

CONRAC FACILITIES REFURBISHMENT

At the Destin - Fort Walton Beach Airport



FOR THE
OKALOOSA COUNTY,
FLORIDA
BOARD OF COUNTY
COMMISSIONERS



ITB AP 42-20

July 2020

PREPARED BY:



5550 W. Idlewild Avenue, Suite 102
Tampa, Florida 33634
FL Certificate of Authorization No. 30862

NOTICE TO REPENDENTS

ITB AP 42-20

**CONRAC FACILITIES REFURBISHMENT
at
DESTIN-FORT WALTON BEACH AIRPORT
OKALOOSA COUNTY, FLORIDA**

Notice is hereby given that the Board of County Commissioners of Okaloosa County will receive sealed bids until **August 26, 2020 at 3:00 P.M.** (local time) for the CONRAC FACILITIES REFURBISHMENT at Destin-Fort Walton Beach Airport project. Interested respondents desiring consideration shall provide an original and two (2) copies (total three (3)) of their Invitation to Bid (ITB) and one (1) thumb drive of their Invitation To Bid (ITB) with the respondent's area of expertise identified. Submissions shall be portrait oriented, unbound, and 8 ½"x 11" where practical. **All originals must have original signatures in blue ink.**

Beginning on **Monday 27 July, 2020** digital copies of the above documents may be downloaded by accessing the following sites:
<http://www.myokaloosa.com/purchasing/home> then accessing the link "View Current Solicitations" <https://www.bidnetdirect.com/florida>
https://www.demandstar.com/supplier/bids/agency_inc/bid_list.asp?f=search&mi=2442519

Okaloosa County, hereby formally known as ("COUNTY"/"OWNER"), on behalf of its Airport Department ("AIRPORT") desire to refurbish their consolidated rental car facility (CONRAC) to consist of the following items: 1) Fuel Pump dispenser (5 total) replacement; 2) New inventory control and lightning protection of same: and; 3) New Fuel Tank monitoring system.

Funding for this project is being provided by Okaloosa County and will be subject to all applicable County, State and Federal requirements as determined applicable.

A non-mandatory Pre-Bid Conference will be conducted at the Destin-Fort Walton Beach Airport, Conference Room No. 1, 1701 State Road 85 N., Eglin AFB, Florida 32542, and virtually via the Zoom platform on **August 6, 2020 at 10:00 A.M. (CDST)**. Okaloosa County will transmit to all plan holders of record an Addenda in response to written questions received no later than seven (7) days prior to Bid Opening date. Oral statements may not be relied upon and will not be binding or legally effective.

For those choosing to attend the pre-bid meeting in person, upon arrival to the Destin-Fort Walton Beach Airport respondents will park in Lot A and proceed to the center lobby where an Airport representative will be standing by to provide instructions to meeting attendees. In order to help protect yourself and others a face covering or mask will be required to attend the meeting. The Airports and Purchasing Department staff will provide additional instructions to attendees to ensure a safe atmosphere during the pre-bid meeting. Staff will be following the latest guidance from the CDC, State, and Local authorities.

In addition to the face-to face Pre-Bid Conference at Destin-Fort Walton Beach Airport, the Airport is offering an electronic version of the conference conducted through a Zoom meeting. **To attend the Zoom meeting, follow the below information to log-in:**

Meeting URL:

<https://myokaloosa.zoom.us/j/4587775973?pwd=N1g5aXMxVUhxWDRuNkktczJTM2x4dz09>

Meeting ID: 458 777 5973

Password: 548523

One tap mobile: +1-971-247-1195,,4587775973#,,,,0#,,548523# or 888-788- 0099,,458-777-5973# ,,,, 0# ,, 548523# (Toll Free)

Dial by your location:

+1 971-247-1195 US

888-788-0099 US Toll-free or 877-853-5247 US Toll-free

Once you have attended the Zoom meeting, please e-mail your company name to jdarr@myokaloosa.com to inform the Purchasing Department after your company has attended the Zoom meeting.

On **August 26, 2020 at 3:00 P.M.** (local time), all bids will be opened and read aloud. All bids must be in sealed envelopes reflecting on the outside thereof the Respondent's name and **"ITB AP 42-20 CONRAC FACILITIES REFURBISHMENT AT THE DESTIN – FORT WALTON BEACH AIRPORT (VPS)"**. The Board of County Commissioners will consider all bids properly submitted at its scheduled bid opening located at 5479A Old Bethel Rd., Crestview, FL 32536. Bids may be submitted at the Purchasing department prior to bid opening or delivered to the Okaloosa County Purchasing Department, 5479A Old Bethel Rd., Crestview, FL 32536.

NOTE: Crestview, FL is not a next day guaranteed delivery location by most delivery services. Respondents using mail or delivery services assume all risks of late or non-delivery.

All bids should be addressed as follows:

BID ENCLOSED – "ITB AP 42-20 CONRAC FACILITIES REFURBISHMENT AT THE DESTIN – FORT WALTON BEACH AIRPORT (VPS)"

ITB 42-20
Okaloosa County Purchasing Department
5479A Old Bethel Rd.
Crestview, FL 32536



Jeff Hyde
Purchasing Manager

07/23/2020
Date

BOARD OF COUNTY COMMISSIONERS
OKALOOSA COUNTY, FL

Robert A. "Trey" Goodwin, III
Chairman

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INVITATION TO BID (ITB) & RESPONDENT'S ACKNOWLEDGEMENT

ITB TITLE: CONRAC FACILITIES
REFURBISHMENT-DESTIN/ FORT WALTON
BEACH AIRPORT (VPS)

ITB NUMBER:
ITB AP 42-20

<u>ISSUE DATE:</u>	July 27, 2020	8:00 A.M. CDST
<u>PRE-BID MEETING:</u>	August 6, 2020	10:00 A.M. CDST
<u>LAST DAY FOR QUESTIONS:</u>	August 12, 2020	3:00 P.M. CDST
<u>ITB OPENING DATE & TIME:</u>	August 26, 2020	3:00 P.M. CDST

NOTE: BIDS RECEIVED AFTER THE BID OPENING DATE & TIME WILL NOT BE CONSIDERED.

Okaloosa County, Florida solicits your company to submit a bid on the above referenced goods or services. All terms, specifications and conditions set forth in this ITB are incorporated into your response. A bid will not be accepted unless all conditions have been met. All bids must have an authorized signature in the space provided below. All bids must be sealed and received by the Okaloosa County Purchasing Department by the "ITB Opening Date & Time" referenced above. "ITB Number" and the "ITB Opening Date & Time". Okaloosa County is not responsible for lost or late delivery of bids by the U.S. Postal Service or other delivery services used by the respondent. Neither faxed nor electronically submitted bids will be accepted. Bids may not be withdrawn for a period of one hundred twenty (120) days after the bid opening unless otherwise specified.

RESPONDENT ACKNOWLEDGEMENT FORM BELOW MUST BE COMPLETED, SIGNED, AND RETURNED AS PART OF YOUR BID. BIDS WILL NOT BE ACCEPTED WITHOUT THIS FORM, SIGNED BY AN AUTHORIZED AGENT OF THE RESPONDENT.

COMPANY NAME _____

MAILING ADDRESS _____

CITY, STATE, ZIP _____

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER (FEIN): _____

TELEPHONE NUMBER: _____ EXT: _____ FAX: _____

EMAIL: _____

I CERTIFY THAT THIS BID IS MADE WITHOUT PRIOR UNDERSTANDING, AGREEMENT, OR CONNECTION WITH ANY OTHER RESPONDENT SUBMITTING A BID FOR THE SAME MATERIALS, SUPPLIES, EQUIPMENT OR SERVICES, AND IS IN ALL RESPECTS FAIR AND WITHOUT COLLUSION OR FRAUD. I AGREE TO ABIDE BY ALL TERMS AND CONDITIONS OF THIS BID AND CERTIFY THAT I AM AUTHORIZED TO SIGN THIS BID FOR THE RESPONDENT.

AUTHORIZED SIGNATURE: _____ TYPED OR PRINTED NAME _____

TITLE: _____ DATE _____

Rev: September 22, 2015

ITB AP 42-20 CONRAC FACILITIES
REFURBISHMENT

ITB-1

Invitation to Bid (ITB) &
Respondents Acknowledgement

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INSTRUCTIONS TO RESPONDENTS

PROJECT IDENTIFICATION:

a) Project Title:

ITB AP 42-20 CONRAC FACILITIES REFURBISHMENT-DESTIN/ FORT WALTON BEACH AIRPORT (VPS)

b) Owner:

OKALOOSA COUNTY BOARD OF COUNTY COMMISSIONERS

c) Engineer:

Infrastructure Consulting and Engineering

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1. Defined Terms.

Certain additional terms used in the Instruction to Contactors have the meanings indicated below which are applicable to both the singular and plural thereof.

1.1 Contactor – one who submits a Bid directly to Owner as distinct from sub-contractor, who submits a bid to a Contactor.

1.2 Issuing Office/Purchasing Department – the office from which the Project Documents are to be issued and where the bid procedures are to be administered.

1.3 Successful Contactor – the lowest, responsible and responsive Contactor to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2. Copies of Project Documents.

2.1 Complete sets of the Project Documents may be obtained from BidNet and the Okaloosa County website.

2.2 Complete sets of Project Documents must be used in preparing Bids; neither Owner nor Architect/Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Project Documents.

2.3 Owner and Architect/Engineer in making copies of Project Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

3. Qualifications of Contractors.

To demonstrate qualifications to perform the Work, each Contractor must upon Owner's request, provide detailed written evidence such as financial data, previous experience, present commitments and other such data as may be called for below. Each Bid must contain evidence of Contractors qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

4. Examination of Documents and Site.

4.1 It is the responsibility of each contactor before submitting a Bid:

4.1.1 To examine thoroughly these documents and other related data identified (including "technical data" referred to below);

4.1.2 To visit the site to become familiar with and satisfy Contactor as to the general, local and site conditions that may affect cost, progress, performance, or furnishing of the Work;

4.1.3 To consider federal, state, and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;

4.1.4 To study and carefully correlate Contactor's knowledge and observations with these Project Documents and such other related data; and

4.1.5 To promptly notify Architect/Engineer of all conflicts, errors, ambiguities or discrepancies which Contactor has discovered in or between these Project Documents and such other related documents.

4.2 thru 4.5 (Omitted-Supplementary Conditions Not Applicable)

4.6 Upon request to the Purchasing Department, Owner will provide each Contactor access to the site to conduct such examinations, investigations, explorations, tests, and studies as each Contactor deems necessary for submission of a Bid. Contactor must fill all holes and clean up and restore the site to its former conditions upon completion of such explorations, investigations, tests, and studies.

4.7 Reference is made to the Bid documents for the identification of the general nature of work that is to be performed at the site by Owner or others (such as utilities and other prime contractors) that relates to the work for which a Bid is to be submitted. On request to the Purchasing Department, Owner will provide to each Contactor for examination access to or copies of appropriate documents (other than portions thereof related to price) for such work.

4.8 The submission of a Bid will constitute and incontrovertible representation by Contactor that Contactor has complied with every requirement of this Article 4, that without exception of the Bid is premised upon performing and furnishing the Work required by these Project Documents and applying the specific means, methods, techniques, sequences, or procedures for construction (if any) that may be shown or indicated or expressly required by these Project Documents, the Contactor has given Architect/Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Contactor has discovered in these Project Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.9 The provisions of 4.1 through 4.8, inclusive, do not apply to Asbestos, Polychlorinated biphenyls (PCBs), Petroleum, Hazardous Waste, or Radioactive Material by paragraph 4.5 of the General Conditions.

5. Availability of Lands for Work, Etc.

The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by the successful Contactor in performing the Work are identified in these Project Documents. All additional land and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by the Successful Contactor. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in these Project Documents.

6. Interpretations and Addenda.

6.1 All questions about the meaning or intent of these Project Documents are to be directed to Issuing Office. Interpretations or clarifications considered necessary by Issuing Office in

response to such questions will be issued by Addenda on the Purchasing website and bid net as mentioned above. Questions received after the question deadline may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Addenda may also be issued to modify these Project Documents as deemed advisable by Owner or Architect/Engineer.

7. Bid Security.

7.1 Each Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Contactors maximum Bid Price in the form of a certified or bank check or a Bid Bond on form attached, issued by a surety meeting the requirements of Paragraph 5.1 of the General Conditions.

7.2 The Bid security of Successful Contactor will be retained until such Contactor has executed the Agreement, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Contactor fails to execute and deliver the Agreement and furnishes the required contract security within fifteen days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Contactor will be forfeited. The Bid security of other Contactors whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of:

the seventh (7th) day after the Effective Date of the Agreement

or

the one hundred twentieth (120th) day after the Bid opening,

whereupon Bid security furnished by such Contractors will be returned. Bid security with Bids which are not competitive will be returned within seven (7) days after the Bid Opening.

8. Contract Times.

The Contract Time in calendar days, from the Issuance of the Notice to Proceed to Final Project Completion is defined in Section 5 of BID FORMS (BF-2).

9. Substitute and "Or-Equal" Items.

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to the County, acceptance of the substitution "or equal" to material or equipment, will typically be considered by the County after the contract is awarded. However, any proposed substitution that represents a deviation from the design intent, must be approved prior to submission of the bid responses. A determination as to whether a design deviation or particular item that changes the design intent of the plans or specification is acceptable as a substitute or "equal" will be made by the County and Architect/Engineer. Design

deviations approved prior to bid submittals will be made known to other contactors through an addendum.

10. Subcontractors, Suppliers, and Others

10.1 If the Bid documents require the identity of certain Subcontractors, Suppliers and other persons and organizations (including those who are to furnish the principal items of material and equipment) are to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement. Apparent Successful Contractor, and any other Contractor so requested, shall with Bid documents submit to Owner a list of all such Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor Supplier, person, or organization if requested by Owner. An Owner or Architect/Engineer who after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person, or organization, may before the Notice of Award is given request apparent Successful Contractor to submit an acceptable substitute without an increase in Bid Price.

If apparent Successful Contractor declines to make any such substitution, Owner may award the contract to the next lowest Contractor that proposes to use acceptable Subcontractors, Suppliers, and other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Contractor. Any subcontractor, Supplier, other person or organization listed and to whom Owner or Architect/Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Architect/Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.8.2 of the General Conditions.

11. Pre-Bid Activity -

Except as provided in this section, contactors are prohibited from contacting or lobbying the County, County Administrator, Commissioners, County staff, and Review Committee members, or any other person authorized on behalf of the County related or involved with the solicitation. All inquiries on the scope of work, specifications, additional requirements, attachments, terms and general conditions or instructions, or any issue must be directed in writing, by US mail or email to:

Okaloosa County Purchasing Department
5479A Old Bethel Road
Crestview, FL 32536
Email: jdarr@myokaloosa.com
(850) 689-5960

All questions or inquiries must be received no later than the last day for questions (reference ITB & Contactor's Acknowledgement form). Any addenda or other modification to the bid documents will be issued by the County five (5) days prior to the date and time of bid closing, as written addenda, and will be posted to <http://www.myokaloosa.com/purchasing/home> then accessing the link "View Current Solicitations" and <https://www.bidnetdirect.com/florida> and https://www.demandstar.com/supplier/bids/agency_inc/bid_list.asp?f=search&mi=2442519

Such written addenda or modification shall be part of the bid documents and shall be binding upon each contactor. Each contactor is required to acknowledge receipt of any and all addenda in writing and submit with their bid. No contactor may rely upon any verbal modification or interpretation.

12. Preparation of Bid – The bid form is included with the bid documents. Additional copies may be obtained from the County. The contactor shall submit bids in accordance with the public notice.

All blanks in the bid documents shall be completed by printing in ink or typed in both words and numbers with the amounts extended, totaled and the bid signed. A bid price shall be indicated for each section, bid item, alternative, adjustment unit price item, and unit price item listed therein, or the words “No Bid”, “No Change”, or “Not Applicable” entered. No changes shall be made to the phraseology of the form or in the items mentioned therein. In case of any discrepancy between the written amount and the numerical figures, the written amount shall govern. Any bid which contains any omissions, erasures, alterations, additions, irregularities of any kind, or items not called for which shall in any manner fail to conform to the conditions of public notice inviting bids may be rejected.

A bid submitted by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature). The official address of the partnership shall be shown below the signature.

A bid submitted by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.

A bid submitted by an individual shall show the contactor’s name and official address.

A bid submitted by a joint venture shall be executed by each joint venture in the manner indicated on the bid form. The official address of the joint venture must be shown below the signature. It is preferred that all signatures be in blue ink with the names type or printed below the signature. Okaloosa County does not accept electronic signatures.

The bid shall contain an acknowledgement of receipt of all Addenda, the numbers of which shall be filled in on the form. The address and telephone # for communications regarding the bid shall be shown.

If the contactor is an out-of-state corporation, the bid shall contain evidence of contactor’s authority and qualification to do business as an out-of-state corporation in the State of Florida. A state contractor license # for the State of Florida shall also be included on the bid form. Contactor shall be licensed in accordance with the requirements of Chapter 489, Florida Statutes.

13. Integrity of Bid Documents - Contactors shall use the original Bid documents provided by the Purchasing Department and enter information only in the spaces where a response is requested. Contactors may use an attachment as an addendum to the Bid documents if sufficient space is not available. Any modifications or alterations to the original bid documents by the contactor, whether intentional or otherwise, will constitute grounds for rejection of a bid. Any such

modification or alteration that a contactor wish to propose must be clearly stated in the contactor's response in the form of an addendum to the original bid documents.

14. Submittal of Bid – A bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in an opaque sealed envelope plainly marked with the project title (and, if applicable, the designated portion of the project for which the bid is submitted), the name and address of the contactor, and shall be accompanied by the bid security and other required documents. It is the contactor's responsibility to assure that its bid is delivered at the proper time and place. Offers by email, facsimile, or telephone will **NOT** be accepted.

Contractor shall submit the original plus two (2) copies of their bid to the place indicated in the Advertisement of Notice to Contactor.

Note: Crestview is not a next day delivery site for overnight carriers.

15. Modification & Withdrawal of Bid - A bid may be modified or withdrawn by an appropriate document duly executed in the manner that a bid must be executed and delivered to the place where bids are to be submitted prior to the date and time for the opening of bids.

If within 24 hours after bids are opened any contactor files a duly signed written notice with the County and promptly thereafter demonstrates to the reasonable satisfaction of the County that there was a material substantial mistake in the preparation of its bid, that contactor may withdraw its bid, and the bid security may be returned. Thereafter, if the work is rebid, that contactor will be disqualified from 1) further bidding on the work, and 2) doing any work on the contract, either as a subcontractor or in any other capacity.

16. Bids to Remain Subject to Acceptance – All bids will remain subject to acceptance or rejection for one hundred twenty (120) calendar days after the day of the bid opening, but the County may, in its sole discretion, release any bid and return the bid security prior to the end of this period.

17. Identical Tie Bids – In cases of identical procurement responses, the award shall be determined either by lot or on the basis of factors deemed to serve the best interest of the County. In the case of the latter, there must be adequate documentation to support such a decision.

18. Conditional & Incomplete Bids – Okaloosa County specifically reserves the right to reject any conditional bid and bids which make it impossible to determine the true amount of the bid.

19. Applicable Laws & Regulations – All applicable Federal and State laws, County and municipal ordinances, orders, rules and regulations of all authorities having jurisdiction over the project shall apply to the bid throughout, and they will be deemed to be included in the contract the same as though they were written in full therein.

20. Disqualification of Contactors - Any of the following reasons may be considered as sufficient for the disqualification of a contactor and the rejection of its bid:

- a. Submission of more than one proposal for the same work from an individual, firm or corporation under the same or different name.
- b. Evidence that the contactor has a financial interest in the firm of another contactor for the same work.
- c. Evidence of collusion among contactors. Participants in such collusion will receive no recognition as contactors for any future work of the County until such participant has been reinstated as a qualified contactor.
- d. Uncompleted work which in the judgment of the County might hinder or prevent the prompt completion of additional work if awarded.
- e. Failure to pay or satisfactorily settle all bills due for labor and material on former contracts in force at the time of advertisement of proposals.
- f. Default under previous contract.
- g. Listing of the contactor by any Local, State or Federal Government on its barred/suspended vendor list.
- h. Violation of the Cone of Silence.

21. Award of Bid

- a. **Okaloosa County Review** - Okaloosa County Designated Staff, to include design consultant, will review all bids and will participate in the Recommendation to Award.
- b. The County will award the bid to the responsive and responsible vendor(s) with the lowest responsive bid(s), Base Bid plus any combination of Additive Alternates, and the County reserves the right to award the bid to the contactor submitting a responsive bid with a resulting negotiated agreement which is most advantageous and in the best interest of the County, and to reject any and all bids or to waive any irregularity or technicality in bids received. Okaloosa County shall be the sole judge of the bid and the resulting negotiated agreement that is in its best interest and its decision shall be final.
- c. Okaloosa County reserves the right to waive any informalities or reject any and all bids, in whole or part, to utilize any applicable state contracts in lieu of or in addition to this bid and to accept the bid that in its judgment will best serve the interest of the County.
- d. Okaloosa County specifically reserves the right to reject any conditional bids and will normally reject those which made it impossible to determine the true amount of the bid. Each item must be bid separately and no attempt is to be made to tie any item or items to any other item or items.

22. Payments – The respondent shall be paid after submission of invoices and approval of acceptance by Okaloosa County Board of County Commissioners, Finance Office, 302 N. Wilson St., #203, Crestview FL 32536, for the prices stipulated herein for articles, or services, delivered and accepted. Invoices must show Contract number.

23. Discrimination - An entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid on a contract to provide goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not award or perform work as a contractor, supplier, subcontractor, or consultant under contract with any public entity, and may not transact business with any public entity.

24. Public Entity Crime Information - Pursuant to Florida Statute 287.133, a contractor may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. [287.017](#) for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted vendor list.

25. Conflict of Interest - The award hereunder is subject to the provisions of Chapter 112, Florida Statutes. All contractors must disclose with their bids the name of any officer, director, or agent who is also a public officer or an employee of the Okaloosa Board of County Commissioners, or any of its agencies. Furthermore, all contractors must disclose the name of any County officer or employee who owns, directly or indirectly, an interest of five percent (5%) or more in the firm or any of its branches.

Note: For contractor's convenience, this certification form is enclosed and is made a part of the bid package.

26. Reorganization or Bankruptcy Proceedings – Bids will not be considered from contractors who are currently involved in official financial reorganization or bankruptcy proceedings.

27. Investigation of Contractor – The County may make such investigations, as it deems necessary to determine the stability of the contractor to perform the work and that there is no conflict of interest as it relates to the project. The contractor shall furnish to the Owner any additional information and financial data for this purpose as the County may request.

28. Cone of Silence Clause - The Okaloosa County Board of County Commissioners has established a solicitation silence policy (**Cone of Silence Clause**) that prohibits oral and written communication regarding all formal solicitations for goods and services (formal bids, Request for Proposals, Requests for Qualifications) issued by the Board through the County Purchasing Department. The period commences from the date of advertisement until award of contract.

All communications shall be directed to the Purchasing Department.

Note: For contractor's convenience, this certification form is enclosed and is made a part of the bid package.

29. Review of Procurement Documents - Per Florida Statute 119.071(1)(b) 2 sealed bids, proposals, or replies received by the County pursuant to a competitive solicitation are exempt from public disclosure until such time as the County provides notice of an intended decision or until 30 days after opening the bids, proposals, or final replies, whichever is earlier.

30. Compliance with Florida Statute 119.0701 - The Contactor shall comply with all the provisions of section 119.0701, Florida Statutes relating to the public records which requires, among other things, that the Contactor: (a) Keep and maintain public records; (b) Provide the public with access to public records on the same terms and conditions that the public agency would provide the records; (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; and (d) Meet all requirements for retaining public records and transfer, at no cost, to the public agency all public records in possession of the contactor upon termination of the contract.

31. Protection of Resident Workers – The Okaloosa County Board of County Commissioners actively supports the Immigration and Nationality Act (INA) which includes provisions addressing employment eligibility, employment verifications, and nondiscrimination. Under the (INA), which employers may hire only persons who may legally work in the United States (i.e., citizens and nationals of the U.S.) and aliens authorized to work in the U.S. The employer must verify the identity and employment eligibility of anyone to be hired, which includes completing the Employment Eligibility Verifications. The contactor shall establish appropriate procedures and controls so no services or products under the Contract Documents will be performed or manufactured by any worker who is not legally eligible to perform such services or employment. Okaloosa County reserves the right to request documentation showing compliance with the requirements.

Contactors doing construction business with Okaloosa County are required to use the Federal Government Department of Homeland Security's website and use the E-Verify Employment Eligibility Verifications System to confirm eligibility of all employees to work in the United States.

32. Suspension or Termination for Convenience - The County may, at any time, without cause, order Contactor in writing to suspend, delay or interrupt the work in whole or in part for such period of time as the County may determine, or to terminate all or a portion of the Contract for the County's convenience. Upon such termination, the Contract Price earned to the date of termination shall be paid to Contactor, but Contactor waives any claim for damages, including loss of profits arising out of or related to the early termination. Those Contract provisions which by their nature survive final acceptance shall remain in full force and effect. If the County orders a suspension, the Contract price and Contract time may be adjusted for increases in the cost and time caused by suspension, delay or interruption. No adjustment shall be made to the extent that performance is, was or would have been so suspended, delayed or interrupted by reason for which Contactor is responsible; or that an equitable adjustment is made or denied under another provision of this Contract.

