
F	Rented/Leased Equ			6305N888510TIL20	01/01/2020	01/01/2021	$1,000,000	

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

Nassau-Amelia Utilities is an additional insured with waiver of subrogation with regards to the General Liability as required by written contract.

CERTIFICATE HOLDER

Nassau-Amelia Utilities
96135 Nassau Place, Suite 2
Yulee, FL 32097

CANCELLATION

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

AUTHORIZED REPRESENTATIVE

Bim Cook

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S2MZP

Attachment "F"

General Information and Minimum Insurance Requirements

GENERAL INFORMATION AND MINIMUM INSURANCE REQUIREMENTS

COMMERCIAL GENERAL LIABILITY INSURANCE

The Contractor shall purchase and maintain at the Contractor's expense Commercial General Liability insurance coverage (ISO or comparable Occurrence Form) for the life of this Contract. Modified Occurrence or Claims Made forms are not acceptable.

The Limits of this insurance shall not be less than the following limits:

Each Occurrence Limit	$1,000,000
Personal & Advertising Injury Limit	$1,000,000
Fire Damage Limit (any one fire)	$ 50,000
Medical Expense Limit (any one person)	$ 5,000
Products & Completed Operations Aggregate Limit	$2,000,000
General Aggregate Limit (other than Products & Completed Operations) Applies Per Project	$2,000,000

General liability coverage shall continue to apply to "bodily injury" and to "property damage" occurring after all work on the Site of the covered operations to be performed by or on behalf of the additional insureds has been completed and shall continue after that portion of "your work" out of which the injury or damage arises has been put to its intended use.

WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY INSURANCE

The Contractor shall purchase and maintain at the Contractor's expense Workers' Compensation and Employer's Liability insurance coverage for the life of this Contract.

The Limits of this insurance shall not be less than the following limits:

Part One – Workers' Compensation Insurance – Unlimited
Statutory Benefits as provided in the Florida Statutes and
Part Two – Employer's Liability Insurance

Bodily Injury By Accident	$500,000 Each Accident
Bodily Injury By Disease	$500,000 Policy Limit
Bodily Injury By Disease	$500,000 Each Employee

*If leased employees are used, policy must include an Alternate Employer's Endorsement

AUTOMOBILE LIABILITY INSURANCE

The Contractor shall purchase and maintain at the Contractor's expense Automobile Liability insurance coverage for the life of this Contract.

The Limits of this insurance shall not be less than the following limits:

Combined Single Limit – Each Accident	$1,000,000

Covered Automobiles shall include any auto owned or operated by the insured Contractor, insured Sub-subcontractor including autos which are leased, hired, rented or borrowed, including autos owned by their employees which are used in connection with the business of the respective Contractor or Sub-subcontractor.

UMBRELLA INSURANCE

The Contractor shall purchase and maintain at the Contractor's expense Umbrella Liability (Umbrella Form) insurance coverage for the life of this Contract.

The Limits of this insurance shall not be less than the following limits:

Each Occurrence Limit	$1,000,000
Aggregate Limit	$1,000,000

Contractor shall require each of his Subcontractors to likewise purchase and maintain at their expense Commercial General Liability insurance, Workers' Compensation and Employer's Liability coverage, Automobile Liability insurance, Umbrella Liability Professional Liability, Environmental Liability, Builders Risk or Installation Floater (as applicable) insurance coverage meeting the same limit and requirements as the Contractors insurance.

Certificates of Insurance acceptable to Nassau County Board of County Commissioners for the Contractor's insurance must be received within five (5) days of Notification of Selection and at time of signing Agreement.

Certificates of Insurance and the insurance policies required for this Agreement shall contain an endorsement that coverage afforded under the policies will not be cancelled or allowed to expire until at least thirty (30) days prior written notice has been given to Nassau County Board of County Commissioners.

Certificates of Insurance and the insurance policies required for this Agreement will include a provision that policies, except Workers' Compensation and Professional Liability, are primary and noncontributory to any insurance maintained by the Contractor.

Nassau County Board of County Commissioners must be named as an Additional Insured and endorsed onto the Commercial General Liability (CGL), Auto Liability and Umbrella Liability policy (ies). A copy of the endorsement(s) must be supplied to Nassau County Board of County Commissioners ten (10) days following the execution of the agreement or prior to the first date of services, whichever comes first.

CGL policy Additional Insured Endorsement must include Ongoing and Completed Operations (Form CG2010 11 84 **OR** Form CG2010 04 13 and GC2037 04 13 edition or equivalent). Other Additional Insured forms might be acceptable but only if modified to delete the word "ongoing" and insert the sentence "Operations include ongoing and completed operations".
CGL policy shall not be endorsed with Exclusion - Damage to Work performed by Subcontractors on Your Behalf (CG2294 or CG2295)
CGL policy shall not be endorsed with Contractual Liability Limitation Endorsement (CG2139) or Amendment of Insured Contract Definition (CG 2426)
CGL policy shall not be endorsed with Exclusion - Damage to Premises Rented to you (CG 2145)
CGL policy shall include broad form contractual liability coverage for the Contractors covenants to and indemnification of the Authority under this Contract

Certificates of Insurance and the insurance policies required for this Agreement shall contain a provision under General Liability, Auto Liability and Workers' Compensation to include a Waiver of Subrogation clause in favor of Nassau County Board of County Commissioners.

All Certificates of Insurance shall be dated and shall show the name of the insured Contractor, the specific job by name and job number, the name of the insurer, the policy number assigned its effective date and its termination date and a list of any exclusionary endorsements.

All Insurers must be authorized to transact insurance business in the State of Florida as provided by Florida Statute 624.09(1) and the most recent Rating Classification/Financial Category of the insurer as published in the latest edition of "Best's Key Rating Guide' (Property-Casualty) must be at least A- or above.

All of the above referenced Insurance coverage is required to remain in force for the duration of this Agreement and for the duration of the warranty period. Accordingly, at the time of submission of final application for payment, Contractor shall submit an additional Certificate of Insurance evidencing continuation of such coverage.

If the Contractor fails to procure, maintain or pay for the required insurance, Nassau County Board of County Commissioners shall have the right (but not the obligation) to secure same in the name of and for the account of Contractor, in which event, Contractor shall pay the cost thereof and shall furnish upon demand, all information that may be required to procure such insurance. Nassau County Board of County Commissioners shall have the right to back-charge contractor for the cost of procuring such insurance. The failure of Nassau County Board of County Commissioners to demand certificates of insurance and endorsements evidencing the required insurance or to identify any deficiency in contractors coverage based on the evidence of insurance provided by the contractor shall

not be construed as a waiver by Nassau County Board of County Commissioners of contractor's obligation to procure, maintain and pay for required insurance.

The insurance requirements set forth herein shall in no way limit Contractors liability arising out of the work performed under the Agreement or related activities. The inclusions, coverage and limits set forth herein are minimum inclusion, coverage and limits. The required minimum policy limits set forth shall not be construed as a limitation of Contractor's right under any policy with higher limits, and no policy maintained by the Contractor shall be construed as limiting the type, quality or quantity of insurance coverage that Contractor should maintain. Contractor shall be responsible for determining appropriate inclusions, coverage and limits, which may be in excess of the minimum requirements set forth herein.

If the insurance of any Contractor or any subcontractor contains deductible(s), penalty(ies) or self-insured retention(s), the Contractor or Subcontractor whose insurance contains such provision(s) shall be solely responsible for payment of such deductible(s), penalty(ies) or self-insured retention(s).

The failure of Contractor to fully and strictly comply at all times with the insurance requirements set forth herein shall be deemed a material breach of the Agreement.