33. Failure of Performance/Delivery - In case of default by the contactor, the County after due notice (oral or written) may procure the necessary supplies or services from other sources and hold the contactor responsible for difference in cost incurred. Continuous instances of default shall result in cancellation of the award and removal of the contactor from the bid list for duration of one (1) year, at the option of the County.

34. Audit - If requested, contactor shall permit the County or an authorized, independent audit agency to inspect all data and records of contactor relating to its performance and its subcontracts under this bid from the date of the award through three (3) years after the expiration of contract.

35. Equal Employment Opportunity; Non-Discrimination – Contactor will not discriminate against any employee or an applicant for employment because of race, color, religion, gender, sexual orientation, national origin, age, familial status or handicap.

36. Non-Collusion – Contact or certifies that it has entered into no agreement to commit a fraudulent, deceitful, unlawful or wrongful act, or any act which may result in an unfair advantage over other contactors. See Florida Statute 838.22.

37. Unauthorized Aliens/Patriot's Act – The knowing employment by contactor or its subcontractors of any alien not authorized to work by the immigration laws is prohibited and shall be a default of the contract. In the event that the contactor is notified or becomes aware of such default, the contactor shall take steps as are necessary to terminate said employment with 24 hours of notification or actual knowledge that an alien is being employed. Contactor's failure to take such steps as are necessary to terminate the employment of any said alien within 24 hours of notification or actual knowledge that an alien is being employed shall be grounds for immediate termination of the contract. Contactor shall take all commercially reasonable precautions to ensure that it and its subcontractors do not employ persons who are not authorized to work by the immigration laws.

38. Acceptance - Delivery of material to Okaloosa Board of County Commissioners does not constitute acceptance for the purpose of payment. Final acceptance and authorization of payment shall be given only after a thorough inspection indicates that the material meets contract specifications and conditions as listed. Should the delivered material differ in any respect from specifications, payment will be withheld until such time as the supplier takes necessary corrective action. The Purchasing Department shall be notified of the deviation in writing within 10 days and the provisions of the delivery paragraph shall prevail. If the proposed corrective action is not acceptable to Okaloosa County, the final acceptance of the material shall remain the property of the supplier and the county shall not be liable for payment for any portion thereof.

39. Pre-Bid Conference.

A non-mandatory Pre-Bid Conference will be conducted at the time and place stated in the Notice to Contractors. The County's Purchasing Department, will transmit via the County website and BidNet such Addenda as Architect/Engineer and Owner consider necessary in response to written questions received no later than the question deadline specified in the Invitation to Bid. Oral statements may not be relied upon and will not be binding or legally effective.

Upon arrival to the Destin-Fort Walton Beach Airport for the pre-bid meeting, respondents will park in Lot A and proceed to the center lobby where an Airport representative will be standing by to provide instructions to meeting attendees. In order to help protect yourself and others, a face covering or mask will be required the meeting. The Airports and Purchasing Department staff will provide additional instructions to attendees to ensure a safe atmosphere during the pre-bid meeting. Staff will be following the latest guidance from the CDC, State, and Local authorities.

In addition to the face-to face Pre-Bid Conference at Destin-Fort Walton Beach Airport, the Airport is offering an electronic version of the conference conducted through a Zoom meeting **on 6 August 2020 at 10:00 a.m.**

40. Sales and Use Taxes.

Work under this Bid is subject to the provisions of Chapter 212, Florida Statutes, Tax on state, Use and Other Transactions. Other state, local, or federal taxes may be applicable. The contractor is responsible to remit to the appropriate governmental entity all applicable taxes. Any applicable tax shall be included in the total Bid price by the contractor.

END OF INSTRUCTION TO RESPONDENTS

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OKALOOSA COUNTY STANDARD CLAUSES

INDEMNIFICATION AND HOLD HARMLESS

CONTRACTOR shall indemnify and hold harmless **COUNTY**, its officers and employees from liabilities, damages, losses, and costs including but not limited to reasonable attorney fees, to the extent caused by the negligence, recklessness, or intentional wrongful conduct of the **CONTRACTOR** and other persons employed or utilized by the **CONTRACTOR** in the performance of this Agreement.

NOTE: For Contractor's convenience, this certification form is enclosed and is made a part of the bid package.

TRENCH SAFETY ACT

Each contractor must submit with his bid an executed sworn certification that he will comply with the Trench Safety Act, Chapter 90-96, Florida Statutes, on trench safety.

NOTE: For Contractor's convenience, a certification form is enclosed and is made a part of the bid package.

PUBLIC ENTITY CRIME INFORMATION

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.107, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

BONDING REQUIREMENTS

A Bid Bond is required with the Contractor's submittal for 5% of the Bid price, in the form of a cashier's check, certified check or bond. A performance and payment bond will be required in the amount of 100% of the estimated contract value. The performance bond and payment bond can be a total of 100% combined.

GENERAL SERVICES INSURANCE REQUIREMENTS

REVISED: 08/01/2018

CONTRACTORS INSURANCE

1. The Contractor shall not commence any work in connection with this Agreement until he has obtained all required insurance and such insurance has been approved by the Okaloosa County Risk Manager or designee.

2. All insurance policies shall be with insurers authorized to do business in the State of Florida.
3. All insurance shall include the interest of all entities named and their respective officials, employees & volunteers of each and all other interests as may be reasonably required by Okaloosa County. The coverage afforded the Additional Insured under this policy shall be primary insurance. If the Additional Insured have other insurance that is applicable to the loss, such other insurance shall be on an excess or contingent basis. The amount of the company's liability under this policy shall not be reduced by the existence of such other insurance.
4. The County shall be shown as an Additional Insured with a Waiver of Subrogation on the Certificate of Insurance.
5. The County shall retain the right to reject all insurance policies that do not meet the requirement of this Agreement. Further, the County reserves the right to change these insurance requirements with 60-day notice to the Contractor.
6. The County reserves the right at any time to require the Contractor to provide copies (redacted if necessary) of any insurance policies to document the insurance coverage specified in this Agreement.
7. The designation of Contractor shall include any associated or subsidiary company which is involved and is a part of the contract and such, if any associated or subsidiary company involved in the project must be named in the Workers' Compensation coverage.
8. Any exclusions or provisions in the insurance maintained by the Contractor that excludes coverage for work contemplated in this agreement shall be deemed unacceptable and shall be considered breach of contract.

WORKERS' COMPENSATION INSURANCE

1. The Contractor shall secure and maintain during the life of this Agreement Workers' Compensation insurance for all of his employees employed for the project or any site connected with the work, including supervision, administration or management, of this project and in case any work is sublet, with the approval of the County, the Contractor shall require the Subcontractor similarly to provide Workers' Compensation insurance for all employees employed at the site of the project, and such evidence of insurance shall be furnished to the County not less than ten (10) days prior to the commencement of any and all sub-contractual Agreements which have been approved by the County.
2. Contractor must be in compliance with all applicable State and Federal workers' compensation laws, including the U.S. Longshore Harbor Workers' Act or Jones Act, if applicable.
3. No class of employee, including the Contractor himself, shall be excluded from the Workers' Compensation insurance coverage. The Workers' Compensation insurance

shall also include Employer's Liability coverage.

BUSINESS AUTOMOBILE LIABILITY

Coverage must be afforded for all Owned, Hired, Scheduled, and Non-Owned vehicles for Bodily Injury and Property Damage in an amount not less than \$15,000,000 combined single limit each accident. If the contractor does not own vehicles, the contractor shall maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Policy. Contractor must maintain this insurance coverage throughout the life of this Agreement.

COMMERCIAL GENERAL LIABILITY INSURANCE

1. The Contractor shall carry other Commercial General Liability insurance against all other Bodily Injury, Property Damage and Personal and Advertising Injury exposures.
2. All liability insurance (other than Professional Liability) shall be written on an occurrence basis and shall not be written on a claims-made basis. If the insurance is issued with an aggregate limit of liability, the aggregate limit of liability shall apply only to the locations included in this Agreement. If, as the result of any claims or other reasons, the available limits of insurance reduce to less than those stated in the Limits of Liability, the Contractor shall notify the County representative in writing. The Contractor shall purchase additional liability insurance to maintain the requirements established in this Agreement. Umbrella or Excess Liability insurance can be purchased to meet the Limits of Liability specified in this Agreement.
3. Commercial General Liability coverage shall include the following:
 - 1.) Premises & Operations Liability
 - 2.) Bodily Injury and Property Damage Liability
 - 3.) Independent Contractors Liability
 - 4.) Contractual Liability
 - 5.) Products and Completed Operations Liability
4. Contractor shall agree to keep in continuous force Commercial General Liability coverage for the length of the contract.

LIMITS OF LIABILITY

The insurance required shall be written for not less than the following, or greater if required by law and shall include Employer's liability with limits as prescribed in this contract:

	<u>LIMIT</u>
1. Worker's Compensation	
1.) State	Statutory
2.) Employer's Liability	\$500,000 each accident
2. Business Automobile	\$1,000,000.00 each accident (A combined single limit)

- | | | |
|----|---------------------------------|--|
| 3. | Commercial General Liability | \$1,000,000.00 each occurrence
for Bodily Injury & Property Damage
\$1,000,000.00 each occurrence
Products and completed operations |
| 4. | Personal and Advertising Injury | \$1,000,000.00 each occurrence |

NOTICE OF CLAIMS OR LITIGATION

The Contractor agrees to report any incident or claim that results from performance of this Agreement. The County representative shall receive written notice in the form of a detailed written report describing the incident or claim within ten (10) days of the Contractor's knowledge. In the event such incident or claim involves injury and/or property damage to a third party, verbal notification shall be given the same day the Contractor becomes aware of the incident or claim followed by a written detailed report within ten (10) days of verbal notification.

INDEMNIFICATION & HOLD HARMLESS

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

Note: For Contractor's convenience, this certification form is enclosed and is made a part of the bid package.

CERTIFICATE OF INSURANCE

1. Certificates of insurance indicating the job site and evidencing all required coverage must be submitted not less than 10 days prior to the commencement of any of the work. The certificate holder(s) shall be as follows: Okaloosa County, 5479A Old Bethel Road, Crestview, Florida, 32536.
2. The contractor shall provide a Certificate of Insurance to the County with a thirty (30) day notice of cancellation; ten (10) days' notice if cancellation is for nonpayment of premium.
3. In the event that the insurer is unable to accommodate the cancellation notice requirement, it shall be the responsibility of the contractor to provide the proper notice. Such notification shall be in writing by registered mail, return receipt requested, and addressed to the Okaloosa County Purchasing Department at 5479-A Old Bethel Road, Crestview, FL 32536.
4. In the event the contract term goes beyond the expiration date of the insurance policy, the contractor shall provide the County with an updated Certificate of insurance no later

than ten (10) days prior to the expiration of the insurance currently in effect. The County reserves the right to suspend the contract until this requirement is met.

5. The certificate shall indicate if coverage is provided under a claims-made or occurrence form. If any coverage is provided on a claims-made form, the certificate will show a retroactive date, which should be the same date of the initial contract or prior.
6. All certificates shall be subject to Okaloosa County's approval of adequacy of protection and the satisfactory character of the Insurer.
7. All deductibles or SIRs, whether approved by Okaloosa County or not, shall be the Contractor's full responsibility. In particular, the Contractor shall afford full coverage as specified herein to entities listed as Additional Insured.
8. In no way will the entities listed as Additional Insured be responsible for, pay for, be damaged by, or limited to coverage required by this schedule due to the existence of a deductible or SIR.

GENERAL TERMS

Any type of insurance or increase of limits of liability not described above which, the Contractor required for its own protection or on account of statute shall be its own responsibility and at its own expense.

Any exclusions or provisions in the insurance maintained by the contractor that excludes coverage for work contemplated in this contract shall be deemed unacceptable and shall be considered breach of contract.

The carrying of the insurance described shall in no way be interpreted as relieving the Contractor of any responsibility under this contract.

Should the Contractor engage a subcontractor or sub-subcontractor, the same conditions will apply under this Agreement to each subcontractor and sub-subcontractor.

The Contractor hereby waives all rights of subrogation against Okaloosa County and its consultants and other indemnities of the Contractor under all the foregoing policies of insurance.

UMBRELLA INSURANCE

The Contractor shall have the right to meet the liability insurance requirements with the purchase of an umbrella insurance policy. In all instances, the combination of primary and umbrella liability coverage must equal or exceed the minimum liability insurance limits stated in this Agreement.

DELIVERY OF BIDS

Bid Opening shall be public, on the date and time specified on the NOTICE TO CONTRACTORS. It is the contractor's responsibility to assure that his bid is delivered at the proper time and place. Offers by telegram, facsimile, or telephone are NOT acceptable. NOTE: Crestview, Florida is "not a next-day-guaranteed delivery location" by delivery services.

Liquidated Damages:

In case of failure on the part of the Contractor to complete the work within the time(s) specified in the contract, or within such additional time(s) as may be granted by Okaloosa County, the County will suffer damage, the amount of which is difficult, if not impossible, to ascertain. Therefore, the Contractor shall pay to the County, as liquidated damages, the amount established in the schedule below for each calendar day of delay that actual completion extends beyond the time limit specified until such reasonable time as may be required for final completion of the work. In no way shall costs for liquidated damages be construed as penalty on the contractor.

Daily Charge

<u>Original Contract Amount</u>	<u>Per Calendar Day</u>
\$50,000 and under	\$ 311
Over \$50,000 but less than \$250,000	\$ 972
\$250,000 but less than \$500,000	\$1584
\$500,000 but less than \$2,500,000	\$1924
\$2,500,000 but less than \$5,000,000	\$2694
\$5,000,000 but less than \$10,000,000	\$3902
\$10,000,000 but less than \$15,000,000	\$6102
\$15,000,000 but less than \$20,000,000	\$7022
\$20,000,000 and over	\$7022

Determination of Number of Days of Default: For all contracts, regardless of whether the contract time is stipulated in calendar days or working days, the default days shall be counted in calendar days. Construction Time is stipulated in Section 5 of the BID FORMS.

Conditions under which Liquidated Damages are Imposed: Should the Contractor or, in case of his default, the Surety, fail to complete the work within the time stipulated in the contract, or within such extra time as may have been granted by the County, the Contractor or, in case of his default, the Surety, shall pay to the County, not as a penalty, but as liquidated damages, the amount so due as determined by the Daily Charge requirements, as provided above.

Right of Collection: The County shall have the right to apply as payment on such liquidated damages any money which is due to the Contractor by the County.

Permitting Contractor to Finish Work: Permitting the Contractor to continue and to finish the work, or any part of it, after the expiration of the contract time allowed, including extensions of time granted to the Contractor, shall in no way act as a waiver on the part of the County the liquidated damages due under the contract.

Completion of Work by County: In case of default of the contract and the completion of the work by the County, the Contractor and his Surety shall be liable for the liquidated damages under the contract, but no liquidated damages shall be chargeable for any delay in the final completion of the work by the County due to any unreasonable action or delay on the part of the County.

END OF OKALOOSA COUNTY STANDARD CLAUSES

Special Conditions
Federal Requirements
With EEO and Davis – Bacon Act

The following special conditions apply to the Agreement and are incorporated herein by reference:

Clean Air Act (42 U.S.C. 7401-7671q.) and Federal Water Pollution Control Act (33 U.S.C. 1251-1387) Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 USC § 740-7671q) and the Federal Water Pollution Control Act as amended (33 USC § 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The County assumes responsibility for notifying the Environmental Protection Agency (EPA) and the _____.

Contractor must include this requirement in all subcontracts that exceeds \$150,000.

Byrd Anti Lobbying Amendment (31 U.S. C. 1352). The Certification regarding Lobbying executed by Contractor and attached as part of Attachment “A” to the Agreement is hereby acknowledged and made part of the Agreement by reference.

Work Hour and Safety Standards (40 U.S.C. 3701-3708). The Certification regarding Work Hours and Safety Standards executed by Contractor and attached as part of Attachment “A” to the Agreement is hereby acknowledged and made part of the Agreement by reference.

Equal Employment Opportunity (2 CFR Part 200, Appendix II(C); 41 CFR § 61-1.4; 41 CFR 61-4.3; Executive Order 11246). During the performance of this contract, the Contractor agrees as follows:

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

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

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

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

(5) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto,

and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

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

(7) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: *Provided, however*, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

Standard Federal Equal Employment Opportunity Construction Contract Specifications:

1. As used in these specifications:

- a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
- b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;
- c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;
- d. "Minority" includes:
 - (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);
 - (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the

provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR part 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the Contractor during the training period and the Contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are

aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or female sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions, including specific review of these items, with onsite supervisory personnel such as superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority.

Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally), the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR part 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Davis-Bacon Act (2 CFR Part 200; 29 CFR Part 5).

1. Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of

Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination;
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program: *Provided* that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding.

The _____ or the County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the contract, _____ may, after written notice to the Contractor, County, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and that show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the

registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the _____ if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, County, or Owner, as the case may be, for transmission to the _____. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at www.dol.gov/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the _____ if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, County, or Owner, as the case may be, for transmission to the _____, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the County government agency (or the applicant, County, or Owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) The payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

(2) Each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;

(3) Each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the County, _____, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, County, applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal Employment Opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act Requirements.

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR Part 5.5(a)(1) through (10) and such other clauses as _____ may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC 1001.

BID FORM

PROJECT IDENTIFICATION:

CONRAC FACILITIES REFURBISHMENT

CONTRACT IDENTIFICATION AND NUMBER:

Okaloosa County Bid No.: **ITB AP 42-20**

THIS BID IS SUBMITTED TO:

OKALOOSA COUNTY BOARD OF COUNTY COMMISSIONERS

1. The undersigned Contractor proposes and agrees, if this Bid is accepted, to enter into an agreement with Owner in the form included in these documents to perform and furnish all Work as specified or indicated in these documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of these documents.

2. Contractor accepts all of the terms and conditions of the Invitation to Bid and Instructions to Contractors, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for one hundred twenty (120) days after the day of Bid opening. Contractor will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Project Requirements within fifteen (15) days after the date of Owner's Notice of Award.

3. In submitting this Bid, Contractor represents as more fully set forth in the Agreement, that:

(a) Contractor has examined and carefully studied the Project Documents and the following Addenda receipt of all which is hereby acknowledged: (List Addenda by Addendum Number and Date)

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

(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, performance, and furnishing 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, performance, and furnishing of the Work.

Contractor has carefully studied all 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 Bid Documents. Contractor acknowledges that such reports and drawings

are not Contract Documents and may not be complete for Contactor's purposes. Contactor acknowledges that Owner and Architect/Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Project Documents with respect to underground facilities at or contiguous to the site. Contactor has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contactor and safety precautions and programs incident thereto. Contactor does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price, and other terms and conditions of these Documents.

(e) Contactor is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in these documents.

(f) Contactor has correlated the information known to Contactor, information and observation obtained from visits to the site, reports and drawings identified in these documents and all additional examinations, investigations, explorations, tests, studies, and data with these documents.

(g) Contactor has given Architect/Engineer written notice of all conflicts, errors, ambiguities or discrepancies that Contactor has discovered in these documents and the written resolution thereof by Architect/Engineer is acceptable to Contactor, and these documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

(h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Contactor has not directly or indirectly induced or solicited any other Contractor to submit a false or sham Bid; Contactor has not solicited or induced any person, firm or corporation to refrain from Project; and Contactor has not sought by collusion to obtain for itself any advantage over any other Contractor or over Owner.

4. Contactor will complete the Work in accordance with these documents for the price found in the Bid Schedule:

5. **Contract Time:** Contactor agrees that Work will be substantially complete **150** calendar days after the date when the (NTP) Contract Time commences to run, and will be completed and ready for final inspection and final payment within **180** calendar days after the date when the (NTP) Contract Time commences to run. *<Substantial completion shall be defined as all contract items completed and ready for owner's use >*

6. **Liquidated Damages:** Contactor accepts the provisions of the Agreement as to liquidated damages identified in the Okaloosa County Standard Clauses, in the event of failure to achieve substantial complete of the Work and the Concession Shell spaces within the Substantial Completion time and achieve final completion of the work within the Final Completion time as specified in the Agreement.

7. The following documents are attached to and made a condition of this Bid:

Bid Schedule (BF-7)

Bid Affidavit (BF-10)

Bid Bond (BF-13)

Required Contractor's Qualification Questionnaire (BF-16)

Form of Noncollusion Affidavit (BF-19)

Certification of Non-Segregated Facilities (BF-21)

Public Entity Crimes (BF-23)

Certificate as to Corporate Principal (BF-27)

Certified Copy of Resolution of Board of Directors (BF-29)

Conflict of Interest Disclosure Form (BF-31)

Drug-Free Workplace Certification (BF-33)

Certification of Contractor Regarding Trench Safety (BF-35)

Indemnification and Hold Harmless (BF-37)

Insurance Compliance (BF-39)

Affidavit – Worker's Compensation (BF-41)

Recycled Content Form (BF-43)

Disadvantaged Business Enterprise Program (BF-45)

DBE Certificate of Compliance Form (BF-49)

Performance of Work by Subcontractors (BF-51)

E-Verify Compliance Certification (BF-53)

Cone of Silence (BF-55)

Buy American Certificate (BF-57)

Lobbying – 31 USC 1352 (BF-59)

Equal Employment Opportunity Report Statement (BF-61)

Vendors On Scrutinized Companies Lists (BF-63)

System Awards Management (BF-65)

Certification of Offerer/Contactor Regarding Tax Delinquency and Felony Convictions (BF-67)

Government Debarment and Suspension (BF-69)

Certification regarding Debarment & Suspension (BF-71)

Company Data (BF-73)

8. Communications concerning this Bid shall be addressed to the address of Contactor indicated below.

9. Terms used in this Bid which are defined in the Instructions to Contractors will have the meanings indicated in the Instructions.

10. Contractor acknowledges that the Basis of Award shall be the Total Bid Amount, price and other factors considered. The bid bond amount shall be in the amount of the Total Bid Amount.

SUBMITTED on _____, 20__

State Contractor License No. _____

If Contractor is:

An Individual

By _____ (SEAL)
(Individual's Name)

doing business as _____

Business address: _____

Phone No.: _____

A Partnership

By _____ (SEAL)
(Firm Name)

_____ (General Partner)

Business address: _____

Phone No.: _____

A Corporation

By _____ (SEAL)
(Corporation Name)

_____ (State of Incorporation)

By _____ (SEAL)
(Name of person authorized to sign)

_____ (Title)

(Corporate Seal)

Attest _____ (Secretary)

Business address: _____

Phone No.: _____

Date of Qualification to do business is _____



Bid Price Schedule
Conrac Facilities Refurbishment
Destin - Fort Walton Beach Airport



Item No.	Spec. No.	Item Description	Quantity	Unit	Unit Price	Amount
1	FDOT 101	Mobilization	1	LS		
2	01210-1	Bid Allowance 1: For Okaloosa County Permit Fees	1	LS	\$5,000.00	\$5,000.00
3	01210-2	Bid Allowance 2: Security Cameras and Equipment	1	LS	\$25,000.00	\$25,000.00
4		New Double Hose Fuel Dispenser Pumps w/Digital Readouts	5	EA		
5		MOGAS Fuel Mangement System (Controller and Site Software)	1	LS		
6		Inventory Control Pedestal	5	EA		
7		Automatic Tank Monitoring System- for all work required to perform the work identified on Sheets P-105 through P-110, Sheets E-200 through E-301, associated technical specifications, and other contract documents (to include but not be limited to fuel flow and volume measuring devices, communication infrastructure, computer hardware and software, electrical grounding and other improvements to provide the complete specified fuel management system), including all costs related to the work. Except where other pay items are specified	1	EA		
8		Utility Cut and Foundation Patching- 2" Asphalt, 6" Granular Base	1	LS		
9		6" Bollards (Removable/ Lockable)	3	EA		
10		Fiber and Infrastructure for Connectivity to County Network	1	LS		

TOTAL AMOUNT OF BID:

****If a contactor would like to have a copy of this bid sheet in Excel format, please email jdarr@myokaloosa.com to request a copy.****

FOR ALL WORK REQUIRED TO PERFORM IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS, SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS, INCLUDING ALL COSTS RELATED TO THE WORK, AND ANY REQUIRED PERMITS, TAXES, BONDS AND INSURANCE, THE UNDERSIGNED SUBMITS A TOTAL BID AMOUNT OF:

TOTAL BID (amount in words):

_____ Dollars and
 _____ cents

The Contactor represents that it has examined the site of the Work and informed itself fully in regard to all conditions pertaining to the place where the work is to be done; that it has examined the plans and specifications for the work and other Contract Documents relative thereto and has read all of the Addenda furnished prior to the opening of the Bids, as acknowledged below; and that it has otherwise fully informed itself regarding the nature, extent, scope and details of the Work to be performed.

If provided with a Notice of Intent to Award the Contract by the Owner, the Contactor shall execute and deliver to the Owner all of the documents required by the Contract Documents, including but not limited to, the Addendum to the Agreement and the Performance and Payment Bonds in the form contained in the Contract Documents, furnish the required evidence of the specified insurance coverages, furnish all necessary permits, license, materials, equipment, machinery, maintenance, tools, apparatus, means of transportation and labor necessary to complete the Work.

Dated and signed at _____, _____, this ____ day of _____, 2020.

(Name of Contactor)

(Authorized Signature)

(Title)

(Mailing Address)

(City, State, Zip)

(Federal ID No. or SS No.)

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BID AFFIDAVIT

The following affidavit must be executed in order that your quotation may be considered.

STATE OF _____

COUNTY OF _____

_____ of lawful age, being first duly sworn, upon his oath deposes and says: That he executed the accompanying Quotation of behalf of the Contractor therein named, and that he had lawful authority so to do, and said Contractor has not directly or indirectly, entered into any agreement, expressed or implied, with any Contractor or Contractors, having to its object the controlling of the price or amount of such quotation or any quotations, the limiting of the Quotation or Contractors, the parceling or farming out to any Contractor or Contractors, to other persons of any part of the contract or any of the subject matter or the Quotations, or of the profits thereof, and that he has not and will not divulge the sealed Quotation to any person whomsoever, except those having a partnership or other financial interest with him in said Quotation or Quotations, until after the sealed Quotation or Quotations are opened.

[signature]

[date]

STATE OF _____ COUNTY OF _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

[name of individual signing]

who, after first being sworn by me, affixed his/her signature in the space provided above on this__day of _____, 20__.

Subscribed and sworn to before me this _____day of _____, 2020.

My Commission Expires:

Notary Public

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BID BOND

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

Okaloosa County
602 N. Pearl Street
Crestview, FL 32536

BID:

BID DUE DATE: _____

PROJECT (Brief Description Including Location): _____

ITB AP 42-20 CONRAC FACILITIES REFURBISHMENT-DESTIN/ FORT WALTON BEACH AIRPORT (VPS)

BOND:

BOND NUMBER: _____

DATE: (Not later than Bid Due Date): _____

PENAL SUM: _____

IN WITNESS WHEREOF, Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each because this Bid bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

Attest: _____
Signature and Title

- Note:**
- (1) Above addresses are to be used for giving required notice.
 - (2) Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

EJCDC NO. 1910-28-C (1990 Edition)

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Contractor the penal sum set forth on the face of this Bond.
2. Default of Contractor shall occur upon the failure of Contractor to deliver within the time required by the Project Documents the executed Agreement required by the Project Documents and any performance and payment bonds required by the Project Documents and Contract Documents.
3. This obligation shall be null and void if:
 - 3.1. OWNER accepts Contractor's Bid and Contractor delivers within the time required by the Project Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Project Documents and any performance and payment bonds required by the Project Documents and Contract Documents, or
 - 3.2 All Bids are rejected by OWNER, or
 - 3.3 OWNER fails to issue a notice of award to Contractor within the time specified in the Project Documents (or any extension thereof agreed to in writing by Contractor 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 of Contractor and within 30 calendar days after receipt by Contractor and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue notice of award agreed to in writing by OWNER and Contractor, provided that the 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 commence under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Contractor 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 state in which the Project is located.
8. Notice required hereunder shall be in writing and sent to Contractor and Surety at their respective addresses shown on the face of this Bond. such notices may be sent by personal deliver, 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 any Bond conflicts with any applicable provision of 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.

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5. Do you plan to sublet any part of this work? If so, give details.

6. What equipment do you own that is available for this work?

7. What equipment do you plan to rent or purchase for this work?

8. Have you ever performed work under the direction of a Professional Architect/Engineer or Registered Architect? If so, list up to three (3) such firms giving the name of the firm, its address, telephone number and the name of the project. (List most recent projects).

9. Give the name, address and telephone number of an individual who represents each of the following and whom the Owner may contact to investigate your financial responsibility: a surety, a bank, and a major material supplier.

10. Provide a financial statement for your company. This should include a balance and income statement for your most recent fiscal year. A certified audit is preferred but not required. Use an insert sheet, if needed. Only three (3) lowest contactors shall submit this information (if requested by Owner) to the Owner within two (2) business days of the opening of the Bids.

11. State the true, exact, correct and complete name of the partnership, corporation or trade name under which you do business, and the address of the place of business. (If a corporation, state the name of all partners. If a trade name, state the names of the individuals who do business under the trade name.) It is absolutely necessary that information be furnished.

Correct Name of Contractor _____

(a) The business is a _____

(b) The address of principal place of business is:

(c) The names of the corporate officers, or partners, or individuals doing business under a trade name, are as follows:

FORM OF NONCOLLUSION AFFIDAVIT

(This Affidavit is Part of Bid)

STATE OF _____

COUNTY OF _____

_____ Being

first duly sworn, deposes and says that he is

_____ (Sole owner, a partner, president, secretary, etc.) of

_____ the party making the foregoing Proposal or BID that such BID is genuine and not collusive or sham; that said CONTRACTOR has not colluded, conspired, connived, or agreed, directly or indirectly, with any CONTRACTOR or person, to put in a sham BID, or that such other person shall refrain from the project, and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the Bid Price of affiant or any other CONTRACTOR, or to fix any overhead, profit or cost element of said Bid Price, or of that of any other CONTRACTOR, or to secure any advantage against OWNER any person interested in the proposed Contract; and that all statements in said Proposal or Bid are true; and further, that such CONTRACTOR has not, directly or indirectly submitted this BID, or the contents thereof, or divulged information or data relative thereto to any association or to any member or agent thereof.

_____ (Contractor)

Sworn to and subscribed before me this _____ day of

_____, 20____.

Notary Public in and for

_____ County,

_____.

My Commission Expires:

_____, 20____.

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CERTIFICATION OF NON-SEGREGATED FACILITIES

(Must be completed and submitted with the Bid)

The Contractor certifies that it does not maintain or provide for its employee any segregated facilities at any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor certifies further that it will not maintain or provide for its employees segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this certification is a violation of the equal opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting room, work areas, restrooms and washrooms, restaurants and other eating areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on basis of race, color, religion, or national origin, because of habit, local custom, or any other reason. The Contractor agrees that (except where it has obtained identical certification from proposed subcontractors for the specific time period) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the equal opportunity clause, and that it will retain such certification in its files.

(Name of Contractor) _____

By: _____

Title: _____

Dated: _____

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**SWORN STATEMENT UNDER SECTION 287.133 (3) (a),
FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES**

**THIS FORM MUST BE SIGNED AND SWORN IN THE PRESENCE OF A NOTARY PUBLIC
OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.**

1. This sworn statement is submitted to _____
[print name of public entity]

by _____
[print individuals name and title]

for _____
[print name of entity submitting sworn statement]

whose business is _____ and (if applicable) its Federal
Employer Identification Number (FEIN) is _____ (If the entity has no FEIN, include the
Social Security Number of the individual signing this sworn statement: _____.)

2. I understand that a "public entity crime" as defined in Section 287.133 (1) (g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Section 287.133 (1) (b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in Section 287.133 (1) (a), Florida Statutes, means:

A. A predecessor or successor of a person convicted of a public entity crime; or

B. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a "person" as defined in Section 287.133 (1) (e) Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for

the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, and employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true and in relation to the entity submitting this sworn statement. [Indicate which statement applies.]

Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the submitting this sworn statement on the convicted vendor list. [attach a copy of the final order]

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THOROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.107, FLORIDA STATUTES FOR CATEGORY TWO ON ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

[signature]

[date]

STATE OF _____ COUNTY OF _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

[name of individual signing] _____

who, after first being sworn by me, affixed his/her signature in the space provided above on this ___ day of _____, 20__.

Subscribed and sworn to before me this _____ day of _____, 20_.

My Commission Expires:

Notary Public

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CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as Principal in the within bond; that _____ who signed the bond on behalf of the Principal, was then _____ of said Corporation; that I know his/her signature, and his/her signature hereto is genuine; and that said bond was duly signed, sealed, and attested for and in behalf of said Corporation by authority of its governing body.

Secretary (Corporate Seal)

**STATE OF FLORIDA
COUNTY OF**

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared _____ to me well known, who being my first duly sworn upon oath, says that he/she is the Attorney-in-Fact, for the _____ and that he has been authorized by _____ to execute the foregoing bond on behalf of the Contractor named therein in favor of Okaloosa County.

Subscribed and sworn to before me this ___ day of __, 20 __, A.D.

[Attach Power of Attorney to Original Bid Bond and Financial Statement from Surety Company]

Notary Public
State of Florida-at-Large

My commission Expires:

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**CERTIFIED COPY OF RESOLUTION OF
BOARD OF DIRECTORS OF**

(NAME OF CORPORATION)

"RESOLVED that, _____
(Title) (Title) (Person Authorized to Sign)

of _____
(Name of Corporation)

is authorized to sign and submit the Bid of this corporation for the following Project:

**CONRAC FACILITIES REFURBISHMENT-DESTIN/ FORT WALTON BEACH
AIRPORT**

and to include in such bid the certificate as to non-collusion, and for any inaccuracies or misstatements in such certificate this corporate Contractor shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by

(NAME OF CORPORATION)

at a meeting of its Board of Directors held on the _____ day of _____,
20__.

By _____

Title _____

(SEAL)

The above form must be completed if the Contractor is a Corporation.

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CONFLICT OF INTEREST DISCLOSURE FORM

For purposes of determining any possible conflict of interest, all contractors/proposers, must disclose if any Okaloosa Board of County Commissioner, employee(s), elected officials(s), or if any of its agencies is also an owner, corporate officer, agency, employee, etc., of their business.

Indicate either "yes" (a county employee, elected official, or agency is also associated with your business), or "no." If yes, give person(s) name(s) and position(s) with your business.

YES _____ NO _____

NAME(S)

POSITION(S)

FIRM NAME: _____

BY (PRINTED): _____

BY (SIGNATURE): _____

TITLE: _____

ADDRESS: _____

EMAIL: _____

PHONE NO.: _____

DATE: _____

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DRUG-FREE WORKPLACE CERTIFICATION

THE BELOW SIGNED CONTRACTOR CERTIFIES that it has implemented a drug-free workplace program. In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection 1.
4. In the statement specified in subsection 1, notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, to any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on, or require the satisfactory participation in drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

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

DATE: _____

COMPANY: _____ SIGNATURE: _____

ADDRESS: _____ NAME: _____
(Typed or Printed)

_____ TITLE: _____

PHONE #: _____

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CERTIFICATION OF CONTRACTOR REGARDING TRENCH SAFETY

This certification is required pursuant to the Trench Safety Act, Chapter90-98, Florida Statutes regarding Trench Safety. The Act specifically incorporates the Occupational Safety and Health Administration's excavation safety standards, 29 CFR S. 1928.650 Subpart P as the state standard. Any revision to OSHA's safety standards that are consistent with the Florida Statutes shall also be complied with upon its effective date. The act requires that any contactor or prospective contractor, or any of their proposed subcontractors, shall provide written assurance that the contractor will comply with the applicable trench safety standards

NAME AND ADDRESS OF CONTRACTOR (Include Zip Code)

1. Contractor agrees that he is aware of the Trench Safety Act and the requirements of the Act.

Yes _____ No _____

2. Contractors agrees to comply with all applicable trench safety standards as set forth in the Act and as referenced in the Act.

Yes _____ No _____

NAME AND TITLE OF SIGNER (Please Print or Type)

SIGNATURE _____ DATE _____

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INDEMNIFICATION AND HOLD HARMLESS

CONTRACTOR shall indemnify and hold harmless COUNTY, its officers and employees from liabilities, damages, losses, and costs including but not limited to reasonable attorney fees, to the extent caused by the negligence, recklessness, or intentional wrongful conduct of the CONTRACTOR and other persons employed or utilized by the CONTRACTOR in the performance of this Agreement.

Contractor's Company Name

Authorized Signature – Manual

Physical Address

Authorized Signature – Typed

Mailing Address

Title

Phone Number

FAX Number

Cellular Number

After-Hours Number(s)

Date

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INSURANCE COMPLIANCE

This form is to be completed and signed the Contractor and by your insurance agent/carrier certifying that your policy either meets the insurance requirements (as specified in page OCSC-3 to OCSC-4) or that the insurance company has reviewed the bid requirements and certifies that you were bid any price increase due to required coverage.

CONTRACTOR

I certify that the insurance requirements have been reviewed.

Company Name _____

Address _____

Representative

Name _____

Title _____

Phone Number _____

INSURANCE COMPANY

I certify that the insurance requirements have been reviewed with the above contractor.

Company Name _____

Address _____

Representative

Name _____

Title _____

Phone Number _____

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AFFIDAVIT - WORKER'S COMPENSATION

State of _____

County of _____

SS: _____

of _____

being duly sworn, deposes and says that he now carries or that he has applied for a Worker's Compensation Policy to cover the operations, as set forth in the preceding contract, and to comply with the provisions thereof.

Signed: _____

Subscribed and sworn to before me this _____ day of __, 20 __

Notary Public

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RECYCLED CONTENT FORM

RECYCLED CONTENT INFORMATION:

1. Is the material in the above: VIRGIN _____ or RECYCLED _____
(Check the applicable blank)

If RECYCLED, what percentage _____ %.

Product Description: _____

2. Is your product packaged and/or shipped in material containing recycled content?

Yes _____ No _____

Specify: _____

3. Is your product recyclable after it has reached its intended end use?

Yes _____ No _____

Specify: _____

The above is not applicable if there is only a personal service involved with no product involvement.

Name of Contractor:

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DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

The following bid condition applies to this Department of Transportation (DOT) assisted contract. Submission of a bid/proposal by a prospective contractor shall constitute full acceptance of these bid conditions.

1. **DEFINITION** - Disadvantaged Business Enterprise (DBE) as used in this contract shall have the same meaning as defined in 49 CFR Part 26.
2. **POLICY** - It is the policy of DOT that DBE's as: defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds. Consequently, the DBE requirements of 49 CFR Part 26 apply to this contract.
3. **OBLIGATION** - The contractor agrees to ensure that DBE's as defined In 49 CFR Part 26 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds. In this regard, all contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that DBE's have the maximum opportunity to compete for and perform contracts. Contractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of DOT assisted contracts.
4. **COMPLIANCE**-Allcontractors,potentialcontractors,orsubcontractorsforthisDOT assisted contract are hereby notified that failure to carry out the DOT policy and the DBE obligation, as set forth above, shall constitute a breach of contract which may result in termination of the contract or such other remedy as deemed appropriate by the owner.
5. **CONTRACT CLAUSE** - All contactors and potential contractors hereby assure that they will include the above clauses in all subcontracts, which offer further subcontracting opportunities.
6. **CONTRACT AWARD** - Contactors are hereby advised that meeting the DBE subcontract goal or making an acceptable good faith effort to meet said goal are conditions of being awarded this DOT assigned contract.

The owner proposes to award the contract to the lowest responsive and responsible contactor submitting a reasonable bid provided he has met the goal for DBE participation or, if failing to meet the goal, he has made an acceptable good faith effort to meet the established goal for DBE participation. Contactor is advised that the owner reserves the right to reject any or all bids submitted.

7. **DBE PARTICIPATION GOAL** –No specific DBE goal has been established for this project; however, the contractor must make a good faith effort to include as much DBE participation as possible and must document the anticipated DBE participation on the next page.
8. **AVAILABLE DBE'S** – The FDOT maintains an online searchable database of DBE firms at <https://www3.dot.state.fl.us/equalopportunityoffice/biznet>. This program contains listing of DBE's (certified and noncertified). Contactors are encouraged to inspect this list to assist in locating DBEs for the work. Other DBEs may be added to the list in accordance

with the owner's approved DBE program. Credit toward the DBE goal will not be counted unless the DBE to be used can be certified by the owner.

9. CONTRACTOR'S REQUIRED SUBMISSION - The owner requires the submission of the following information with the bid:

(DBE percentage should reflect price plus any alternates)

(CONTRACTOR/FIRM NAME) _____

The undersigned, hereinafter called "Contractor", lists below the names of the DBE subcontractors who will perform the indicated scope of work for the amounts listed. DBE Goal is **Not Specified for this Project.**

<u>Name, Address, and Telephone Number of DBE Subcontractor</u>	<u>Scope of Work</u>	<u>Dollar Amount of Subcontract</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

Only 60% of the dollars spent with a DBE Supplier will be counted toward participation in any category, and this amount can only satisfy 60% of the total needed to fulfill any goal.

Total DBE Dollars: \$ _____

Total Project Bid (includes alternates): \$ _____

DBE Percentage of Total Bid: _____ %

If the Contractor fails to meet the contract goal established in Section 7 above, the following information must be submitted with the bid to assist the owner in determining whether or not the contractor made acceptable good faith efforts to meet the contract goal. This information (when applicable), as well as the DBE information, should be submitted as specified in Section 9 above. Use the "Statement of Good Faith Efforts" form provided herein.

Suggested guidance for use in determining if good faith efforts were made by a contractor are included in 49 CFR Part 26.

A list of the efforts that a contractor may make and the owner may use in making a determination as to the acceptability of a contractor's efforts to meet the goal as included in 49 CFR Part 26 are as follows:

- a. Whether the contractor attended any pre-solicitation or pre-bid meetings that were scheduled by the recipient to inform DBE's of contracting and subcontracting opportunities;
- b. Whether the contractor advertised in general circulation, trade association, and minority-focus media concerning the subcontracting opportunities;
- c. Whether the contractor provided written notice to a reasonable number of specific DBE's that their interest in the contract was being solicited in sufficient time to allow the DBE's to participate effectively;
- d. Whether the contractor followed up initial solicitations of interest by contacting DBE's to determine with certainty whether the DBE's were interested;
- e. Whether the contractor selected portions of work to be performed by DBE's in order to increase the likelihood of meeting the DBE goal (including, where appropriate, breaking down contracts into economically feasible units to facilitate DBE participation);
- f. Whether the contractor provided interested DBE's with adequate information about the plans, specifications, and requirements of the contract;
- g. Whether the contractor negotiated in good faith with interested DBE's, not rejecting DBE's as unqualified without sound reasons based on a thorough investigation of their capabilities.
- h. Whether the contractor made efforts to assist interested DBE's in obtaining bonding, lines of credit, or insurance required by the recipient or contractor; and
- i. Whether the contractor effectively used the services of available minority community organizations; minority contractors' groups; local and state Federal Minority Business Assistance Offices; and other organizations that provide assistance in the recruitment and placement of DBE's.

NOTE: The nine items set forth above are merely suggested criteria and the owner may specify

that you submit information on certain other actions a contractor took to secure DBE participation in an effort to meet the goals. A contractor may also submit to the owner other information on efforts to meet the goals.

10. CONTRACTOR ASSURANCE - The contractor hereby assures that he will meet one of the following as appropriate:

- a. The DBE participation goal as established on page BF-46.
- b. The DBE participation percentage as shown in (N/A), which was submitted as a condition of contract award.

Agreements between contractor/proposer and a DBE in which the DBE promises not to provide subcontracting quotations to other contractors/proposers are prohibited. The contractor shall make a good faith effort to replace a DBE subcontract that is unable to perform successfully with another DBE subcontractor. Substitution must be coordinated and approved by the owner.

The contractor shall establish and maintain records and submit regular reports, as required, which will identify and assess progress in achieving DBE subcontract goals and other DBE affirmative action efforts.

11. PROMPT PAYMENT - The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than **10** days from the receipt of each payment the prime contractor receives from the owner. The prime contractor agrees further to return retainage payments to each subcontractor within **10** days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the owner. This clause applies to both DBE and non-DBE subcontractors.

DBE CERTIFICATE OF COMPLIANCE FORM

The Florida Department of Transportation maintains an online searchable database of DBE firms at (<https://www3.dot.state.fl.us/equalopportunityoffice/biznet>).

Okaloosa County intends to utilize and implement this program in the awarding of this contract.

This is to certify that I have reviewed the plan, bid evaluation procedure, and DBE directory and will make all reasonable efforts to include DBE Contractors as outlined in this document.

Contractor's Signature

Date

Title

Notary Public

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PERFORMANCE OF WORK BY SUBCONTRACTORS

The CONTRACTOR hereby states that he proposes, if awarded the Contract, to use the following subcontractors on this project: List below all proposed subcontractors and trade specialties. (List only one subcontractor for each item.)

	<u>Items of Work (Describe)</u>	<u>Subcontractors</u>
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Estimated Total Cost of Items that CONTRACTOR states will be performed by Subcontractor:

(\$_____)

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E-VERIFY COMPLIANCE CERTIFICATION

In accordance with Okaloosa County Policy and Executive Order Number 11-116 from the office of the Governor of the State of Florida, Contactor hereby certifies that the U.S. Department of Homeland Security's E-Verify system will be used to verify the employment eligibility of all new employees hired by the contractor during the contract term, and shall expressly require any subcontractors performing work or providing services pursuant to the contract to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the contract term; and shall provide documentation of such verification to the OWNER upon request.

As the person authorized to sign this statement, I certify that this company complies/will comply fully with the above requirements.

DATE: _____

SIGNATURE: _____ NAME: _____
(Typed or Printed)

TITLE: _____

COMPANY: _____

ADDRESS: _____

EMAIL: _____

PHONE NO.: _____

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CONE OF SILENCE

The Board of County Commissioners have established a solicitation silence policy (**Cone of Silence**) that prohibits oral and written communication regarding all formal solicitations for goods and services (ITB, RFP, ITQ, ITN, and RFQ) or other competitive solicitation between the contactor (or its agents or representatives) or other entity with the potential for a financial interest in the award (or their respective agents or representatives) regarding such competitive solicitation, and any County Commissioner or County employee, selection committee member or other persons authorized to act on behalf of the Board including the County's Architect, Architect/Engineer or their sub consultants, or anyone designated to provide a recommendation to award a particular contract, other than the Purchasing Department Staff.

The period commences from the time of advertisement until all parties have signed the contract.

Any information thought to affect the committee or staff recommendation submitted after bids are due, should be directed to the Purchasing Manager or an appointed representative. It shall be the Purchasing Manager's decision whether to consider this information in the decision process.

Any violation of this policy shall be grounds to disqualify the contactor from consideration during the selection process.

All contactors must agree to comply with this policy by signing the following statement and including it with their submittal.

I _____(Signature) representing _____
(Company Name) on this _____ day of _____, 20____ hereby
agree to abide by the County's "Cone of Silence Clause" and understand violation of this policy
shall result in disqualification of my proposal/submittal.

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BUY AMERICAN CERTIFICATE

Except for those items listed by the Contactor below or on a separate and clearly identified attachment to this Bid, the Contactor hereby certifies that steel and each manufactured product, is produced in the United States and that components of unknown origin are considered to have been produced or manufactured outside the United States.

PRODUCT

COUNTRY OF ORIGIN

(Name of Contactor)

By: _____

Title: _____

Dated: _____

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LOBBYING- 31 U.S.C. 1352, 49 CFR PART 19, 49 CFR PART 20

APPENDIX A, 49 CFR PART 20—CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned (Contractor) certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for making the lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form—LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions [as amended by "Government wide Guidance for New Restrictions on Lobbying," 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, et seq.)
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Note: Pursuant to 31 U.S.C. 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such expenditure or failure.

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq*, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official

Name and Title of Contractor's Authorized Official

Date

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EQUAL EMPLOYMENT OPPORTUNITY REPORT STATEMENT

Section 60-1.7(b) of the Regulations of the Secretary of Labor requires each contactor or prospective prime Contractor and proposed Subcontractor, where appropriate, to state in the bid or at the outset of negotiations for the Contract whether it has participated in any previous Contract or Subcontract subject to the equal opportunity clause; and if so, whether it has filed with the Joint Reporting Committee, the Director, an agency, or the former President's Committee on Equal Employment Opportunity all reports due under the applicable filing requirements. In any case in which a contactor or prospective prime Contractor or proposed Subcontractor which participated in a previous Contract subject to Executive Order 10925, 11114 or 111246 has not filed a report due under the applicable filing documents, no Contract or Subcontract shall be awarded unless such Contractor submits a report covering the delinquent period or such other period specified by the FAA or the Director, OFCCP.

The Proposer shall complete the following statement by checking the appropriate boxes. Failure to complete these blanks may be grounds for rejection of bid.

1. The Proposer has () has not () developed and has on file at each establishment Affirmative Action Programs pursuant to 41 CFR 60-1.4 and 41 CFR 60-2.
2. The Proposer has () has not () participated in any previous Contract or Subcontract subject to the Equal Opportunity Clause prescribed by Executive Order 10925, or Executive Order 111114, or Executive Order 11246.
3. The Proposer has () has not () filed with the Joint Reporting Committee the annual compliance report on Standard Form 100 (EEO-1 Report).
4. The Proposer has () has not () submitted all compliance reports in connection with any such Contract due under the application filing requirements; and that representations indicating submission of required compliance reports signed by proposed Subcontractors will be obtained prior to award of Subcontractors.
5. The Proposer does () does not () employ fifty (50) or more employees.

If the Proposer has participated in a previous Contract subject to the equal opportunity clause and has not submitted compliance reports due under applicable filing requirements, the Contactor Proposer shall submit a compliance report on Standard Form 100. "Employee Information EEO-1" prior to the award of Contract.

Standard Form 100 is normally furnished to Contractors annually, based on a mailing list currently maintained by the Joint Reporting Committee. In the event a Contractor has not received the form, he may obtain it by writing to the following address: Joint Reporting Committee, 1800 G Street, Washington, D.C. 20506.

Name of Proposer

Title

By: _____
Signature

Date

*Must be the same Signature on Bid Proposal

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VENDORS ON SCRUTINIZED COMPANIES LISTS

By executing this Certificate _____, the bid proposer, certifies that it is not: (1) listed on the Scrutinized Companies that Boycott Israel List, created pursuant to section 215.4725, Florida Statutes, (2) engaged in a boycott of Israel, (3) listed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to section 215.473, Florida Statutes, or (4) engaged in business operations in Cuba or Syria. Pursuant to section 287.135(5), Florida Statutes, the County may disqualify the bid proper immediately or immediately terminate any agreement entered into for cause if the bid proposer is found to have submitted a false certification as to the above or if the Contractor is placed on the Scrutinized Companies that Boycott Israel List, is engaged in a boycott of Israel, has been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or has been engaged in business operations in Cuba or Syria, during the term of the Agreement. If the County determines that the bid proposer has submitted a false certification, the County will provide written notice to the bid proposer. Unless the bid proposer demonstrates in writing, within 90 calendar days of receipt of the notice, that the County's determination of false certification was made in error, the County shall bring a civil action against the bid proposer. If the County's determination is upheld, a civil penalty shall apply, and the bid proposer will be ineligible to bid on any Agreement with a Florida agency or local governmental entity for three years after the date of County's determination of false certification by bid proposer.

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

DATE: _____

SIGNATURE: _____

COMPANY: _____

NAME: _____
(Typed or Printed)

ADDRESS: _____

TITLE: _____

E-MAIL: _____

PHONE NO.: _____

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SYSTEM FOR AWARD MANAGEMENT (OCT 2016)

(a) Definitions. As used in this provision.

“Electronic Funds Transfer (EFT) indicator” means a four-character suffix to the unique entity identifier. The suffix is assigned at the discretion of the commercial, nonprofit, or Government entity to establish additional System for Award Management records for identifying alternative EFT accounts (see [subpart 32.11](#)) for the same entity.

“Registered in the System for Award Management (SAM) database” means that.

- (1) The Offeror has entered all mandatory information, including the unique entity identifier and the EFT indicator, if applicable, the Commercial and Government Entity (CAGE) code, as well as data required by the Federal Funding Accountability and Transparency Act of 2006 (see [subpart 4.14](#)) into the SAM database;
- (2) The offeror has completed the Core, Assertions, and Representations and Certifications, and Points of Contact sections of the registration in the SAM database;
- (3) The Government has validated all mandatory data fields, to include validation of the Taxpayer Identification Number (TIN) with the Internal Revenue Service (IRS). The offeror will be required to provide consent for TIN validation to the Government as a part of the SAM registration process; and
- (4) The Government has marked the record “Active”. “Unique entity identifier” means a number or other identifier used to identify a specific commercial, nonprofit, or Government entity. See www.sam.gov for the designated entity for establishing unique entity identifiers.

(b)

- (1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the SAM database prior to award, during performance, and through final payment of any contract, basic agreement, basic ordering agreement, or blanket purchasing agreement resulting from this solicitation.
- (2) The Offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation “Unique Entity Identifier” followed by the unique entity identifier that identifies the Offeror’s name and address exactly as stated in the offer. The Offeror also shall enter its EFT indicator, if applicable. The unique entity identifier will be used by the Contracting Officer to verify that the Offeror is registered in the SAM database.

(c) If the Offeror does not have a unique entity identifier, it should contact the entity designated at www.sam.gov for establishment of the unique entity identifier directly to obtain one. The

Offeror should be prepared to provide the following information:

- (1) Company legal business name.
- (2) Tradestyle, doing business, or other name by which your entity is commonly recognized.
- (3) Company Physical Street Address, City, State, and Zip Code.
- (4) Company Mailing Address, City, State and Zip Code (if separate from physical).
- (5) Company telephone number.
- (6) Date the company was started.
- (7) Number of employees at your location.

- (8) Chief executive officer/key manager.
- (9) Line of business (industry).
- (10) Company Headquarters name and address (reporting relationship within your entity).
- (d) If the Offeror does not become registered in the SAM database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror.
- (e) Processing time, which normally takes 48 hours, should be taken into consideration when registering. Offerors who are not registered should consider applying for registration immediately upon receipt of this solicitation.
- (f) Offerors may obtain information on registration at <https://www.acquisition.gov> .

Offerors SAM information:

Entity Name: _____

Entity Address: _____

Duns Number: _____

CAGE Code: _____

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Government Debarment & Suspension

Instructions

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out in accordance with these instructions.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the person(s) to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Orders 12549, at Subpart C of OMB 2 C.F.R. Part 180 and 3000.332. You may contact the department or agency to which this proposal is being submitted for assistance in obtaining a copy of those regulations.
5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the System for Award Management (SAM) database.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
9. Except for transactions authorized under paragraph (5) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

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**Certification Regarding Debarment, Suspension,
Ineligibility and Voluntary Exclusion
Lower Tier Covered Transactions**

The following statement is made in accordance with the Privacy Act of 1974 (5 U.S.C. § 552(a), as amended). This certification is required by the regulations implementing Executive Orders 12549, Debarment and Suspension, and OMB 2 C.F.R. Part 180, Participants' responsibilities. The regulations were amended and published on August 31, 2005, in 70 Fed. Reg. 51865-51880.

[READ INSTRUCTIONS ON PREVIOUS PAGE BEFORE COMPLETING CERTIFICATION]

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal or State department or agency;
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal

Printed Name and Title of Authorized Representative

Signature

Date

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COMPANY DATA

Contactors Company Name: _____

Physical Address & Phone #: _____

Contact Person (Typed-Printed): _____

Phone #: _____

Cell #: _____

Email: _____

Federal ID or SS #: _____

Contactors License #: _____

Contactors DUNS #: _____

Fax #: _____

Emergency #'s After Hours,
Weekends & Holidays: _____

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AGREEMENT BETWEEN OKALOOSA COUNTY, FLORIDA

AND

CONTRACT ID

THIS AGREEMENT (hereinafter referred to as the "Agreement") is made this _____, day of _____, 20_____, by and between Okaloosa County, a political subdivision of the state of Florida, (hereinafter referred to as the "County"), with a mailing address of 1250 N. Eglin Parkway, Suite 100, Shalimar, Florida, 32579, and _____, a _____ authorized to do business in the State of Florida (hereinafter referred to as "Contractor") whose Federal I.D. # is _____.

RECITALS

WHEREAS, the County is in need of a contractor to provide _____ ("Services"); and

WHEREAS, pursuant to the Okaloosa County Purchasing Manual, the County issued an _____ to competitively procure the Services and received responses to perform these Services. A copy of the procurement and Contractor's responsive to the procurement is included as Attachment "A"; and

WHEREAS, Contractor is a certified and insured entity with the necessary experience to provide the desired Services; and

WHEREAS, the County wishes to enter into this Agreement with Contractor to provide the Services to the County for an amount of _____ Dollars (\$ _____), as further detailed below.

NOW THEREFORE, in consideration of the promises and the mutual covenants herein, the parties agree as follows:

1. Recitals and Attachments. The Recitals set forth above are hereby incorporated into this Agreement and made part hereof for reference. The following documents are attached to this Agreement and are incorporated herein.

- Attachment "A" – Procurement _____ and Contractor's Response;
- Attachment "B" – Insurance Requirements;
- Attachment "C" – Title VI list of pertinent nondiscrimination acts and authorities;
- Attachment "D" – Scrutinized Companies Certification;
- Attachment "E" – Special Conditions Federal Requirements with EEO and Davis – Bacon Act

2. Services. Contractor agrees to perform the following services,

_____.

The Services to be provided are further detailed in the Contractor's proposal attached as Attachment "A" and incorporated herein by reference. The Services shall be performed by Contractor to the full satisfaction of the County. Contractor agrees to have a qualified representative to audit and inspect the Services provided on a regular basis to ensure all Services are being performed in accordance with the County's needs and pursuant to the terms of this Agreement and shall report to the County accordingly. Contractor agrees to immediately inform the County via telephone and in writing of any problems that could cause damage to the County. Contractor will require its employees to perform their work in a manner befitting the type and scope of work to be performed.

3. Term and Renewal. The term of this Agreement shall begin _____, and shall continue for a period of _____ (_____) _____ from the date of full execution of this Agreement, subject to the County's ability to terminate in accordance with Section 7 of this Agreement. The terms of Section 20 entitled "Indemnification and Waiver of Liability" shall survive termination of this Agreement.

This agreement may not be renewed; or

This agreement may be renewed upon mutual written agreement of the parties for a period of up to _____, _____ renewals.

4. Compensation. The Contractor agrees to provide the Services to the County, including materials and labor, in a total amount of _____ Dollars (\$ _____).

a. Contractor shall submit an invoice to the County upon _____. The invoice shall indicate that all services have been completed for that invoice period. In addition, Contractor agrees to provide the County with any additional documentation requested to process the invoices.

b. Disbursement. Check one:

There are no reimbursable expenses associated with this Agreement.

The following are reimbursable expenses associated with this Agreement:

- c. **Payment Schedule.** Invoices received from the Contractor pursuant to this Agreement will be reviewed by the initiating County Department. Payment will be disbursed as set forth above. If services have been rendered in conformity with the Agreement, the invoice will be sent to the Finance Department for payment. Invoices must reference the contract number assigned by the County after execution of this Agreement. Invoices will be paid in accordance with the State of Florida Local Government Prompt Payment Act.
- d. **Availability of Funds.** The County's performance and obligation to pay under this Agreement is contingent upon annual appropriation for its purpose by the County Commission.

Contractor shall make no other charges to the County for supplies, labor, taxes, licenses, permits, overhead or any other expenses or costs unless any such expenses or cost is incurred by Contractor with the prior written approval of the County. If the County disputes any charges on the invoices, it may make payment of the uncontested amounts and withhold payment on the contested amounts until they are resolved by agreement with the Contractor. Contractor shall not pledge the County's credit or make it a guarantor of payment or surety for any contract, debt, obligation, judgment, lien, or any form of indebtedness. The Contractor further warrants and represents that it has no obligation or indebtedness that would impair its ability to fulfill the terms of this Agreement.

5. Ownership of Documents and Equipment. All documents prepared by the Contractor pursuant to this Agreement and related Services to this Agreement are intended and represented for the ownership of the County only. Any other use by Contractor or other parties shall be approved in writing by the County. If requested, Contractor shall deliver the documents to the County within fifteen (15) calendar days.

6. Insurance. Contractor shall, at its sole cost and expense, during the period of any work being performed under this Agreement, procure and maintain the minimum insurance coverage required as set forth in Attachment "B" attached hereto and incorporated herein, to protect the County and Contractor against all loss, claims, damages and liabilities caused by Contractor, its agents, or employees.

7. Termination and Remedies for Breach.

- a. If, through any cause within its reasonable control, the Contractor shall fail to fulfill in a timely manner or otherwise violate any of the covenants, agreements or stipulations material to this Agreement, the County shall have the right to terminate the Services then remaining to be performed. Prior to the exercise of its option to terminate for cause, the County shall notify the Contractor of its violation of the particular terms of the Agreement and grant Contractor _____ (_____) days to cure such default. If the default remains uncured after _____ (_____) days the County may terminate this Agreement, and the County shall receive a refund from the Contractor in an amount equal to the

actual cost of a third party to cure such failure. If Contractor fails, refuses or is unable to perform any term of this Agreement, County shall pay for services rendered as of the date of termination.

- i. In the event of termination, all finished and unfinished documents, data and other work product prepared by Contractor (and sub-Contractor (s)) shall be delivered to the County and the County shall compensate the Contractor for all Services satisfactorily performed prior to the date of termination, as provided in Section 4 herein.
 - ii. Notwithstanding the foregoing, the Contractor shall not be relieved of liability to the County for damages sustained by it by virtue of a breach of the Agreement by Contractor and the County may reasonably withhold payment to Contractor for the purposes of set-off until such time as the exact amount of damages due the County from the Contractor is determined.
- b. Termination for Convenience of County. The County may, for its convenience and without cause immediately terminate the Services then remaining to be performed at any time by giving written notice. The terms of Section 7 Paragraphs a(i) and a(ii) above shall be applicable hereunder.
 - c. Termination for Insolvency. The County also reserves the right to terminate the remaining Services to be performed in the event the Contractor is placed either in voluntary or involuntary bankruptcy or makes any assignment for the benefit of creditors.
 - d. Termination for failure to adhere to the Public Records Law. Failure of the Contractor to adhere to the requirements of Chapter 119 of the Florida Statutes and Section 9 below, may result in immediate termination of this Agreement.

8. Governing Law, Venue and Waiver of Jury Trial. This Agreement shall be interpreted and construed in accordance with and governed by the laws of the State of Florida. All parties agree and accept that jurisdiction of any dispute or controversy arising out of this Agreement, and any action involving the enforcement or interpretation of any rights hereunder shall be brought exclusively in the First Judicial Circuit in and for Okaloosa County, Florida, and venue for litigation arising out of this Agreement shall be exclusively in such state courts, forsaking any other jurisdiction which either party may claim by virtue of its residency or other jurisdictional device. In the event it becomes necessary for the County to file a lawsuit to enforce any term or provision under this Agreement, then the County shall be entitled to its costs and attorney's fees at the pretrial, trial and appellate levels. BY ENTERING INTO THIS AGREEMENT, CONTRACTOR AND COUNTY HEREBY EXPRESSLY WAIVE ANY RIGHTS EITHER PARTY MAY HAVE TO A TRIAL BY JURY OF ANY CIVIL LITIGATION RELATED TO THIS AGREEMENT. Nothing in this Agreement is intended to serve as a waiver of sovereign

immunity, or of any other immunity, defense, or privilege enjoyed by the County pursuant to Section 768.28, Florida Statutes.

9. Public Records. Any record created by either party in accordance with this Contract shall be retained and maintained in accordance with the public records law, Florida Statutes, Chapter 119. Contractor must comply with the public records laws, Florida Statute chapter 119, specifically Contractor must:

- a. Keep and maintain public records required by the County to perform the service.
- b. Upon request from the County's custodian of public records, provide the County with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in chapter 119 Florida Statutes 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 the contractor does not transfer the records to the County.
- d. Upon completion of the contract, transfer, at no cost, to the County all public records in possession of the contractor or keep and maintain public records required by the County to perform the service. If the contractor transfers all public records to the public agency upon completion of the contract, the contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the contractor keeps and maintains public records upon completion of the contract, the contractor shall meet all applicable requirements for retaining the public records. All records stored electronically must be provided to the public agency, upon the 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.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT OKALOOSA COUNTY RISK MANAGEMENT DEPARTMENT 5479 OLD BETHEL ROAD CRESTVIEW, FL 32536 PHONE: (850) 689-5977 riskinfo@myokaloosa.com.

14. Civil Rights. The Contractor agrees to comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

15. Compliance with Nondiscrimination Requirements. During the performance of this Agreement, the Contractor, for itself, its assignees, and successors in interest, agrees as follows:

a. Compliance with Regulations: The Contractor will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated and attached hereto as Attachment "C".

b. Nondiscrimination: The Contractor, with regard to the work performed by it during the Agreement, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.

c. Solicitations for Subcontracts, including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.

d. Information and Reports: The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the County or other governmental entity to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the County or the other governmental entity, as appropriate, and will set forth what efforts it has made to obtain the information.

e. Sanctions for Noncompliance: In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the County will impose such contract sanctions as it or another applicable state or federal governmental entity may determine to be appropriate, including, but not limited to:

a. Withholding payments to the Contractor under the Agreement until the Contractor complies; and/or

b. Cancelling, terminating, or suspending the Agreement, in whole or in part.

f. Incorporation of Provisions: The Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the County may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the County to enter into any litigation to protect the interests of the County. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

16. Compliance with Laws. Contractor shall secure any and all permits, licenses and approvals that may be required in order to perform the Services, shall exercise full and complete authority over Contractor's personnel, shall comply with all workers' compensation, employer's liability and all other federal, state, county, and municipal laws, ordinances, rules and regulations required of an employer performing services such as the Services, and shall make all reports and remit all withholdings or other deductions from the compensation paid to Contractor's personnel as may be required by any federal, state, county, or municipal law, ordinance, rule, or regulation.

17. Conflict of Interest. The Contractor covenants that it presently has no interest and shall not acquire any interest, directly or indirectly which could conflict in any manner or degree with the performance of the Services. The Contractor further covenants that in the performance of this Agreement, no person having any such interest shall knowingly be employed by the Contractor. The Contractor guarantees that he/she has not offered or given to any member of, delegate to the Congress of the United States, any or part of this contract or to any benefit arising therefrom.

18. Independent Contractor. Contractor enters into this Agreement as, and shall continue to be, an independent contractor. All services shall be performed only by Contractor and Contractor's employees. Under no circumstances shall Contractor or any of Contractor's employees look to the County as his/her employer, or as partner, agent or principal. Neither Contractor, nor any of Contractor's employees, shall be entitled to any benefits accorded to the County's employees, including without limitation worker's compensation, disability insurance, vacation or sick pay. Contractor shall be responsible for providing, at Contractor's expense, and in Contractor's name, unemployment, disability, worker's compensation and other insurance as well as licenses and permits usual and necessary for conducting the services to be provided under this Agreement.

19. Third Party Beneficiaries. It is specifically agreed between the parties executing this Agreement that it is not intended by any of the provisions of any part of the Agreement to create in the public or any member thereof, a third-party beneficiary under this Agreement, or to authorize anyone not a party to this Agreement to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this Agreement.

20. Indemnification and Waiver of Liability. The Contractor agrees, to the fullest extent permitted by law, to defend, indemnify and hold harmless the County, its agents, representatives, officers, directors, officials and employees from and against claims, damages, losses and expenses (including but not limited to attorney's fees, court costs and costs of appellate proceedings) relating to, arising out of or resulting from the Contractor's negligent acts, errors, mistakes or omissions relating to professional Services performed under this Agreement. The Contractor's duty to defend, hold harmless and indemnify the County its agents, representatives, officers, directors, officials and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury; sickness; disease; death; or injury to impairment, or destruction of tangible property including loss of use resulting therefrom, caused by any negligent acts, errors, mistakes or omissions related to Services in the performance of this Agreement including any person for whose acts, errors, mistakes or omissions the Contractor may be legally liable. The parties agree that TEN DOLLARS (\$10.00) represents specific consideration to the Contractor for the indemnification set forth herein.

The waiver by a party of any breach or default in performance shall not be deemed to constitute a waiver of any other or succeeding breach or default. The failure of the County to enforce any of the provisions hereof shall not be construed to be a waiver of the right of the County thereafter to enforce such provisions.

21. Taxes and Assessments. Contractor agrees to pay all sales, use, or other taxes, assessments and other similar charges when due now or in the future, required by any local, state or federal law, including but not limited to such taxes and assessments as may from time to time be imposed by the County in accordance with this Agreement. Contractor further agrees that it shall protect, reimburse and indemnify County from and assume all liability for its tax and assessment obligations under the terms of the Agreement.

The County is exempt from payment of Florida state sales and use taxes. The Contractor shall not be exempted from paying sales tax to its suppliers for materials used to fulfill contractual obligations with the County, nor is the Contractor authorized to use the County's tax exemption number in securing such materials.

The Contractor shall be responsible for payment of its own and its share of its employees' payroll, payroll taxes, and benefits with respect to this Agreement.

22. Prohibition Against Contracting with Scrutinized Companies. Pursuant to Florida Statutes Section 215.4725, contracting with any entity that is listed on the Scrutinized Companies

that Boycott Israel List or that is engaged in the boycott of Israel is prohibited. Contractors must certify that the company is not participating in a boycott of Israel. Any contract for goods or services of One Million Dollars (\$1,000,000) or more shall be terminated at the County's option if it is discovered that the entity submitted false documents of certification, is listed on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or has been engaged in business operations in Cuba or Syria after July 1, 2018.

Any contract entered into or renewed after July 1, 2018 shall be terminated at the County's option if the company is listed on the Scrutinized Companies that Boycott Israel List or engaged in the boycott of Israel. Contractors must submit the certification that is attached to this agreement as Attachment "D". Submitting a false certification shall be deemed a material breach of contract. The County shall provide notice, in writing, to the Contractor of the County's determination concerning the false certification. The Contractor shall have ninety (90) days following receipt of the notice to respond in writing and demonstrate that the determination was in error. If the Contractor does not demonstrate that the County's determination of false certification was made in error, then the County shall have the right to terminate the contract and seek civil remedies pursuant to Florida Statute Section 215.4725.

23. Inconsistencies and Entire Agreement. If there is a conflict or inconsistency between any term, statement, requirement, or provision of any attachment attached hereto, any document or events referred to herein, or any document incorporated into this Agreement, the term, statement, requirement, or provision contained in this Agreement shall prevail and be given superior effect and priority over any conflicting or inconsistent term, statement, requirement or provision contained in any other document or attachment, including but not limited to Attachments listed in Section 1.

24. Severability. If any term or condition of this Contract shall be deemed, by a court having appropriate jurisdiction, invalid or unenforceable, the remainder of the terms and conditions of this Contract shall remain in full force and effect. This Contract shall not be more strictly construed against either party hereto by reason of the fact that one party may have drafted or prepared any or all the terms and provisions hereof.

25. Entire Agreement. This Agreement contains the entire agreement of the parties, and may be amended, waived, changed, modified, extended or rescinded only by in writing signed by the party against whom any such amendment, waiver, change, modification, extension and/or rescission is sought.

26. Representation of Authority to Contractor/Signatory. The individual signing this Agreement on behalf of Contractor represents and warrants that he or she is duly authorized and has legal capacity to execute and deliver this Agreement. The signatory represents and warrants to the County that the execution and delivery of this Agreement and the performance of the Services

and obligations hereunder have been duly authorized and that the Agreement is a valid and legal agreement binding on the Contractor and enforceable in accordance with its terms.

(Remainder of Page Intentionally Left Blank)

IN WITNESS WHEREOF, the parties hereto have executed this Agreement in duplicate on the day and year first written above.

WITNESS:

Signature

BY: _____

Print Name

ATTEST:

OKALOOSA COUNTY, FLORIDA

J.D. Peacock II, Clerk of Courts

BY: _____
Robert A. "Trey" Goodwin III, Chairman

Attachment "A"

**Attachment “B”
Insurance Requirements**

**Attachment “C”
Civil Rights Clauses**

Attachment “C”

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this Agreement, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “Contractor”), as applicable, agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 USC § 2000d *et seq.*, 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 USC § 794 *et seq.*), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended (42 USC § 6101 *et seq.*) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 USC §§ 12131 – 12189) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration’s Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC 1681 *et seq.*)

**Attachment “D”
Scrutinized Contractors Certificate**

PERFORMANCE BOND

KNOW ALL MEN by these presents; That we (1) _____

_____ a (2) _____

hereinafter called "Principal" and (3) _____

of _____, State of _____, hereinafter called the

"Surety", are held and firmly bound unto (4) _____

of _____, hereinafter called "OWNER", in the penal sum

of _____ dollars (\$ _____)

in lawful money of the United States for the payment of which sum well and truly to be made, we bind

ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these

presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain

contract with the Owner, dated the __ day of _____, 20__, a copy of which is hereto

attached and make a part hereof for the construction of:

CONSTRUCTION OF CONRAC FACILITIES REFURBISHMENT-DESTIN FORT WALTON BEACH AIRPORT (VPS)

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does not hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the Specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST:

Principal

(Principal) Secretary

By: _____

Witness as to Surety

Address

Address

SEAL:

ATTEST:

Surety

(Surety) Secretary

Attorney-in-Fact

Witness as to Surety

Address

Address

SEAL:

Date of bond must not be prior to date of Contract

1. Correct name of Contractor.
2. A Corporation, A Partnership or an Individual as case may be.
3. Correct name of Surety.
4. Correct name of Owner.
5. If Contractor is Partnership, all partners should execute bond.

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PAYMENT BOND

KNOW ALL MEN by these presents; That we (1) _____

_____ a (2) _____

hereinafter called "Principal" and (3) _____

of _____, State of _____, hereinafter call the

"Surety", are held and firmly bound unto (4) _____

of State of Florida _____, hereinafter called "OWNER", in the penal sum of _

_____ dollars (\$ _____) in

lawful money of the United States for the payment of which sum well and truly to be made, we

bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly

by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner, dated the __ day of _____, 20__, a

copy of which is hereto attached and make a part hereof for the construction of:

CONSTRUCTION OF CONRAC FACILITIES REFURBISHMENT-DESTIN FORT WALTON BEACH AIRPORT (VPS)

NOW, THEREFORE, if the Principal shall promptly make payments to all persons, firms,

subcontractors, and corporations furnishing materials for or performing labor in the prosecution

of the work provided for in such contract, and any authorized extension or modification thereof,

including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on

machinery, equipment and tools, consumed or used in connection with the construction of such

work, and all insurance premiums on said work, and for all labor, performed in such work, whether

by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be in any wise affect its obligation on this bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the contractor or to the work or to the Specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST:

(Principal) Secretary

Witness as to Surety

Address

By:

Principal

Address

SEAL:

ATTEST:

(Surety) Secretary

Witness as to Surety

Address

Surety

Attorney-in-Fact

Address

SEAL:

CONTRACTOR'S RELEASE OF LIENS

STATE OF: _____

COUNTY OF: _____

Before me, the undersigned Notary Public in and for the said County and State personally appeared _____, representing the Contractor

_____, who being duly sworn according to law deposes and says that all labor, materials, and outstanding claims and indebtedness of whatever nature arising out of the performance of the Contract with _____, the Owner, for _____, Contract No. _____, have been paid in full and that for the final payment in the amount of \$ _____, the Contractor releases and discharges the Owner and his authorized representatives from any liens or claims or any nature because of or arising from this Contract and/or its performance, which it has had, has or may have in the future.

By: _____

Sworn to and subscribed before me this _____ day of _____

(Notary Public)

My Commission Expires: _____

ADVERTISEMENT OF COMPLETION

_____ (Contractor)

_____ (Address)

gives notice of completion of _____ (Project)

and sets _____ as the date of final settlement.

All persons and firms should file all claims for payment to the below address prior to the settlement date:

**Okaloosa County
5479A Old Bethel Road
Crestview, FL 32536**

By: _____ (Name)

_____ (Title)

Leg: _____ (Publication Dates)

Standard Additional Contract Clauses

Title VI Clauses for Compliance with Nondiscrimination Requirements

Compliance with Nondiscrimination Requirements

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

2. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts And Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
3. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
4. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Nondiscrimination Acts And Authorities on the grounds of race, color, or national origin.
5. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
6. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
 - a. Withholding payments to the contractor under the contract until the contractor complies; and/or
 - b. Cancelling, terminating, or suspending a contract, in whole or in part.

7. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “contractor”) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination In Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;

- The Federal Aviation Administration’s Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part time workers.

The *contractor* has full responsibility to monitor compliance to the referenced statute or regulation. The *contractor* must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The Contractor retains full responsibility to monitor its compliance and their subcontractor’s compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

E-VERIFY

Enrollment and verification requirements.

- (1) If the Contractor is not enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor shall-
 - a. Enroll. Enroll as a Federal Contractor in the E-Verify Program within thirty (30) calendar days of contract award;

- b. Verify all new employees. Within ninety (90) calendar days of enrollment in the E-Verify program, begin to use E-Verify to initiate verification of employment eligibility of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section); and,
 - c. Verify employees assigned to the contract. For each employee assigned to the contract, initiate verification within ninety (90) calendar days after date of enrollment or within thirty (30) calendar days of the employee's assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section.)
- (2) If the Contractor is enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor shall use E-Verify to initiate verification of employment eligibility of
- a. All new employees.
 - a. Enrolled ninety (90) calendar days or more. The Contractor shall initiate verification of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section); or
 - b. Enrolled less than ninety (90) calendar days. Within ninety (90) calendar days after enrollment as a Federal Contractor in E-Verify, the Contractor shall initiate verification of all new hires of the contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section); or
 - c. Employees assigned to the contract. For each employee assigned to the contract, the Contractor shall initiate verification within ninety (90) calendar days after date of contract award or within thirty (30) days after assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section.)
- (3) If the Contractor is an institution of higher education (as defined at 20 U.S.C. 1001(a)); a State of local government or the government of a Federally recognized Indian tribe, or a surety performing under a takeover agreement entered into with a Federal agency pursuant to a performance bond, the Contractor may choose to verify only employees assigned to the contract, whether existing employees or new hires. The Contractor shall follow the applicable verification requirements of (b)(1) or (b)(2), respectively, except that any requirement for verification of new employees applies only to new employees assigned to the contract.

- (4) Option to verify employment eligibility of all employees. The Contractor may elect to verify all existing employees hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), rather than just those employees assigned to the contract. The Contractor shall initiate verification for each existing employee working in the United States who was hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), within one hundred eighty (180) calendar days of-
- a. Enrollment in the E-Verify program; or
 - b. Notification to E-Verify Operations of the Contractor's decision to exercise this option, using the contract information provided in the E-Verify program Memorandum of Understanding (MOU)
- (5) The Contractor shall comply, for the period of performance of this contract, with the requirements of the E-Verify program MOU.
- a. The Department of Homeland Security (DHS) or the Social Security Administration (SSA) may terminate the Contractor's MOU and deny access to the E-Verify system in accordance with the terms of the MOU. In such case, the Contractor, will be referred to a suspension or debarment official.
 - b. During the period between termination of the MOU and a decision by the suspension or debarment official whether to suspend or debar, the contractor is excused from its obligations under paragraph (b) of this clause. If the suspension or debarment official determines not to suspend or debar the Contractor, then the Contractor must reenroll in E-Verify.
 - c. Web site. Information on registration for and use of the E-Verify program can be obtained via the Internet at the Department of Homeland Security Web site: <http://www.dhs.gov/E-Verify>.
 - d. Individuals previously verified. The Contractor is not required by this clause to perform additional employment verification using E-Verify for any employee
 - i. Whose employment eligibility was previously verified by the Contractor through the E-Verify program;
 - ii. Who has been granted and holds an active U.S. Government security clearance for access to confidential, secret, or top secret information in accordance with the National Industrial Security Program Operating Manual; or
 - iii. Who has undergone a completed background investigation and been issued credentials pursuant to Homeland Security Presidential Directive (HSPD)-12. Policy for a Common Identification Standard for Federal Employees and Contractors.

Subcontracts. The Contractor shall include the requirements of this clause, including this paragraph € (appropriately modified for identification of the parties in each subcontract that-

(1) Is for-

- i. Commercial and noncommercial services (except for commercial services that are part of the purchase of a COTS item (or an item that would be a COTS item, but for minor modifications), performed by the COTS provider, and are normally provided for that COTS item); or
- ii. Construction;

(2) Has a value of more than \$3,500; and

(3) Includes work performed in the United States.

GENERAL SERVICES INSURANCE REQUIREMENTS

CONTRACTORS INSURANCE

1. The Contractor shall not commence any work in connection with this Agreement until obtaining all required insurance and the certificate of insurance has been approved by the Okaloosa County Risk Manager or designee.
2. All insurance policies shall be with insurers authorized to do business in the State of Florida and having a minimum rating of A, Class X in the Best Key Rating Guide published by A.M. Best & Co. Inc.
3. All insurance shall include the interest of all entities named and their respective officials, employees & volunteers of each and all other interests as may be reasonably required by Okaloosa County. The coverage afforded the Additional Insured under this policy shall be primary insurance. If the Additional Insured have other insurance that is applicable to the loss, such other insurance shall be on an excess or contingent basis. The amount of the company's liability under this policy shall not be reduced by the existence of such other insurance.
4. Where applicable the County shall be shown as an Additional Insured with a waiver of subrogation on the Certificate of Insurance.
5. The County shall retain the right to reject all insurance policies that do not meet the requirement of this Agreement. Further, the County reserves the right to change these insurance requirements with 60-day prior written notice to the Contractor.
6. The County reserves the right at any time to require the Contractor to provide copies of any insurance policies to document the insurance coverage specified in this Agreement.
7. Any subsidiaries used shall also be required to obtain and maintain the same insurance requirements as are being required herein of the Contractor.
8. Any exclusions or provisions in the insurance maintained by the Contractor that excludes coverage for work contemplated in this agreement shall be deemed unacceptable and shall be considered a breach of contract.

WORKERS' COMPENSATION INSURANCE

4. The Contractor shall secure and maintain during the life of this Agreement Workers' Compensation insurance for all of his employees employed for the project or any site connected with the work, including supervision, administration or management of this project and in case any work is sublet, with the approval of the County, the Contractor shall require the Subcontractor similarly to provide Workers' Compensation insurance for all employees employed at the site of the project, and such evidence of insurance shall be furnished to the County not less than ten (10) days prior to the commencement of any and all sub-contractual Agreements which have been approved by the County.

5. Contractor must be in compliance with all applicable State and Federal workers' compensation laws, including the U.S. Longshore Harbor Workers' Act or Jones Act, if applicable.
6. No class of employee, including the Contractor himself, shall be excluded from the Workers' Compensation insurance coverage. The Workers' Compensation insurance shall also include Employer's Liability coverage.
7. A Waiver of Subrogation is required to be shown on all Workers Compensation Certificates of Insurance.

BUSINESS AUTOMOBILE LIABILITY

Coverage must be afforded for all Owned, Hired, Scheduled, and Non-Owned vehicles for Bodily Injury and Property Damage in an amount not less than \$1,000,000 (One Million Dollars) combined single limit each accident. If the contractor does not own vehicles, the contractor shall maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Policy. Contractor must maintain this insurance coverage throughout the life of this Agreement.

COMMERCIAL GENERAL LIABILITY INSURANCE

4. The Contractor shall carry Commercial General Liability insurance against all claims for Bodily Injury, Property Damage and Personal and Advertising Injury caused by the Contractor.
5. Commercial General Liability coverage shall include the following:
 - 1.) Premises & Operations Liability
 - 2.) Bodily Injury and Property Damage Liability
 - 3.) Independent Contractors Liability
 - 4.) Contractual Liability
 - 5.) Products and Completed Operations Liability
3. Contractor shall agree to keep in continuous force Commercial General Liability coverage for the length of the contract.

INSURANCE LIMITS OF LIABILITY

See OKALOOSA COUNTY STANDARD CLAUSES, page OCSC-3 and 4.

NOTICE OF CLAIMS OR LITIGATION

The Contractor agrees to report any incident or claim that results from performance of this Agreement. The County representative shall receive written notice in the form of a detailed written report describing the incident or claim within ten (10) days of the Contractor's

knowledge. In the event such incident or claim involves injury and/or property damage to a third party, verbal notification shall be given the same day the Contractor becomes aware of the incident or claim followed by a written detailed report within ten (10) days of verbal notification.

INDEMNIFICATION & HOLD HARMLESS

To the fullest extent permitted by law, Contractor shall indemnify and hold harmless the County, its officers and employees from liabilities, damages, losses, and costs including but not limited to reasonable attorney fees, to the extent caused by the negligence, recklessness, or wrongful conduct of the Contractor and/or other persons employed or utilized by the Contractor in the performance of this contract.

CERTIFICATE OF INSURANCE

9. Certificates of insurance indicating the job site and evidencing all required coverage must be submitted not less than 10 days prior to the commencement of any of the work. The certificate holder(s) shall be as follows: Okaloosa County, 302 N Wilson Street, Crestview, Florida, 32536.
10. The contractor shall provide a Certificate of Insurance to the County with a thirty (30) day prior written notice of cancellation; ten (10) days' prior written notice if cancellation is for nonpayment of premium.
11. In the event that the insurer is unable to accommodate the cancellation notice requirement, it shall be the responsibility of the contractor to provide the proper notice. Such notification shall be in writing by registered mail, return receipt requested, and addressed to the Okaloosa County Purchasing Department at 5479-A Old Bethel Road, Crestview, FL 32536.
12. In the event the contract term goes beyond the expiration date of the insurance policy, the contractor shall provide the County with an updated Certificate of insurance no later than ten (10) days prior to the expiration of the insurance currently in effect. The County reserves the right to suspend the contract until this requirement is met.
13. The certificate shall indicate if coverage is provided under a claims-made or occurrence form. If any coverage is provided on a claims-made form, the certificate will show a retroactive date, which should be the same date of the initial contract or prior.
14. All certificates shall be subject to Okaloosa County's approval of adequacy of protection.
15. All deductibles or self-insured retentions (SIRs), whether approved by Okaloosa County or not, shall be the Contractor's full responsibility.
16. In no way will the entities listed as Additional Insured be responsible for, pay for, be damaged by, or limited to coverage required by this schedule due to the existence of a deductible or SIR.

GENERAL TERMS

Any type of insurance or increase of limits of liability not described above which, the Contractor required for its own protection or on account of statute shall be its own responsibility and at its own expense.

Any exclusions or provisions in the insurance maintained by the contractor that excludes coverage for work contemplated in this contract shall be deemed unacceptable and shall be considered a breach of contract.

The carrying of the insurance described shall in no way be interpreted as relieving the Contractor of any responsibility under this contract.

Should the Contractor engage a subcontractor or sub-subcontractor, the same conditions will apply under this Agreement to each subcontractor and sub-subcontractor.

The Contractor hereby waives all rights of subrogation against Okaloosa County and its employees under all the foregoing policies of insurance.

EXCESS/UMBRELLA INSURANCE

The Contractor shall have the right to meet the liability insurance requirements with the purchase of an EXCESS/UMBRELLA insurance policy. In all instances, the combination of primary and EXCESS/UMBRELLA liability coverage must equal or exceed the minimum liability insurance limits stated in this Agreement. An Excess liability policy must be submitted indicating which policy it applies to.

GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

- 1.1 AASHTO – The American Association of State Highway and Transportation Officials, the successor association AASHO.
- 1.2 Access Road – The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.
- 1.3 Addenda – Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Project Requirements or the Contract Documents.
- 1.4 Advertisement – A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
- 1.5 Agreement – The written contract between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.
- 1.6 AIP – The Airport Improvement Program, a grant-in-aid program, administered by the Federal Aviation Administration.
- 1.7 Air Operations Area – For the purpose of these specifications, the term air operations area shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
- 1.8 Airport – Airport means the area of land or water which is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any.
- 1.9 Application for Payment – The form accepted by Architect/Engineer which is to be used by Contractor in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
- 1.10 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.
- 1.11 ASTM – The American Society for Testing and Materials.
- 1.12 Award – The acceptance, by the Owner, of the successful contractor's proposal.
- 1.13 Bid – The offer or proposal of the contractor submitted on the prescribed form setting forth the prices for the Work to be performed.

- 1.14. Contractor – Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
- 1.15. Project Documents – The advertisement or invitation to Bid, instructions to contractors, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).
- 1.16. Project Requirements – The advertisement or invitation to Bid, instructions to contractors, and the Bid Form.
- 1.17. Building Area – An area on the airport to be used, considered, or intended to be used for airport buildings, or other facilities or rights-of-way together with all airport buildings and facilities located thereon.
- 1.18. Bonds – Performance and Payment bonds and other instruments of security.
- 1.19. Calendar Day – Every day shown on the calendar.
- 1.20. Certificates of Compliance – Written statements by the manufacturer stating the material furnished is in conformance with the Specifications.
- 1.21. Change Order – A document recommended by Architect/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. The work covered by a change order shall be within the scope of the contract.
- 1.22. Contract Documents – The Agreement, Addenda (which pertain to the Contract Documents), Contractor's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders and Architect/Engineer's written interpretations and clarifications issued pursuant to paragraphs 3.5, 3.6.1, and 3.6.3 on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to paragraphs 6.19 and 6.20 and the reports and drawings referred to in paragraphs 4.2.1.1 and 4.2.2.2 are not Contract Documents.
- 1.23. Contract Price – The money 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 11.9.1 in the case of Unit Price Work).
- 1.24. Contract Times – The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by Architect/Engineer's written recommendation of final payment in accordance with paragraph 14.13.
- 1.25. Contract Item (Pay Item) – A specific unit of work for which a price is provided in the Contract.

- 1.26. Contractor – The person, firm or corporation with whom Owner has entered into the Agreement.
- 1.27. Defective – An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to Architect/Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with paragraph 14.8 or 14.10).
- 1.28. Drainage System – The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
- 1.29. Drawings – The drawings which show the scope, extent, and character of the Work to be furnished and performed by Contractor and which have been prepared or approved by Architect/Engineer and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.
- 1.30. 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.
- 1.31. Architect/Engineer – The person, firm, or corporation named as such in the Agreement.
- 1.32. Architect/Engineer's Consultant – A person, firm, or corporation having a contract with Architect/Engineer to furnish services as Architect/Engineer's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions. The following list of independent professional associates and consultants are considered the Architect/Engineer's consultant for this Construction Contract: AVCON, Inc.
- 1.33. Equipment – All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.
- 1.34. Extra Work – An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which if found by the Architect/Engineer to be necessary to complete the work within the intended scope of the contract as previously modified.
- 1.35. FAA – The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his duly authorized representative.
- 1.36. Federal Specifications – The Federal Specifications and Standards, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government. They may be obtained from the Specifications

Activity, Printed Materials Supply Division, Building 197, Naval Weapons Plant, Washington, D.C. 20407.

- 1.37. Field Order – A written order issued by Architect/Engineer which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Times.
- 1.38. General Requirements – Sections of Division 1 of the Specifications.
- 1.39. 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.
- 1.40. Inspector – An authorized representative of the Architect/Engineer assigned to make all necessary inspections and/or tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
- 1.41. Intention of Terms – Whenever, in these specifications or on the plans, the words, "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of the like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Architect/Engineer is intended; and similarly, the words "approved," "acceptable," "Satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Architect/Engineer, subject in each case to the final determination of the Owner.
- 1.42. Laboratory – The official testing laboratories of the Owner or such other laboratories as may be designated by the Architect/Engineer.
- 1.43. 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.
- 1.44. Liens – Liens, charges, security interests, or encumbrances upon real property or personal property.
- 1.45. Lighting – A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
- 1.46. Major and Minor Contract Items – A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 25 percent of the total amount of the award contract. All other items shall be considered minor contract items.
- 1.47. Materials – Any substance specified for use in the construction of the Contract work.
- 1.48. Mil Specifications – The Military Specifications and Standard, and indices thereto, that are prepared and issued by the Department of Defense.

- 1.49. 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.
- 1.50. Notice of Award – The written notice by Owner to the apparent successful contractor stating that upon compliance by the apparent successful contractor with the conditions precedent enumerated therein, within the time specified, Owner will sign and deliver the Agreement.
- 1.51. Notice to Proceed – A written notice given by Owner to Contractor (with a copy to Architect/Engineer) fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform Contractor's obligations under the Contract Documents.
- 1.52. FDOT – The Florida State Department of Transportation. When used to designate a person, FDOT shall mean the commissioner or his duly authorized representative.
- 1.53. Owner – The public body or authority, corporation, association, firm, or person with whom Contractor has entered into the Agreement and for whom the Work is to be provided.
- 1.54. Partial Utilization – Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.
- 1.55. Pavement – The combined surface course, base course, and subbase course, if any, considered as a single unit.
- 1.56. Payment Bond – The approved form of security furnished by the Contractor and his/her surety as a guaranty that he will pay in full all bills and accounts for materials and labor used in the construction of the work.
- 1.57. PCBs – Polychlorinated biphenyls.
- 1.58. Performance Bond – The approved form of security furnished by the Contractor and his/her surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
- 1.59. 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 Wastes and crude oils.
- 1.60. Plans – The official drawings or exact reproductions which show the location, character, dimensions, and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications.
- 1.61. Project – The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.
- 1.62. Proposal – (See Bid).

- 1.63. 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.
- 1.64. Resident Project Representative - The authorized representative of Architect/Engineer who may be assigned to the site or any part thereof.
- 1.65. Runway – The area on the airport prepared for the landing and takeoff of aircraft.
- 1.66. 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.
- 1.67. 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.
- 1.68. Special Provisions – The specific clauses setting forth conditions or requirements peculiar to the project under consideration, covering work or materials involved in the proposal and estimate, which are not thoroughly or satisfactorily stipulated in these specifications.
- 1.69. Specifications – Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.
- 1.70. Sponsor – For AIP Contracts, the term Sponsor shall have the meaning as the term Owner.
- 1.71. Structures – Airport facilities such as bridges; culverts; catch basins; inlets; retaining walls; cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
- 1.72. Subcontractor – An individual, firm, or corporation having a direct contract with Contractor or with any other Subcontractor for performance of a part of the Work at the site.
- 1.73. Subgrade – The soil which forms the pavement foundation.
- 1.74. Superintendent – The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instruction from the Architect/Engineer, and who shall supervise and direct the construction.
- 1.75. Substantial Completion – The Work (or a specified part thereof) has progressed to the point where, in the opinion of Architect/Engineer as evidenced by Architect/Engineer's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by Architect/Engineer's written recommendation of final payment in accordance with paragraph 14.13. The terms

"substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

- 1.76. Supplemental Agreement – A written agreement between the Contractor and the Owner covering: (1) work that would increase or decrease the total amount of the awarded contract, or any major contract item, by more than 25 percent, such increased or decreased work being within the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded contract.
- 1.77. Supplementary Conditions – The part of the Contract Documents which amends or supplements these General Conditions.
- 1.78. Supplier – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.
- 1.79. Surety – The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds which are furnished to the Owner by the Contractor.
- 1.80. Taxiway – For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways or aircraft parking areas.
- 1.81. Underground Facilities – All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone, or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.
- 1.82. Unit Price Work – Work to be paid for on the basis of unit prices.
- 1.83. Work – The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishings and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.
- 1.84. Work Change Directive - A written directive to Contractor, issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Architect/Engineer, ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.18. A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed 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 as provided in Article 10.
- 1.85. Working Day – A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular

work for at least 6 hours toward completion of the Contract. Unless work is suspended for causes beyond the Contractor's control, Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work, requiring the presence of an inspector, will be considered as working days.

- 1.86. Work Period – A work period shall consist of any designated block of time on which the normal working forces of the Contractor may proceed with regular work for at least 5 hours toward completion of the contract. Unless work is suspended for causes beyond the Contractor's control, work occurring on any day, regardless of it being a weekend or holiday, which requires an Inspector, will be considered a work period. Work periods are limited to between 7:00 a.m. and 5:00 p.m. local time Monday through Friday. Weekend work will not be permitted unless contractor obtains written permission from Owner.
- 1.87. Written Amendment – A written amendment of the Contract Documents, signed by Owner and Contractor on or after the Effective Date of the Agreement and normally dealing with the non-Architect/Engineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

ARTICLE 2 – PRELIMINARY MATTERS

Delivery of Bonds:

- 2.1. When Contractor delivers the executed Agreements to Owner, Contractor shall also deliver to Owner such Bonds as Contractor may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

- 2.2. Owner shall furnish to Contractor up to five copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Times; Notice to Proceed:

- 2.3. 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 thirty days after the Effective Date of the Agreement. In no event will the Contract Time commence to run later than the *one hundred twentieth (120th)* day after the day of Bid opening or the *ninetieth (90th)* day after the Effective Date of the Agreement, whichever date is earlier.

Starting the Work:

- 2.4. Contractor shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence to run.

Before Starting Construction:

- 2.5. Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. Contractor shall promptly report in writing to Architect/Engineer any conflict, error, ambiguity or discrepancy which Contractor may

discover and shall obtain a written interpretation or clarification from Architect/Engineer before proceeding with any Work affected thereby; however, Contractor shall not be liable to Owner or Architect/Engineer for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents, unless Contractor knew or reasonably should have known thereof.

2.6. Within ten days after the Construction Notice to Proceed contractor shall submit to Architect/Engineer for review:

2.6.1. 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;

2.6.2. a preliminary schedule of Shop Drawings and Sample submittals which will list each required submittal and the times for submitting, reviewing and processing such submittal;

2.6.3. a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include and appropriate amount of overhead and profit applicable to each item of Work.

2.7. 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 paragraphs 5.4 and 5.6.

Preconstruction Conference:

2.8. Within twenty (20) days prior to Construction Notice to Proceed, but before any Work at the site is started, a conference attended by Contractor, Architect/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 2.6, procedures for handling Shop Drawings, and other submittals, processing Applications for Payment and maintaining required records.

Initially Acceptable Schedules:

2.9. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by Contractor, Architect/Engineer, and others as appropriate will be held to review for acceptability to Architect/Engineer as provided below the schedules submitted in accordance with paragraph 2.6. Contractor shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until the schedules are submitted to and acceptable to Architect/Engineer as provided below. The progress schedule will be acceptable to Architect/Engineer as providing an orderly progression of the Work to completion within any specified Milestones and the Contract Times, but such acceptance will neither impose on Architect/Engineer responsibility for the sequencing, scheduling, or progress of Work nor interfere with or relieve Contractor from Contractor's full responsibility therefore,

Contractor's schedule of Shop Drawing and Sample submissions will be acceptable to Architect/Engineer as providing a workable arrangement for reviewing and processing the required submittals. Contractor's schedule of values will be acceptable to Architect/Engineer as to form and substance.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:

3.1. The Contract Documents comprise the entire agreement between Owner and Contractor concerning the Work. The Contract Documents are complementary: what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2. 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 Work, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for. When words or phrases, which have a well-known technical or construction industry or trade meaning are used to describe Work, materials, or equipment, such words or phrases shall be interpreted in accordance with the meaning. Clarifications and interpretations of the Contract Documents shall be issued by Architect/Engineer as provided in paragraph 9.4.

3.3. Reference to Standards and Specifications of Technical Societies: Reporting and Resolving Discrepancies:

3.3.1. Reference to standards, specifications, manuals or codes of any technical society, organization, or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest 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.

3.3.2. 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 any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual, or code or of any instruction of any Supplier referred to in paragraph 6.5., Contractor shall report it to Architect/Engineer in writing at once, and, Contractor shall not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.18) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.5 or 3.6; provide, however, that Contractor shall not be liable to Owner or Architect/Engineer for failure to report any such conflict, error, ambiguity or discrepancy unless Contractor knew or reasonably should have known thereof.

3.3.3. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement thereto issued by one of the methods indicated in paragraph 3.5 or 3.6, 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:

3.3.3.1. the provisions of any such standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents): or

3.3.3.2. the provisions of any such 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).

No provision of any such standard, specification, manual, code, or instruction shall be effective to change the duties and responsibilities of Owner, Contractor, or Architect/Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Owner, Architect/Engineer, or any of Architect/Engineer's Consultants, agents, or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.13 or any other provision of the Contract Documents.

3.3.4. Whenever the plans or specifications are in conflict, resolution of such conflict shall be in the following order of precedence subject to agreement by Architect/Engineer:

- Contract Agreement
- Addenda, with those of later date having precedence over those of earlier dates
- Bid Documents
- Supplementary Conditions
- General Conditions
- Construction Drawings
- Technical Specifications
- FAA General Provisions
- Florida DOT Standard Specifications

In case of our inconsistency within the Contract Drawings, the order of procedure is as follows:

- Schedules
- Specific Details
- Typical Details
- Construction Drawings

3.4. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved" or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of Architect/Engineer as to the Work, it is intended that such requirement, direction, review, or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 shall not be effective to

assign to Architect/Engineer any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.13 or any other provision of the Contract Documents.

Amending and Supplementing Contract Documents:

3.5. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

- 3.5.1. a formal Written Amendment.
- 3.5.2. a Change Order (pursuant to paragraph 10.4) or
- 3.5.3. a Work Change Directive (pursuant to paragraph 10.1).

3.6. In addition, the requirements of the Contract Documents may be supplemented and minor variations, and deviations of the Work may be authorized, in one or more of the following ways:

- 3.6.1. a Field Order (pursuant to paragraph 9.5).
- 3.6.2. Architect/Engineer's approval of a Shop Drawing or Sample (pursuant to paragraphs 6.19 and 6.20), or
- 3.6.3. Architect/Engineer's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.7. Contractor and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with Owner (i) shall not 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 Architect/Engineer or Architect/Engineer's Consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies on extensions of the Project or any other project without written consent of Owner and Architect/Engineer and specific written verification or adaption by Architect/Engineer.

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

4.1 Availability of Lands:

Owner shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of Contractor. Upon reasonable written request, Owner shall furnish Contractor with a correct 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 lien against such lands in accordance with applicable Laws and Regulations. Owner shall identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which Contractor will have to comply in performing the Work. Easements for permanent structures or permanent in existing facilities will be obtained

and paid for by Owner, unless otherwise provided in the Contract Documents. If Contractor and Owner are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times as a result of any delay in Owner's furnishing these lands, rights-of-way or easements. Contractor may make a claim therefore as provided in Articles 11 and 12. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2. Subsurface and Physical Conditions:

4.2.1. Reports and Drawings: Reference is made to the *Information Available to Contractors* for identification of:

4.2.1.1. **Subsurface Conditions:** Those reports of explorations and tests of subsurface conditions at or contiguous to the site that have been utilized by Architect/Engineer in preparing the Contract Documents; and

4.2.1.2. **Physical Conditions:** Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by Architect/Engineer in preparing the Contract Documents.

4.2.2. Limited Reliance by Contractor Authorized; Technical Data: Contractor may rely upon the general 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 *Information Available to Contractors*. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner, Architect/Engineer, or any of Architect/Engineer's Consultants with respect to:

4.2.2.1. 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

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

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

4.2.3. Notice of Differing Subsurface or Physical Conditions: If Contractor believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:

4.2.3.1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is materially inaccurate, or

4.2.3.2. is of such a nature as to require a change in the Contract Documents, or

4.2.3.3. differs materially from that shown or indicated in the Contract Documents, or

4.2.3.4. 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, but in no event later than fifteen (15) days, after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.18), notify Owner and Architect/Engineer in writing about such condition. Contractor shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

4.2.4. **Architect/Engineer's Review:** Architect/Engineer will promptly review the pertinent conditions, 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 Architect/Engineer's findings and conclusions.

4.2.5. **Possible Contract Documents Change:** If Architect/Engineer concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 4.2.3., a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

4.2.6. **Possible Price and Times Adjustments:** An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of such uncovered or revealed condition causes an increase or decrease in Contractor's cost of, or time required for performance of the Work; subject, however, to the following:

4.2.6.1. such condition must meet any one or more of the categories described in paragraphs 4.2.3.1 through 4.2.3.4. inclusive;

4.2.6.2. a change in the Contract Documents pursuant to paragraph 4.2.5 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment:

4.2.6.3. 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 Article 10 and Paragraph 11.9; and

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

4.2.6.4.1. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner in respect of Contract Price and Contract Times by the submission of a bid or becoming bound under a contract: or

4.2.6.4.2. 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 Project Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

4.2.6.4.3. Contractor failed to give the written notice within the time and as required by paragraph 4.2.3.

If Owner and Contractor are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made therefore as provided in Articles 11 and 12. However, Owner, Architect/Engineer, and

Architect/Engineer's Consultants shall not be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

4.3. Physical Conditions – Underground Facilities:

4.3.1. **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 Architect/Engineer by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided in the *Information Available to Contractors*:

4.3.1.1. Owner and Architect/Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

4.3.1.2. The cost of all of the following will be included in the Contract Price and Contractor shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

4.3.2. **Not Shown or Indicated:** If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated 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 6.18), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Architect/Engineer. Architect/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 of the Underground Facility. If Architect/Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document such consequences. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.15. Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated 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 the amount or length of any such adjustment in Contract Price or Contract Times, Contractor may make a claim, therefore, as provided in Articles 11 and 12. However, Owner, Architect/Engineer, and Architect/Engineer's Consultants shall not be liable to Contractor for any claims, costs, losses or damages incurred or sustained by Contractor on or in connection with any other project or anticipated project.

Reference Points:

4.4. Owner shall provide Architect/Engineering surveys to establish reference points for construction which in Architect/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 shall make no changes or relocations without the prior written approval of Owner, Contractor shall report to Architect/Engineer whenever any

reference point 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 by professionally qualified personnel.

4.5. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material:

4.5.1. Owner shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material 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 and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. Owner shall not be responsible for any such materials brought to the site by Contractor, Subcontractor, Suppliers, or anyone else for whom Contractor is responsible.

4.5.2. Contractor shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by paragraph 6.18), and (ii) notify Owner and Architect/Engineer (and thereafter confirm such notice in writing). Owner shall promptly consult with Architect/Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such hazardous condition to take corrective action, if any. Contractor shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after Owner has obtained any required permits related thereto and delivered to Contractor special written notice: (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 the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of such Work stoppage or such special conditions under which Work is agreed by Contractor to be resumed, either party may make a claim therefore as provided in Articles 11 and 12.

4.5.3. If after receipt of such special 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 such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a claim therefore as provided in Articles 11 and 12. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

4.5.4. The provisions of paragraphs 4.2 and 4.3 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site.

ARTICLE 5 – BONDS AND INSURANCE

Performance, Payment, and Other Bonds:

5.1. 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 Contractor's obligations under the Contract Documents. These Bonds shall remain in effect at least until one

year after the date when final payment becomes due, 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 Supplementary Conditions. 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 current 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 Audit Staff. Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

5.2. If the surety on any Bond furnished by Contractor is declared a 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 5.1. Contractor shall within ten days thereafter substitute another bond and surety, both of which must be acceptable to Owner.

5.3. Licensed Sureties and Insurers; Certificates of Insurance:

5.3.1. 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.

5.3.2. Contractor shall deliver to Owner, with copies to each additional insured 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 in accordance with paragraph 5.4.

Contractor's Liability Insurance:

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

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

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

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

5.4.4. claims for damages insured by customary personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or by any other person for any other reason;

5.4.5. 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

5.4.6. 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.

The policies of insurance so required by this paragraph 5.4 to be purchased and maintained shall:

5.4.7. with respect to insurance required by paragraphs 5.4.3 through 5.4.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) Owner, Architect/Engineer, Architect/Engineer's Consultants and any other persons or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers and employees of all such additional insureds;

5.4.8. include 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;

5.4.8.1 Contractor's Liability Insurance and the Owner's Protective Liability Insurance specified above shall be provided in not less than the following amount:

a. Injury or death to more than one person or single occurrence	\$1,000,000
b. On and Off Premises Operations Liability	\$1,000,000
c. Explosion and Collapse Hazard	\$1,000,000
d. Underground Hazard	\$1,000,000
e. Completed Operations and Products Liability	\$1,000,000
f. Property damage in account of all occurrences	\$1,000,000
g. Independent Contractors Liability	\$15,000,000
h. Personal Injury Liability Insurance	\$1,000,000

Contractor's Vehicle Insurance as follows:

1. Injury or death to one person	\$1,000,000
2. Injury or death to more than one person or a single occurrence	\$1,000,000
3. Property Damage	\$1,000,000
4. Business Auto Liability, Including all owned, non-owned and hired vehicles	\$1,000,000

An Umbrella Policy may be used to meet the above limits.

All policies shall be drawn to cover a period of not less than one (1) year from the date of issue.

5.4.9. include contractual liability insurance covering Contractor's indemnity obligations under paragraphs 6.9, 6.13.1, and 6.22.1 through 6.22.2.8;

5.4.10. contain a provision or endorsement that the coverage afforded will not be cancelled, materially changed or renewal refused until at least thirty 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 5.3.2 will so provide);

5.4.11. 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 13.12; and

5.4.12. with respect to completed operations insurance, and any insurance coverage written on an occurrence basis, remain in effect for at least two years after final payment (and 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).

Owner's Liability Insurance:

5.5. In addition to the insurance required to be provided by Contractor under paragraph 5.4, 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. Any liability insurance carried by Owner is excess and non-contributory to any and all other coverage whether collectable or not.

Property Insurance:

5.6 Contractor shall purchase and maintain property insurance upon the Work at the site in amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in these Supplementary Conditions or required by Laws and Regulations). This insurance shall:

5.6.1 include the interests of Owner, Contractor, Subcontractors, Architect/Engineer, Architect/Engineer's Consultants and any other persons or entities identified in the Supplementary Conditions each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

5.6.2 include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of Architect/Engineers and architects);

5.6.3 cover materials and equipment in transit for incorporation in the Work or 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 Architect/Engineer; and

5.6.4 be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Architect/Engineer with thirty days written notice to each other additional insured to whom a certificate of insurance has been issued.

5.7. NOT USED

5.8. NOT USED

5.9. Owner shall not be responsible for purchasing and maintaining any property insurance 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, Subcontractor, 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.

5.10. NOT USED

5.11. NOT USED

Receipt and Application of Insurance Proceeds:

5.12. Any insureds loss under the policies of insurance required by paragraphs 5.5 and 5.6 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.13. 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 or Written Amendment.

5.13. 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 fifteen 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.

Acceptance of Bonds and Insurance; Option to Replace:

5.14. If either party (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 ten days after receipt of the certificates (or other evidence requested) required by paragraph 2.7. 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.

Partial Utilization – Property Insurance:

5.15. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use or occupancy shall commence before the insurers providing the property insurance 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 cancelled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. 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, but Contractor shall not be responsible for the negligence of others 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. Contractor shall be responsible to see that the completed Work complies accurately with the Contract Documents.

6.2. Contractor shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to Owner and Architect/Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3. Contractor shall provide competent, suitably qualified personnel to survey, lay out and construct the Work as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the site. 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 indicated in the Contract Documents, all Work at the site shall be performed during regular working hours and Contractor will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without Owner's written consent given after prior written notice to Architect/Engineer.

6.4. Unless otherwise specified in the General Requirements, Contractor shall furnish and assume full responsibility for all 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 furnishing, performance, testing, start-up and completion of the Work.

6.5. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of Owner. If required by Architect/Engineer,

Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

Progress Schedule:

6.6. Contractor shall adhere to the progress schedule established in accordance with paragraph 2.9 as it may be adjusted from time to time as provided below:

6.6.1. Contractor shall submit to Architect/Engineer for acceptance (to the extent indicated in paragraph 2.9) proposed adjustments in the progress schedule that will not change the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.6.2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of paragraph 12.1. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.7. Substitutes and "Or-Equal" Items:

6.7.1. 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 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 accepted by Architect/Engineer under the following circumstances:

6.7.1.1. "Or-Equal": If in Architect/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 Architect/Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Architect/Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

6.7.1.2. Substitute Items: If in Architect/Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under subparagraph 6.7.2, it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Architect/Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. The procedure for review by the Architect/Engineer will include the following as supplemented in the General Requirements and as Architect/Engineer may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by Architect/Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall first make written application

to Architect/Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Contractor's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use 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 work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Architect/Engineer in evaluating the proposed substitute. Architect/Engineer may require Contractor to furnish additional data about the proposed substitute.

6.7.1.3. Contractor's Expense: All data to be provided by Contractor in support of any proposed "or-equal" or substitute item will be at Contractor's expense.

6.7.2. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in an expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to Architect/Engineer. Contractor shall submit sufficient information to allow Architect/Engineer, in Architect/Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by Architect/Engineer will be similar to that provided in subparagraph 6.7.3.

6.7.3. Architect/Engineer's Evaluation: Architect/Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.7.1.1 and 6.7.1.2. Architect/Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without Architect/Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. Architect/Engineer will record time required by Architect/Engineer and Architect/Engineer's Consultants in evaluating substitutes proposed or submitted by Contractor pursuant to paragraphs 6.7.1.1 and 6.7.1.2 and in making changes in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) occasioned thereby. Whether or not Architect/Engineer accepts a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the changes of Architect/Engineer and Architect/Engineer's Consultants for evaluating each such proposed substitute item.

6.8. Concerning Subcontractors, Suppliers and Others:

The Contractor shall submit a list of Subcontractors and major Material Suppliers for the Owner's approval within (24) hours after Bid Opening. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other

evidence of qualifications from each such Subcontractor, person and organization requested by Owner. If Owner, after due investigation has reasonable objections to any proposed Subcontractor, other person or organization, the Owner may before giving the Notice of Award request the apparent successful Contractor to submit an acceptable Subcontractor without an increase in Bid Price. If the apparent successful Contractor declines to make any such substitution, the Contract shall not be awarded to such Contractor, but his declining to make any such substitution will not constitute grounds for sacrificing his Bid Security. Any Subcontractor, other person or organization so listed and to whom Owner does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner.

6.8.1. Contractor shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to Owner and Architect/Engineer as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom Owner or Architect/Engineer may have reasonable objection. Contractor shall not be required to employ any subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom Contractor has reasonable objection.

6.8.2. If the Supplementary Conditions and/or Bid Documents require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials or equipment) to be submitted to Owner in advance of the specified date prior to the Effective Date of the Agreement for acceptance by Owner and Architect/Engineer, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's or Architect/Engineer's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the project documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case Contractor shall submit an acceptable substitute, the Contract Price will be adjusted by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by Owner or Architect/Engineer of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of Owner or Architect/Engineer to reject defective Work.

6.8.3. Contractor shall be fully responsible to Owner and Architect/Engineer for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other person or organization any contractual relationship between Owner or Architect/Engineer and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of Owner or Architect/Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

6.8.4. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Contractor shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with the Architect/Engineer through Contractor.

6.8.5. 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.

6.8.6. All Work performed by 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 Architect/Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.5. or 5.6. the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Architect/Engineer, Architect/Engineer's Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils 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.

6.9 Patent Fees and Royalties:

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 Architect/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. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from 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.

6.10. Permits:

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. Contractor shall pay all charges of utility owners for connections to the Work, and Owner shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

6.11. Laws and Regulations:

6.11.1. Contractor shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by

applicable Laws and Regulations, neither Owner nor Architect/Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

6.11.2. 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 caused by, arising out of or resulting therefrom: however, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor or Contractor's obligations under paragraph 3.3.2.

6.12. Taxes:

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.

6.13. Use of Premises:

6.13.1 Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents, rights-of-way, permits and easements, and shall not unreasonably encumber the premises 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. 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 dispute resolution proceeding or at law. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultant and anyone directly or indirectly employed by any of them from and against all claims costs, losses and damages arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Architect/Engineer or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

6.13.2. During the progress of the Work, Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. Contractor shall leave the site clean and ready for occupancy by Owner at Substantial Completion of the Work. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents.

6.13.3. 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.

6.14. Record Documents:

Contractor shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field

Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Architect/Engineer for reference. Upon completion of the Work, these record documents, Samples and Shop Drawings will be delivered to Architect/Engineer for Owner.

6.15. Safety and Protection:

Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

- 6.15.1. all persons on the Work site or who may be affected by the Work;
- 6.15.2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
- 6.15.3. 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.

Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them 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 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. All damage, injury or loss to any property referred to in paragraph 6.15.2. or 6.15.3. caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish 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 Architect/Engineer or Architect/Engineer's Consultant 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 person or organization directly or indirectly employed by any of them). 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 Architect/Engineer has issued a notice to Owner and Contractor in accordance with paragraph 14.13. that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.16. Safety Representative:

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.

6.17. Hazard Communication Programs:

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.

6.18. Emergencies:

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Owner or Architect/Engineer, is obligated to act to prevent threatened damage, injury or loss. Contractor shall give Architect/Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Architect/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 to document the consequences of such action.

6.19. Shop Drawings and Samples:

6.19.1. Contractor shall submit Shop Drawings to Architect/Engineer for review and approval in accordance with the accepted schedule of Shop Drawings and Sample submittals (see paragraph 2.9.). All submittals will be identified as Architect/Engineer may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to shown Architect/Engineer the materials and equipment Contractor proposes to provide and to enable Architect/Engineer to review the information for the limited purposes required by paragraph 6.26.

6.19.2. Contractor shall also submit Samples to Architect/Engineer for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended and otherwise as Architect/Engineer may require to enable Architect/Engineer to review the submittal for the limited purposes required by paragraph 6.20. The numbers of each Sample to be submitted will be as specified in the Specifications.

6.20. Submittal Procedures:

6.20.1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

6.20.1.1 all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto,

6.20.1.2. all materials with respect to intended use, fabrication, shipping, handling storage, assembly and installation pertaining to the performance of the Work, and

6.20.1.3. all information relative to Contractor's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

Contractor shall also have 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.

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

6.20.3. At the time of each submission, Contractor shall give Architect/Engineer specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to Architect/Engineer for review and approval of each such variation.

6.20.4. Architect/Engineer will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by Architect/Engineer as required by paragraph 2.9. Architect/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. Architect/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. Contractor shall make corrections required by Architect/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 Architect/Engineer on previous submittals.

6.20.5. Architect/Engineer's review and approval of Shop Drawings or Samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called Architect/Engineer's attention to each such variation at the time of submission as required by paragraph 6.20.3 and Architect/Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying Shop Drawing or Sample approval; nor will any approval by Architect/Engineer relieve Contractor from responsibility for complying with the requirements of paragraph 6.20.

6.20.6. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by Architect/Engineer as required by paragraph 2.9, any related Work performed prior to Architect/Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

6.21. Continuing the Work:

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 15.5 or as Owner and Contractor may otherwise agree in writing.

6.22. Contractor's General Warranty and Guarantee:

6.22.1. Contractor warrants and guarantees to Owner, Architect/Engineer and Architect/Engineer's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

6.22.1.1. abuse, modification or improper maintenance or operation by persons other than Contractor, Subcontractors or Suppliers; or

6.22.1.2. normal wear and tear under normal usage.

6.22.2. 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:

6.22.2.1. observations by Architect/Engineer;

6.22.2.2. recommendation of any progress or final payment by Architect/Engineer;

6.22.2.3. the issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;

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

6.22.2.5. any acceptance by Owner or any failure to do so;

6.22.2.6. any review and approval of Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Architect/Engineer pursuant to paragraph 14.13;

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

6.22.2.8. any correction of defective Work by Owner.

6.23 Indemnification:

6.23.1. Contractor shall indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultants and the officers, directors, employees, agents and other consultants 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 Architect/Engineers, architects, attorneys and other professionals and all court or dispute resolution costs) caused by, arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage: (i) 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, and (ii) is caused in whole or in part by any negligent act or omission of Contractor, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them

may be liable, regardless of whether or not caused in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity.

6.23.2. In any and all claims against Owner or Architect/Engineer or any of their respective consultants, agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.23.1 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 person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.23.3. The indemnification obligations of Contractor under paragraph 6.23.1 shall not extend to the liability of Architect/Engineer and Architect/Engineer's Consultants, officers, directors, employees or agents caused by the professional negligence, errors or omissions of any of them.

6.24. Survival of Obligations:

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 and termination or completion of the Agreement.

ARTICLE 7 – OTHER WORK

Related Work at Site:

7.1. Owner may perform other work related to the Project at the site by Owner's own forces, or let other direct contracts therefore which shall contain General Conditions similar to these, or have other work performed by utility owners. If the fact that such other work is to be performed was not noted in the Contract Documents, then; (i) written notice thereof will be given to Contractor prior to starting any such other work, and (ii) Contractor may make a claim therefore as provided in Articles 11 and 12 if Contractor believes that such performance will involve additional expense to Contractor or requires additional time and the parties are unable to agree as to the amount or extent thereof.

7.2. Contractor shall afford each other contractor who is a party to such a direct contract and each utility owner (and Owner if Owner is performing the additional work with Owner's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents. Contractor shall do all cutting, fitting, and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of Architect/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.

7.3. 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 Architect/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 so to report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent or non-apparent defects and deficiencies in such other work.

Coordination:

7.4. If Owner contracts with others for the performance of other work on the Project at the site, the following will be set forth in Supplementary Conditions:

7.4.1. the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;

7.4.2. the specific matters to be covered by such authority and responsibility will be itemized:
and

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

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

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

8.2. In case of termination of the employment of Architect/Engineer, Owner shall appoint an Architect/Engineer, whose status under the Contract Documents shall be that of the former Architect/Engineer.

8.3. Owner shall furnish the data required of Owner under the Contract Documents promptly and shall make payments to Contractor promptly when they are due as provided in paragraphs 14.4 and 14.13.

8.4. Owner's duties in respect of providing lands and easements and providing Architect/Engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions at the site and drawings of physical conditions in existing structures at or contiguous to the site that have been utilized by Architect/Engineer in preparing the Contract Documents.

8.5. Owner's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.6.

- 8.6. Owner is obligated to execute Change Orders as indicated in paragraph 10.4.
- 8.7. Owner's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.
- 8.8. In connection with Owner's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with Owner's right to terminate services of Contractor under certain circumstances.
- 8.9. 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 furnishing or performance of the Work. Owner will not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.
- 8.10. Owner's responsibility in respect of undisclosed Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Materials uncovered or revealed at the site is set forth in paragraph 4.5.
- 8.11. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – ARCHITECT/ENGINEER'S STATUS DURING CONSTRUCTION

Owner's Representative:

9.1. Architect/Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Architect/Engineer as Owner's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of Owner and Architect/Engineer.

Visits to Site:

9.2. Architect/Engineer will make visits to the site at intervals appropriate to the various stages of construction as Architect/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, Architect/Engineer will endeavor for the benefit of Owner to determine, in general, if the Work is proceeding in accordance with the Contract Documents. Architect/Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. Architect/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 on-site observations, Architect/Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work. Architect/Engineer's visits and on-site observations are subject to all the limitations on

Architect/Engineer's authority and responsibility set forth in paragraph 9.13, and particularly, but without limitation, during or as a result of Architect/Engineer's on-site visits or observations of Contractor's Work Architect/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 furnishing or performance of the Work.

Project Representative:

9.3. If Owner and Architect/Engineer agree, Architect/Engineer will furnish a Resident Project Representative to assist Architect/Engineer in providing more continuous observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.13 and in the Supplementary Conditions. If Owner designates another representative or agent to represent Owner at the site who is not Architect/Engineer's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other person will be as provided in the Supplementary Conditions.

9.3.1 Architect/Engineer may furnish a Resident Project Representative, assistants and other field staff as needed, to assist Owner in observing performance of the Work. The Resident Project Representative is to observe and inspect, in the Owner's interest, the materials furnished and the work done as the work progresses in order to insure full and complete compliance with the contract and to verify quantities of work completed.

9.3.2 Owner may also designate one of its employees to represent Owner for these purposes.

9.3.3 Architect/Engineer, Resident Project Representative, Owner and all such other persons referred to shall have unrestricted access to all parts of the Work. Contractor shall cooperate by supplying necessary facilities and assistance required by above persons to carry out their work of observation and inspection.

9.3.4 It is not the function of the Architect/Engineer, Resident Project Representative or Owner to supervise or direct the manner in which the work to be done under this Contract is carried on or conducted. The Architect/Engineer, Resident Project Representative or Owner is not responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, and they will not be responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents. Nevertheless, Contractor agrees that any method or procedure, which in the opinion of the Architect/Engineer or Owner does not achieve the required results or quality of the work specified, shall be discontinued immediately upon the order of the Architect/Engineer.

9.3.5 All communications between Contractor and Architect/Engineer or Contractor and Owner are to be through the Resident Project Representative.

9.3.6 Duties and Responsibilities of Resident Project Representative (RPR):

- 1) RPR will act as directed by and under the supervision of Architect/Engineer and/or Owner, and will confer with Architect/Engineer and Owner regarding RPR's actions.

RPR's dealings in matters pertaining to the on-site work shall in general be with Architect/Engineer and Contractor keeping Owner advised as necessary. RPR's dealings with subcontractors shall only be through or with the full knowledge and approval of Contractor.

- 2) Review progress schedule, schedule of Shop Drawing submittals and schedule of values prepared by Contractor and consult with Architect/Engineer and Owner concerning acceptability.
- 3) Attend meetings with Contractor, such as pre-construction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
- 4) Serve as Architect/Engineer's and Owner's liaison with Contractor, working principally through Contractor's superintendent and assist in understanding the intent of the Contract Documents.
- 5) Advise Architect/Engineer, Owner and Contractor of the commencement of any Work requiring a Shop Drawing or sample if the submittal has not been approved by Architect/Engineer.
- 6) Conduct on-site observations of the Work in progress to assist Architect/Engineer and Owner in determining if the Work is in general proceeding in accordance with the Contract Documents. Report to Architect/Engineer and Owner whenever RPR believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Architect/Engineer and Owner of Work that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- 7) Report to Architect/Engineer and Owner when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Architect/Engineer.
- 8) Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report with RPR's recommendations to Architect/Engineer and Owner. Transmit to Contractor decisions as issued by Architect/Engineer and/or Owner.
- 9) Maintain orderly files for correspondence, reports of job conferences, Shop Drawings and samples, reproductions of original Contract Documents including all Work Directive Changes, Addenda, Change Orders, Field Orders, additional Drawings issued subsequent to the execution of the Contract, Architect/Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.
- 10) Keep a diary or log book, recording Contractor hours on the job site, weather conditions, data relative to questions of Work Directive Changes, Change Orders or Changed conditions, list of job site visitors, daily activities, decisions, observations in

general, and specific observations in more detail as in the case of observing test procedures; and send copies to Architect/Engineer and Owner.

- 11) Record names, addresses and telephone numbers of all Contractors, subcontractors and major suppliers of materials and equipment.
- 12) Furnish Architect/Engineer and Owner periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and sample submittals.
- 13) Draft proposed Change Orders and Work Directive Changes, obtaining backup material from Contractor and recommend to Architect/Engineer and Owner Change Orders, Work Directive Changes, and Field Orders.
- 14) Report immediately to Architect/Engineer and Owner upon the occurrence of any accident.
- 15) Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Architect/Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.
- 16) During the course of the Work, verify that certificates, maintenance and operation manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have this material delivered to Architect/Engineer for review and forwarding to Owner prior to final payment for the work.
- 17) Before Architect/Engineer issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.
- 18) Conduct final inspection in the company of Architect/Engineer, Owner and Contractor and prepare a final list of items to be completed or corrected.
- 19) Observe that all items on final list have been completed or corrected and make recommendations to Architect/Engineer and Owner concerning acceptance.

9.3.7 Limitations of Authority of Resident Project Representative (RPR):

- 1) Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by Architect/Engineer or Owner.
- 2) Shall not exceed limitations of Architect/Engineer's authority as set forth in the Contract Documents.
- 3) Shall not undertake any of the responsibilities of Contractor, subcontractors or Contractor's superintendent.

- 4) Shall not advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction unless such advice or directions are specifically required by the Contract Documents.
- 5) Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work.
- 6) Shall not accept Shop Drawing or sample submittals from anyone other than Contractor.

9.3.8 The Architect/Engineer and or Owner shall have the authority to reject any work, or materials, or any part thereof, which does not in his opinion conform to the plans, drawings, specifications and contract, and it shall be permissible for him to do so at any time during the progress of the work and until its acceptance.

No material of any kind shall be used upon the work until it has been inspected and accepted by the Architect/Engineer. All materials rejected shall be removed immediately from the work and not again offered for inspection. Any materials or workmanship found at any time to be defective or not of the quality or character required by the plans and specifications shall be remedied at once regardless of previous inspection.

Such inspection shall not relieve the Contractor from any obligation to perform said work strictly in accordance with the plans and specifications and work not so constructed shall be removed and made good by the Contractor at his own expense, and free from all expense to the Owner whenever so ordered by the Owner without reference to any previous oversight or error in inspection.

9.4. Clarifications and Interpretations:

Architect/Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as Architect/Engineer may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. Such written clarifications and interpretations will be binding on Owner and Contractor. If Owner or Contractor believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree to the amount or extent thereof, if any, Owner or Contractor may make a written claim therefore as provided in Article 11 or Article 12.

9.5. Authorized Variations in Work:

Architect/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 the Contract Times and the parties are unable to agree as to the amount or extent thereof, Owner or Contractor may make a written claim therefore as provided in Article 11 or 12.

9.6. Rejecting Defective Work:

Architect/Engineer will have authority to disapprove or reject Work which Architect/Engineer believes to be defective, or that Architect/Engineer believes will not produce a complete 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. Architect/Engineer will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

9.7. Shop Drawings, Change Orders and Payments:

9.7.1 In connection with Architect/Engineer's authority as to Shop Drawings and Samples, see paragraphs 6.19 through 6.20.4 inclusive.

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

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

9.8. Determinations for Unit Prices:

Architect/Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Architect/Engineer will review with Contractor the Architect/Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Architect/Engineer's written decision thereon will be final and binding upon Owner and Contractor, unless, within ten days after the date of any such decision, either Owner or Contractor delivers to the other and to Architect/Engineer written notice of intention to appeal from Architect/Engineer's decision and, a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to Architect/Engineer's decision, unless otherwise agreed in writing by Owner and Contractor. Such appeal will not be subject to procedures of paragraph 9.9.

9.9. Decisions on Disputes:

9.9.1. Architect/Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work there under. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and Claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Times will be referred initially to Architect/Engineer in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant to Architect/Engineer and the other party to the Agreement promptly, but in no event later than fifteen (15) days, after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to Architect/Engineer and the other party within forty-five (45) days after the start of such occurrence or event unless Architect/Engineer allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to Architect/Engineer and the claimant within thirty days after receipt of the claimant's last submittal (unless

Architect/Engineer allows additional time). Architect/Engineer will render a formal decision in writing within thirty days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. Architect/Engineer's written decision on such claim, dispute or other matter will be final and binding upon Owner and Contractor unless: a written notice of intention to appeal from Architect/Engineer's written decision is delivered by Owner or Contractor to the other and to Architect/Engineer within thirty days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to such claim, dispute or other matter in accordance with applicable Laws and Regulations within sixty days of the date of such decision, unless otherwise agreed in writing by Owner and Contractor.

9.9.2. When functioning as interpreter and judge under paragraph 9.9.1, Architect/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. The rendering of a decision by Architect/Engineer pursuant to paragraphs 9.8 or 9.9 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.15) will be a condition precedent to any exercise by Owner or Contractor of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter.

9.10. Not Used

9.11. Not Used

9.12. Not Used

9.13. Limitations on Architect/Engineer's Authority and Responsibilities:

9.13.1. Neither Architect/Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Architect/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 Architect/Engineer shall create, impose or give rise to any duty owed by Architect/Engineer to Contractor, any Subcontractor, and Supplier, any other person or organization, or to any surety for employee or agent of any of them.

9.13.2. Architect/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 furnishing or performance of the Work. Architect/Engineer will not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.

9.13.3. Architect/Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.13.4. Architect/Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests, and approvals and Other documentation required to be

delivered by paragraph 14.12 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.

9.13.5. the limitations upon authority and responsibility set forth in this paragraph 9.13 shall also apply to Architect/Engineer's Consultants, Resident Project Representative and assistants.

ARTICLE 10 – CHANGES IN THE WORK

10.1. Without invalidating the Agreement and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions or revisions in the Work. Such additions, deletions or revisions will be authorized by a Written Amendment, 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).

10.2. If Owner and Contractor are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Times that should be allowed as a result of a Work Change Directive, a claim may be made therefore as provided in Article 11 or Article 12.

10.3. 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 and supplemented as provided in paragraphs 3.5 and 3.6 except in the case of an emergency as provided in paragraph 6.23 or in the case of uncovering Work as provided in paragraph 13.9.

10.4. Owner and Contractor shall execute appropriate Change Orders recommended by Architect/Engineer covering:

10.4.1. changes in the Work which are (i) ordered by Owner pursuant to paragraph 10.1, (ii) required because of acceptance of defective Work under paragraph 13.13 or correcting defective Work under paragraph 13.14, or (iii) agreed to by the parties;

10.4.2. changes in the Contract Price or Contract Times which are agreed to by the parties; and

10.4.3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Architect/Engineer pursuant to paragraph 9.9;

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 6.21.

10.5. If notice 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) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be Contractor's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 – CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Price.

11.2. 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 delivered by the party making the claim to the other party and to Architect/Engineer promptly (but in no event later than ten days) after the start of the occurrence or event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within thirty days after the start of such occurrence or event (unless Architect/Engineer allows additional time for claimant to submit additional or more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event. All claims for adjustment in the Contract Price shall be determined by Architect/Engineer in accordance with paragraph 9.8 if Owner and Contractor cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph 11.2.

11.3 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:

11.3.1. 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 paragraphs 11.9.1. through 11.9.3. inclusive);

11.3.2. 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 11.6.2):

11.3.3. 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 11.3.2, on the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a Contractor's fee for overhead and profit (determined as provided in paragraph 11.6).

Cost of the Work Covered by a Change Order:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by Contractor in the proper performance of the Work. 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 include only the following items and shall not include any of the costs itemized in paragraph 11.5.

11.4.1. 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 at the site. 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 after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by Owner.

11.4.2. 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.

11.4.3. Payments made by Contractor to the Subcontractors for Work performed or furnished 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 Architect/Engineer, which bids, if any, will be accepted. 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 paragraphs 11.4, 11.5, 11.6 and 11.7. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

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

11.4.5. Supplemental costs including the following:

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

11.4.5.2. 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.

11.4.5.3. 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 Architect/Engineer, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof – all 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.

11.4.5.4. Sales, consumer, use or similar taxes related to the work, and for which Contractor is liable, imposed by Laws and Regulations.

11.4.5.5. 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.

11.4.5.6. 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 and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by Owner in accordance with paragraph 5.9), provided they 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. If, however, any such loss or damage requires reconstruction and Contractor is placed in charge thereof, Contractor is placed in charge thereof, Contractor shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9. Cost of premiums for additional Bonds and insurance required because of changes in the Work.

11.5. The term Cost of the Work Covered by a Change Order shall not include any of the following:

11.5.1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnership and sole proprietorships), general managers, Architect/Engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by Contractor whether at the site or in Contractor's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4 – all of which are to be considered administrative costs covered by the Contractor's fee.

11.5.2. Expenses of Contractor's principal and branch offices other than Contractor's office at the site.

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

11.5.4. Cost of premiums for all Bonds and for all insurance whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5. 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.

Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6. The Contractor's fee allowed to Contractor for overhead and profit shall be determined as follows:

11.6.1. a mutually acceptable fixed fee; or

11.6.2. 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:

11.6.2.1. for costs incurred under paragraphs 11.4.1 and 11.4.2, the Contractor's fee shall be ten percent;

11.6.2.2. for costs incurred under paragraph 11.4.3, the Contractor's fee shall be five percent.

11.6.2.3. 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 11.4.1, 11.4.2, 11.4.3 and 11.6.2 is that the Subcontractor who actually performs or furnishes the Work, at whatever tier, will be paid a fee of ten percent of the costs incurred by such Subcontractor under paragraphs 11.4.1 and 11.4.2 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:

11.6.2.4. no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.5. 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

11.6.2.6. 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 11.6.2.1 through 11.6.2.5, inclusive.

11.7. Whenever the cost of any work is to be determined pursuant to paragraphs 11.4 and 11.5, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to Architect/Engineer an itemized cost breakdown together with supporting data.

11.8. Not Used

11.9. Unit Price Work:

11.9.1. 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 established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. 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 Architect/Engineer in accordance with paragraph 9.10.

11.9.2. 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.

11.9.3. Owner or Contractor may make a claim for an adjustment in the Contract Price in accordance with Article 11 if:

11.9.3.1. 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

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

11.9.3.3. if 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 TIMES

12.1. The Contract Times (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to Architect/Engineer promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless Architect/Engineer allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Times (or Milestones) shall be determined by Architect/Engineer in accordance with paragraph 9.11 if Owner and Contractor cannot otherwise agree. No claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. All time limits stated in the Contract Documents are of the essence of the Agreement.

12.3. Where Contractor is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of Contractor, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a claim is made therefore as provided in paragraph 12.1. 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. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

12.4. Should Contractor be obstructed or delayed in the prosecution of or completion of the Work as a result of unforeseeable causes beyond the control of Contractor, and not due to its fault or neglect, including but not restricted to acts of God or of the public enemy, acts of government, fires, floods, epidemics, quarantine regulation, strikes or lockouts, Contractor shall notify the Owner in writing within forty-eight (48) hours after the commencement of such delay, stating the cause or causes thereof, or be deemed to have waived any right which Contractor may have had to request a time extension.

12.5. No interruption, interference, inefficiency, suspension or delay in the commencement or progress of the Work from any cause whatever, including those for which the Owner may be responsible, in whole or in part, shall relieve Contractor of his duty to perform or give rise to any right to damages or additional compensation from the Owner. Contractor expressly acknowledges and agrees that it shall receive no damages for delay. Contractor's sole remedy, if any, against the Owner will be the right to seek an extension to the Contract Time; provided, however, the granting of any such time extension shall not be a condition precedent to the aforementioned "No Damage for Delay" provision. This paragraph shall expressly apply to claims for early completion, as well as to claims based on late completion.

ARTICLE 13 – TESTS AND INSPECTION: CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1. **Notice of Defects:** Prompt notice of all defective Work of which Owner or Architect/Engineer have actual knowledge will be given to Contractor. All defective Work may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

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

Tests and Inspections:

13.3. Contractor shall give Architect/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.

13.4. Contractor shall employ and pay for services of an independent testing laboratory to perform all Quality Control inspections, test or approvals required by the contract documents. Contractor shall allow the Architect/Engineer access to all work done in the project for Acceptance Testing by the owner. This testing will be in addition to Quality Control Testing required by the Contractor. Owner shall arrange and pay all costs associated with Acceptance Testing done by an independent testing laboratory of the Owners choosing except:

13.4.1. for inspections, tests or approvals covered by paragraph 13.5 below.

13.4.2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.9 below shall be paid as provided in said paragraph 13.9; and

13.4.3. as otherwise specifically provided in the Contract Documents.

13.4.4 Owner shall perform the following test as part of quality assurance / acceptance testing:

All material testing included in the Bidding Documents.

All other required testing is to be completed by the contractor as part of the contractor's quality control procedures and submittals. This section shall take precedence over all other sections that describe testing requirements.

13.5. 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 Architect/Engineer the required certificates of inspection, or approval. Contractor shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for Owner's and Architect/Engineer's acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Quality Control Testing of materials and equipment shall be the responsibility of the Contractor who shall pay all costs associated with the required testing. Contractor shall provide the Architect/Engineer adequate advance notice of intended tests to allow the Architect/Engineer to be present during the Testing.

13.6. If any Work (or the work of others) that is to be inspected, tested or approved is covered by Contractor without written concurrence of Architect/Engineer, it must, if requested by Architect/Engineer, be uncovered for observation.

13.7. Uncovering Work as provided in paragraph 13.6 shall be at Contractor's expense unless Contractor has given Architect/Engineer timely notice of Contractor's intention to cover the same and Architect/Engineer has not acted with reasonable promptness in response to such notice.

Uncovering Work:

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

13.9. If Architect/Engineer considers it necessary or advisable that covered Work be observed by Architect/Engineer or inspected or tested by others, Contractor, at Architect/Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as Architect/Engineer may require that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, Contractor shall pay all claims, costs, losses and damages caused by, arising out of or resulting from 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, and, if the parties are unable to agree as to the amount thereof, may make a claim therefore as provided in Article 11. If, however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent therefore, Contractor may make a claim therefore as provided in Articles 11 and 12.

Owner May Stop the Work:

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

Correction or Removal of Defective Work:

13.11. If required by Architect/Engineer, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Architect/Engineer, remove it from the site and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.12. Correction Period:

13.12.1. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or 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, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instruction: (i) correct such defective Work, or, if it has been rejected by Owner, remove it from the site and replace it with Work that is not defective, and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If Contractor does not promptly comply with the terms of such instructions, or in any emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

13.12.2. 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 or by Written Amendment.

13.12.3. Where defective Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph 13.12, 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.

13.13. Acceptance of Defective Work:

If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Architect/Engineer's recommendation of final payment, also Architect/Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Architect/Engineer as to reasonableness). If any such acceptance occurs prior to Architect/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, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim therefore as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.14. Owner May Correct Defective Work:

If Contractor fails within a reasonable time after written notice from Architect/Engineer to correct defective Work or to remove and replace rejected Work as required by Architect/Engineer in accordance with paragraph 13.11, 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 and remedy any such deficiency. In exercising the rights and remedies under this paragraph Owner shall proceed expeditiously. In connection with such corrective and 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 representative, agents and employees, Owner's other contractors and Architect/Engineer and Architect/Engineer's Consultants access to the site to enable Owner to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by Owner in exercising such rights and remedies 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, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim therefore as provided in Article 11. 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. Contractor shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies hereunder.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Architect/Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

Application for Progress Payment:

14.2. At least ten days before the date established for each progress payment (but not more often than once a month), Contractor shall submit to Architect/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 and other arrangements to protect Owner's interest therein, all of which will be satisfactory to Owner. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

Contractor's Warranty of Title:

14.3. 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.

Review of Applications for Progress Payment:

14.4. Architect/Engineer will, within fifteen (15) 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 Architect/Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application. Thirty (30) days after presentation of the Application for Payment to Owner with Architect/Engineer's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by Owner to Contractor.

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

14.5.1. the Work has progressed to the point indicated.

14.5.2. 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, to the results of any subsequent tests called for in the Contract Documents, to a

final determination of quantities and classifications for Unit Price Work under paragraph 9.8, and to any other qualifications stated in the recommendation), and

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

However, by recommending any such payment Architect/Engineer will not thereby be deemed to have represented that: (i) exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to Architect/Engineer in the Contract Documents or (ii) that 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.

14.6. Architect/Engineer's recommendation of any payment, including final payment, shall not mean that Architect/Engineer is 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 furnishing or performance of Work, or for any failure of Contractor to perform or furnish Work in accordance with the Contract Documents.

14.7. Architect/Engineer may refuse to recommend the whole or any part of any payment if, in Architect/Engineer's opinion, it would be incorrect to make the representations to Owner referred to in paragraph 14.5. Architect/Engineer may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in Architect/Engineer's opinion to protect Owner from loss because:

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

14.7.2. the Contract Price has been reduced by Written Amendment or Change Order.

14.7.3. Owner has been required to correct defective Work or complete Work in accordance with paragraph 13.14. or

14.7.4. Architect/Engineer has actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.4 inclusive.

Owner may refuse to make payment of the full amount recommended by Architect/Engineer because:

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

14.7.6. 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,

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

14.7.8. Owner has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.7.1 through 14.7.3 or paragraphs 15.2.1 through 15.2.4 inclusive;

but Owner must give Contractor immediate written notice (with a copy to Architect/Engineer) stating the reasons for such action and promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

Substantial Completion:

14.8. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Architect/Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Architect/Engineer issue a certificate of Substantial Completion. Within a reasonable time thereafter, Owner, Contractor and Architect/Engineer shall make an inspection of the Work to determine the status of completion. If Architect/Engineer does not consider the Work substantially complete, Architect/Engineer will notify Contractor in writing giving the reasons therefore. If Architect/Engineer considers the Work substantially complete, Architect/Engineer will prepare and 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 Architect/Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Architect/Engineer concludes that the Work is not substantially complete, Architect/Engineer will within fourteen days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefore. If, after consideration of Owner's objections, Architect/Engineer considers the Work substantially complete, Architect/Engineer will within said fourteen 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 Architect/Engineer believes justified after consideration of any objections from Owner. At the time of delivery of the tentative certificate of Substantial Completion Architect/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, maintenance, heat, utilities, insurance and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Architect/Engineer in writing prior to Architect/Engineer's issuing the definitive certificate of Substantial Completion, Architect/Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

14.9. Owner shall have the right to exclude Contractor from the Work after the date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

Partial Utilization:

14.10. Use by Owner at Owner's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) Owner, Architect/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, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1. Owner at any time may request Contractor in writing to permit Owner to use any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Architect/Engineer that such part of the Work is substantially complete and request Architect/Engineer to issue a certificate of Substantial Completion for that part of the Work. Contractor at any time may notify Owner and Architect/Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Architect/Engineer to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, Owner, Contractor and Architect/Engineer shall make an inspection of that part of the Work to determine its status of completion. If Architect/Engineer does not consider that part of the Work to be substantially complete, Architect/Engineer will notify Owner and Contractor in writing giving the reasons therefore. If Architect/Engineer considers that part of the Work to be substantially complete, the provisions of paragraphs 14.8 and 14.9 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.

14.10.2. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.6 in respect of property insurance.

Owner may at any time request Contractor in writing to permit Owner to take over operation of any such part of the work although it is not substantially complete. A copy of such request will be sent to Architect/Engineer and within a reasonable time thereafter Owner, Contractor, and Architect/Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If Contractor does not object in writing to Owner and Architect/Engineer that such part of the Work is not ready for separate operation by Owner, Architect/Engineer will finalize the list if items to be completed or corrected and will deliver such lists to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Architect/Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

Final Inspection:

14.11. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Architect/Engineer will 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.

Final Application for Payment:

14.12. After Contractor has completed all such corrections to the satisfaction of Architect/Engineer and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by paragraph 5.4, certificates of inspection, marked-up record documents (as provided in paragraph 6.14) and other documents, Contractor may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by:

(i) consent of the surety, if any, to final payment.

(ii) complete and legally effective releases or waivers (satisfactory to Owner) of all Liens arising out of or filed in connection with the Work. In lieu of such releases or waivers of Liens 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 or Owner's property might in any way be responsible 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.

(iii) certification from surety that payment and performance bond shall remain in effect one (1) year following final payment.

(iv) contractor's advertisement of completion – advertisement for a period of four (4) successive weeks in the newspaper or largest circulation published within the county where the work is performed.

(v) certification from insurance company that any insurance coverage written on a claims-made basis, remain in effect for at least two (2) years following final payment.

Final Payment and Acceptance:

14.13. If, on the basis of Architect/Engineer's observation of the Work during construction and final inspection, and Architect/Engineer's review of the final application for Payment and accompanying documentation as required by the Contract Documents, Architect/Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Architect/Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Architect/Engineer's recommendation of payment and present the Application to Owner for payment. At the same time Architect/Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 14.15. Otherwise, Architect/Engineer will return the Application 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. Thirty days after the presentation to Owner of the Application and accompanying documentation, in appropriate form and substance and with Architect/Engineer's recommendation and notice of acceptability, the amount recommended by Architect/Engineer will become due and will be paid by Owner to Contractor.

14.14. If, through no fault of Contractor, final completion of the Work is significantly delayed and if Architect/Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for

Payment and recommendation of Architect/Engineer, and without terminating the Agreement, 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 5.1, 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 Architect/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.

Waiver of Claims:

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

14.15.1. 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 14.11, 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

14.15.12. a waiver of all claims by Contractor against Owner other than those previously made in writing and still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

Owner May Suspend Work:

15.1. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to Contractor and Architect/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 allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes an approved claim therefore as provided in Articles 11 and 12.

Owner May Terminate:

15.2. Upon the occurrence of any one or more of the following events:

15.2.1. if Contractor persistently fails 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 2.9 as adjusted from time to time pursuant to paragraph 6.6);

15.2.2. if Contractor disregards Laws or Regulations of any public body having jurisdiction;

15.2.3. if Contractor disregards the authority of Architect/Engineer; or

15.2.4. if Contractor otherwise violates in any substantial way any provisions of the Contract Documents;

15.2.5 if Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency;

15.2.5.1 if a petition is filed against Contractor under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

15.2.5.2 if Contractor makes a general assignment for the benefit of creditors;

15.2.5.3 if a trustee, receiver, custodian, or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors;

15.2.5.4 if Contractor admits in writing an inability to pay its debts generally as they become due.

Owner may, after giving Contractor (and the surety, if any,) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of Contractor, 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), 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 finish the Work as Owner may deem expedient. In such case Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by Owner arising out of or resulting from 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 Architect/Engineer as to their reasonableness and when so approved by Architect/Engineer incorporated in a Change Order, provided that when exercising any rights or remedies under this paragraph Owner shall not be required to obtain the lowest price for the Work performed.

15.3. 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.

15.4. Upon seven days' written notice to Contractor and Architect/Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, elect to terminate the Agreement. In such case, Contractor shall be paid (without duplication of any items):

15.4.1. for 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;

15.4.2. for 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;

15.4.3. for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and other; and

15.4.4. for reasonable expenses directly attributable to termination.

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.

Contractor May Stop Work or Terminate:

15.5. If, through no act or fault of Contractor, the Work is suspended for a period of more than ninety days by Owner or under an order of court or other public authority, or Architect/Engineer fails to act on any Application for Payment within thirty days after it is submitted or Owner fails for thirty days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days' written notice to Owner and Architect/Engineer, and provided Owner or Architect/Engineer do not remedy such suspension or failure within that time, terminate the Agreement and recover from Owner payment on the same terms as provided in paragraph 15.4. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if Architect/Engineer has failed to act on an Application for Payment within thirty days after it is submitted, or Owner has failed for thirty days to pay Contractor any sum finally determined to be due, Contractor may upon seven day's written notice to Owner and Architect/Engineer stop the Work until payment of all such amounts due Contractor, including interest thereon. The provisions of this paragraph 15.5 are not intended to preclude Contractor from making claim under Articles 11 and 12 for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping Work as permitted by this paragraph.

ARTICLE 16 – MISCELLANEOUS

16.1 Giving Notice:

Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if 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 if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

16.2 Computation of Times:

16.2.1. 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.

16.2.2. A calendar day of twenty-four hours measured from midnight to the next midnight will constitute a day.

16.3. Notice of Claim:

Should Owner or Contractor suffer injury or damage to person or property because of any error, omission or act of the other part or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party promptly, but in no event later than fifteen (15) days of the first observance of such injury or damage. The provisions of this paragraph 16.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

16.4. Cumulative Remedies:

The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon Contractor by paragraphs 6.2, 6.13, 6.22, 6.23, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to Owner and Architect/Engineer thereunder, 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, and 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.

16.5. Professional Fees and Court Costs Included:

Whenever reference is made to "claims, costs, losses and damages," it shall include in each case, but not be limited to, all fees and charges of Architect/Engineers, architects, attorneys and other professionals and all court or other dispute resolution costs.

16.6. Labor Records and Schedules:

The Department of Jurisdiction on such public work shall require all Contractors and Subcontractors to keep the following records on the site of the public work project on which such Contractors, and Subcontractors are engaged:

16.6.1 Record of hours worked by each worker, laborer, and mechanic on each day.

16.6.2 Record of days worked each week by each worker, laborer, and mechanic.

16.6.3 Schedule of occupation or occupations at which each worker, laborer, and mechanic on the project is employed during each workday and week.

16.6.4 Schedule of hourly wage rates and supplements paid to each worker, laborer, and mechanic for each occupation.

16.7. Wage Schedules:

Pursuant to the Labor Law, each laborer, worker, or mechanic employed by the Contractor, Subcontractor, or other person shall be paid not less than the prevailing rate of wages for a legal day's work and shall be provided supplements not less than the prevailing supplements as determined by the Industrial Commissioner.

The Contractor and every Subcontractor shall post in a prominent and accessible place on the site of the work a legible statement of all wage rates and supplements as specified in the Contract to be paid or provided, as the case may be, for the various classes of mechanics, workers, and laborers employed on the work.

The Owner does not represent or warrant that the accompanying schedule of wage rates and supplements with the classification of workers, mechanics, and laborers, as required the Labor Law, is complete, and it reserves the right to revise such schedule when required. If any occupation is not mentioned in the schedule of wage rates and supplements it shall be requested from the Industrial Commissioner, by the Contractor through the Architect/Engineer and such schedules, shall, upon notice to the Contractor, become and be a part of the wage and supplement schedules embodied in the Contract.

Also included is the Federal Wage Rate Determination. Laborers, workmen, and mechanics employed on the work done in performance of said Contract shall be paid not less than the rate of wages listed thereon for the trade or occupation of such laborer, etc.

SECTION 26 05 11
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on drawings.
- C. Electrical service entrance equipment and arrangements for temporary and permanent connections to the utility's system shall conform to the utility's requirements. Coordinate fuses, circuit breakers and relays with the utility's system, and obtain utility approval for sizes and settings of these devices.
- D. Wiring ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.

1.2 MINIMUM REQUIREMENTS

- A. References to the International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL) and National Fire Protection Association (NFPA) are minimum installation requirement standards.
- B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.3 TEST STANDARDS

- A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:

1. Listed; Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed equipment or materials or periodic evaluation of services, and whose listing states that the equipment, material, or services either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled; Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified; equipment or product which:
 - a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
 - c. Bears a label, tag, or other record of certification.
4. Nationally recognized testing laboratory; laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.
- B. Product Qualification:
 1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
 2. The Airport reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 APPLICABLE PUBLICATIONS

Applicable publications listed in all Sections of Division are the latest issue, unless otherwise noted.

1.6 MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.
- B. When more than one unit of the same class or type of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 - 1. Components of an assembled unit need not be products of the same manufacturer.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:
 - 1. The Engineer shall have the option of witnessing factory tests. The contractor shall notify the Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
 - 2. Four copies of certified test reports containing all test data shall be furnished to the Engineer prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Airport.

1.7 EQUIPMENT REQUIREMENTS

Where variations from the contract requirements are requested in accordance with Section 00 72 00, GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.8 EQUIPMENT PROTECTION

- A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.

1. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to switchgear, switchboards, panelboards, transformers, motor control centers, motor controllers, uninterruptible power systems, enclosures, controllers, circuit protective devices, cables, wire, light fixtures, electronic equipment, and accessories.
2. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
3. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
5. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

- A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the contractor.
- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
 2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
 3. Before initiating any work, a job specific work plan must be developed by the contractor with a peer review conducted and documented by the Engineer staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used and exit pathways.
 4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Engineer.
- D. For work on existing facilities, arrange, phase and perform work to assure electrical service for other buildings at all times. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

- E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- F. Coordinate location of equipment and conduit with other trades to minimize interferences.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working spaces shall not be less than specified in the NEC for all voltages specified.
- C. Inaccessible Equipment:
 - 1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Airport.
 - 2. "Conveniently accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

1.11 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers (starters), fused and unfused safety switches, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.
- B. Nameplates for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Nameplates for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 1/2 inch [12mm] high. Nameplates shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.
- C. Install adhesive arc flash warning labels on all equipment as required by NFPA 70E. Label shall indicate the arc hazard boundary (inches), working distance (inches), arc flash incident energy at the working distance (calories/cm²), required PPE category and description including the glove rating, voltage rating of the equipment, limited approach distance (inches), restricted approach distance (inches), prohibited approach distance (inches), equipment/bus name, date prepared, and manufacturer name and address.

1.12 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION _____".
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. Submit each section separately.
- E. The submittals shall include the following:
 - 1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Elementary and interconnection wiring diagrams for communication and signal systems, control systems and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 - 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer.
- F. Manuals: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
 - 1. Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
 - 2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
 - 3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The

instructions shall be legible and easily read, with large sheets of drawings folded in.

4. The manuals shall include:
 - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
 - b. A control sequence describing start-up, operation, and shutdown.
 - c. Description of the function of each principal item of equipment.
 - d. Installation instructions.
 - e. Safety precautions for operation and maintenance.
 - f. Diagrams and illustrations.
 - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers and replacement frequencies.
 - h. Performance data.
 - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
 - j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.

- G. Approvals will be based on complete submission of manuals together with shop drawings.

1.13 SINGULAR NUMBER

Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.14 ACCEPTANCE CHECKS AND TESTS

The contractor shall furnish the instruments, materials and labor for field tests.

1.15 TRAINING

- A. Training shall be provided in accordance with Article 1.25, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.
- B. Training shall be provided for the particular equipment or system as required in each associated specification.
- C. A training schedule shall be developed and submitted by the contractor and approved by the Engineer at least 30 days prior to the planned training.

END OF SECTION 26 05 11

**SECTION 26 05 21
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
(600 VOLTS AND BELOW)**

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of the low voltage power and lighting wiring.

1.2 RELATED WORK

- A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.
- E. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Installation of low-voltage conductors and cables in manholes and ducts.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 FACTORY TESTS

Low voltage cables shall be thoroughly tested at the factory per NEMA WC-70 to ensure that there are no electrical defects. Factory tests shall be certified.

1.5 SUBMITTALS

In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

1. Manufacturer's Literature and Data: Showing each cable type and rating.

2. Certifications: Two weeks prior to the final inspection, submit four copies of the following certifications to the Engineer:
 - a. Certification by the manufacturer that the materials conform to the requirements of the drawings and specifications.
 - b. Certification by the contractor that the materials have been properly installed, connected, and tested.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.
- B. American Society of Testing Material (ASTM):

D2301-04	Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
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- C. National Fire Protection Association (NFPA):

70-08	National Electrical Code (NEC)
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- D. National Electrical Manufacturers Association (NEMA):

WC 70-09	Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy
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- E. Underwriters Laboratories, Inc. (UL):

44-05	Thermoset-Insulated Wires and Cables
83-08	Thermoplastic-Insulated Wires and Cables
467-071	Electrical Grounding and Bonding Equipment
486A-486B-03	Wire Connectors
486C-04	Splicing Wire Connectors
486D-05	Sealed Wire Connector Systems
486E-94	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
493-07	Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable
514B-04	Conduit, Tubing, and Cable Fittings
1479-03	Fire Tests of Through-Penetration Fire Stops

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Conductors and cables shall be in accordance with NEMA WC-70 and as specified herein.
- B. Single Conductor:
 1. Shall be annealed copper.

2. Shall be stranded for sizes No. 8 AWG and larger, solid for sizes No. 10 AWG and smaller.
3. Shall be minimum size No. 12 AWG, except where smaller sizes are allowed herein.

C. Insulation:

1. XHHW-2 or THHN-THWN shall be in accordance with NEMA WC-70, UL 44, and UL 83.

D. Color Code:

1. Secondary service feeder and branch circuit conductors shall be color-coded as follows:

208/120 volt	Phase	480/277 volt
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

- a. Lighting circuit “switch legs” and 3-way switch “traveling wires” shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the Engineer.
2. Use solid color insulation or solid color coating for No. 12 AWG and No. 10 AWG branch circuit phase, neutral, and ground conductors.
3. Conductors No. 8 AWG and larger shall be color-coded using one of the following methods:
 - a. Solid color insulation or solid color coating.
 - b. Stripes, bands, or hash marks of color specified above.
 - c. Color as specified using 0.75 in [19 mm] wide tape. Apply tape in half-overlapping turns for a minimum of 3 in [75 mm] for terminal points, and in junction boxes, pull-boxes, troughs, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.
4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.

2.2 SPLICES AND JOINTS

- A. In accordance with UL 486A, C, D, E, and NEC.
- B. Aboveground Circuits (No. 10 AWG and smaller):

1. Connectors: Solderless, screw-on, reusable pressure cable type, rated 600 V, 220° F [105° C], with integral insulation, approved for copper and aluminum conductors.
2. The integral insulator shall have a skirt to completely cover the stripped wires.
3. The number, size, and combination of conductors, as listed on the manufacturer's packaging, shall be strictly followed.

C. Aboveground Circuits (No. 8 AWG and larger):

1. Connectors shall be indent, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
2. Field-installed compression connectors for cable sizes 250 KCMIL and larger shall have not fewer than two clamping elements or compression indents per wire.
3. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Splice and joint insulation level shall be not less than the insulation level of the conductors being joined.
4. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

D. Underground Branch Circuits and Feeders:

1. Submersible connectors in accordance with UL 486D, rated 600 V, 190° F [90° C], with integral insulation.

2.3 CONTROL WIRING

- A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified for power and lighting wiring, except that the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be large enough such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

2.4 WIRE LUBRICATING COMPOUND

- A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install in accordance with the NEC, and as specified.
- B. Install all wiring in raceway systems.

- C. Splice cables and wires only in outlet boxes, junction boxes, pull-boxes, manholes, or handholes.
- D. Wires of different systems (e.g., 120 V, 277 V) shall not be installed in the same conduit or junction box system.
- E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- F. For panel boards, cabinets, wireways, switches, and equipment assemblies, neatly form, train, and tie the cables in individual circuits.
- G. Seal cable and wire entering a building from underground between the wire and conduit where the cable exits the conduit, with a non-hardening approved compound.
- H. Wire Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables. Use lubricants approved for the cable.
 - 2. Use nonmetallic ropes for pulling feeders.
 - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Engineer.
 - 4. All cables in a single conduit shall be pulled simultaneously.
 - 5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- I. No more than three single-phase branch circuits shall be installed in any one conduit.

3.2 INSTALLATION IN MANHOLES

- A. Install and support cables in manholes on the steel racks with porcelain or equivalent insulators. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter.

3.3 SPLICE INSTALLATION

- A. Splices and terminations shall be mechanically and electrically secure.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque values.
- C. Where the Engineer determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the County.

3.4 FEEDER IDENTIFICATION

- A. In each interior pull-box and junction box, install metal tags on all circuit cables and wires to clearly designate their circuit identification and voltage. The tags shall be the

embossed brass type, 1.5 in [40 mm] in diameter and 40 mils thick. Attach tags with plastic ties.

- B. In each manhole and handhole, provide tags of the embossed brass type, showing the circuit identification and voltage. The tags shall be the embossed brass type, 1.5 in [40 mm] in diameter and 40 mils thick. Attach tags with plastic ties.

3.5 EXISTING WIRING

Unless specifically indicated on the plans, existing wiring shall not be reused for a new installation.

3.6 CONTROL AND SIGNAL WIRING INSTALLATION

- A. Unless otherwise specified in other sections, install wiring and connect to equipment/devices to perform the required functions as shown and specified.
- B. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.
- C. Where separate power supply circuits are not shown, connect the systems to the nearest panel boards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.

3.7 CONTROL AND SIGNAL SYSTEM wiring IDENTIFICATION

- A. Install a permanent wire marker on each wire at each termination.
- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.
- D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

3.8 ACCEPTANCE CHECKS AND TESTS

- A. Feeders and branch circuits shall have their insulation tested after installation and before connection to utilization devices, such as fixtures, motors, or appliances. Test each conductor with respect to adjacent conductors and to ground. Existing conductors to be reused shall also be tested.
- B. Applied voltage shall be 500VDC for 300-volt rated cable, and 1000VDC for 600-volt rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300-volt rated cable and 100 megohms for 600-volt rated cable.

- C. Perform phase rotation test on all three-phase circuits.
- D. The contractor shall furnish the instruments, materials, and labor for all tests.

END OF SECTION 26 05 21

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the general grounding and bonding requirements for electrical equipment and operations to provide a low impedance path for possible ground fault currents.
- B. "Grounding electrode system" refers to all electrodes required by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.
- C. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
- C. Section 26 24 16, PANELBOARDS: Low voltage panelboards.
- D. Section 26 32 13, ENGINE-GENERATORS: Engine-generators.
- E. Section 26 36 23, AUTOMATIC TRANSFER SWITCHES: Automatic transfer switches.
- F. Section 26 41 00, FACILITY LIGHTNING PROTECTION: Requirements for lightning protection.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

- B. Shop Drawings:
 1. Clearly present enough information to determine compliance with drawings and specifications.
 2. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.
- C. Test Reports: Provide certified test reports of ground resistance.
- D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Engineer:
 1. Certification that the materials and installation are in accordance with the drawings and specifications.
 2. Certification by the contractor that the complete installation has been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

- A. American Society for Testing and Materials (ASTM):
 - B1-07 Standard Specification for Hard-Drawn Copper Wire
 - B3-07 Standard Specification for Soft or Annealed Copper Wire
 - B8-04 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 81-1983 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
 - C2-07 National Electrical Safety Code
- C. National Fire Protection Association (NFPA):
 - 70-08 National Electrical Code (NEC)
 - 99-2005 Health Care Facilities
- D. Underwriters Laboratories, Inc. (UL):
 - 44-05 Thermoset-Insulated Wires and Cables
 - 83-08 Thermoplastic-Insulated Wires and Cables
 - 467-07 Grounding and Bonding Equipment
 - 486A-486B-03 Wire Connectors
- E. Motorola: R56 Standards and Guidelines for Communication Sites

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 44 or UL 83 insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.
- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes No. 10 AWG and smaller shall be ASTM B1 solid bare copper wire.
- C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.
- D. Ground (earth) bus conductors, including ground bus extension conductors, shall be a #2 AWG or larger, green-jacketed, solid or stranded copper conductor. When the conductors are insulated, they shall be listed for the space in which they are intended to be placed and the jacket shall be green or properly marked with a distinctive green color.
- A. The equipment grounding (earthing) conductor shall be a #6 AWG or larger, green jacketed, solid or stranded copper conductor

2.2 GROUND RODS

- A. Steel or copper clad steel, 0.75 in diameter by 10 ft long, conforming to UL 467.
- B. Quantity of rods shall be as required to obtain the specified ground resistance, as shown on the drawings.

2.3 CONCRETE ENCASED ELECTRODE

Concrete encased electrode shall be No. 4 AWG bare copper wire, installed per NEC.

2.4 MEDIUM VOLTAGE SPLICES AND TERMINATIONS

Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

2.5 GROUND CONNECTIONS

- A. Below Grade: Exothermic-welded type connectors.
- B. Above Grade:

1. Bonding Jumpers: Compression-type connectors, using zinc-plated fasteners and external tooth lockwashers.
2. Connection to Building Steel: Exothermic-welded type connectors.
3. Ground Busbars: Two-hole compression type lugs, using tin-plated copper or copper alloy bolts and nuts.
4. Rack and Cabinet Ground Bars: One-hole compression-type lugs, using zinc-plated or copper alloy fasteners.

2.6 EQUIPMENT RACK AND CABINET GROUND BARS

Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 0.375 in thick x 0.75 in wide.

2.7 GROUND TERMINAL BLOCKS

At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

2.8 GROUNDING BUS

Pre-drilled rectangular copper bar with stand-off insulators, minimum 0.25 in thick x 4 in high in cross-section, length as shown on drawings, with 0.281 in holes spaced 1.125 in apart.

PART 3 - EXECUTION

3.1 GENERAL

- A. Ground in accordance with the NEC, as shown on drawings, and as specified herein.
- B. System Grounding:
 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic structures, including ductwork and building steel, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

Make grounding connections, which are normally buried or otherwise inaccessible (except connections for which access for periodic testing is required), by exothermic weld.

3.3 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
 - 1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building steel, and supplemental or made electrodes. Provide jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
 - 2. Provide a supplemental ground electrode and bond to the grounding electrode system.
- C. Service Disconnect (Separate Individual Enclosure): Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.
- D. Switchgear, Panelboards, Engine-Generators, and Automatic Transfer Switches:
 - 1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 - 2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
 - 3. Provide ground bars, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
 - 4. Connect metallic conduits that terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.
- E. Transformers:
 - 1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
 - 2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest component of the grounding electrode.

3.4 RACEWAY

- F. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
 2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
 3. Conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
 4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a bare grounding conductor to the equipment ground bus.
- G. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders and power and lighting branch circuits.
- H. Boxes, Cabinets, Enclosures, and Panelboards:
1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
 2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
- I. Wireway Systems:
1. Bond the metallic structures of wireway to provide 100% electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
 2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 50 ft.
 3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.
 4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 49 ft.
- J. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.
- K. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

- M. Raised Floors: Provide bonding of all raised floor components. See details on the drawings.

3.5 OUTDOOR METALLIC FENCES AROUND ELECTRICAL EQUIPMENT

- N. Outdoor Metallic Fences Around Electrical Equipment: Fences shall be grounded with a ground rod at each fixed gate post and at each corner post. Drive ground rods until the top is 12 in below grade. Attach a No. 4 AWG copper conductor by exothermic weld to the ground rods, and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 12 in of fence mesh and fasten by two approved bronze compression fittings, one to bond the wire to post and the other to bond the wire to fence. Each gate section shall be bonded to its gatepost by a 0.375 in x 1 in flexible, braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

3.6 CORROSION INHIBITORS

When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.7 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- B. In operating rooms and at intensive care and coronary care type beds, bond the gases and suction piping at the outlets directly to the room or patient ground bus.

3.8 LIGHTNING PROTECTION SYSTEM

Bond the lightning protection system to the electrical grounding electrode system.

3.9 ELECTRICAL ROOM GROUNDING

Building Earth Ground Busbars: Provide ground busbar and mounting hardware at each electrical room and connect to pigtail extensions of the building grounding ring.

3.10 EXTERIOR LIGHT POLES

Provide 20 ft of No. 4 bare copper coiled at bottom of pole base excavation prior to pour, plus additional unspliced length in and above foundation as required to reach pole ground stud.

3.11 GROUND RESISTANCE

- A. Grounding system resistance to ground shall not exceed 25 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the County. Final tests shall ensure that this requirement is met.
- B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- C. Services at power company interface points shall comply with the power company ground resistance requirements.
- D. Below-grade connections shall be visually inspected by the Engineer prior to backfilling. The contractor shall notify the Engineer 24 hours before the connections are ready for inspection.

3.12 GROUND ROD INSTALLATION

- A. For outdoor installations, drive each rod vertically in the earth, until top of rod is 24 in [609 mm] below final grade.
- B. For indoor installations, leave 4 in of rod exposed.
- C. Where permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal joints. Make accessible ground connections with mechanical pressure-type ground connectors.
- D. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

END OF SECTION 26 05 26

**SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
- B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

- A. Manufacturer's Literature and Data: Showing each cable type and rating. The specific item proposed and its area of application shall be identified on the catalog cuts.
- B. Shop Drawings:
 - 1. Size and location of main feeders.
 - 2. Size and location of panels and pull-boxes.
 - 3. Layout of required conduit penetrations through structural elements.
- C. Certifications:

1. Two weeks prior to the final inspection, submit four copies of the following certifications to the Contractor:
 - a. Certification by the manufacturer that the material conforms to the requirements of the drawings and specifications.
 - b. Certification by the contractor that the material has been properly installed.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American National Standards Institute (ANSI):

C80.1-05	Electrical Rigid Steel Conduit
C80.3-05	Steel Electrical Metal Tubing
C80.6-05	Electrical Intermediate Metal Conduit

C. National Fire Protection Association (NFPA):

70-08	National Electrical Code (NEC)
12-21	Standard for the Installation, Maintenance and Use of Emergency Communications Systems

D. Underwriters Laboratories, Inc. (UL):

1-05	Flexible Metal Conduit
5-04	Surface Metal Raceway and Fittings
6-07	Electrical Rigid Metal Conduit - Steel
50-95	Enclosures for Electrical Equipment
360-093	Liquid-Tight Flexible Steel Conduit
467-07	Grounding and Bonding Equipment
514A-04	Metallic Outlet Boxes
514B-04	Conduit, Tubing, and Cable Fittings
514C-96	Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
651-05	Schedule 40 and 80 Rigid PVC Conduit and Fittings
651A-00	Type EB and A Rigid PVC Conduit and HDPE Conduit
797-07	Electrical Metallic Tubing
1242-06	Electrical Intermediate Metal Conduit - Steel

E. National Electrical Manufacturers Association (NEMA):

TC-2-03	Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
TC-3-04	PVC Fittings for Use with Rigid PVC Conduit and Tubing
FB1-07	Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Conduit Size: In accordance with the NEC, but not less than 0.5 in unless otherwise shown. Where permitted by the NEC, 0.5 in flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
1. Rigid steel: Shall conform to UL 6 and ANSI C80.1.
 2. Rigid intermediate steel conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
 3. Electrical metallic tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 4 in [105 mm] and shall be permitted only with cable rated 600 V or less.
 4. Flexible galvanized steel conduit: Shall conform to UL 1.
 5. Liquid-tight flexible metal conduit: Shall conform to UL 360.
 6. Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high-density polyethylene (PE).
 7. Surface metal raceway: Shall conform to UL 5.
 8. **Exposed conduits, boxes and fittings shall be PVC coated or stainless steel, due to extreme sea salt environment.**
- C. Conduit Fittings:
1. Rigid steel and IMC conduit fittings:
 - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
 - b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
 - c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
 - d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
 - e. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
 - f. Sealing fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.
 2. Electrical metallic tubing fittings:
 - a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Compression couplings and connectors: Concrete-tight and rain-tight, with connectors having insulated throats.
 - d. Indent-type connectors or couplings are prohibited.

- e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
 - 3. Flexible steel conduit fittings:
 - a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
 - b. Clamp-type, with insulated throat.
 - 4. Liquid-tight flexible metal conduit fittings:
 - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
 - 5. Direct burial plastic conduit fittings:
 - a. Fittings shall meet the requirements of UL 514C and NEMA TC3.
 - 6. Surface metal raceway fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system. **Exposed raceways, boxes and fittings shall be PVC coated or stainless steel due to heavy sea salt environment.**
 - 7. Expansion and deflection couplings:
 - a. Conform to UL 467 and UL 514B.
 - b. Accommodate a 0.75 in [19 mm] deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
 - c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.
 - d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.
- D. Conduit Supports:
- 1. Parts and hardware: Zinc-coat, **stainless steel** or provide equivalent corrosion protection.
 - 2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
 - 3. Multiple conduit (trapeze) hangers: Not less than 1.5 x 1.5 in, 12-gauge steel, cold-formed, lipped channels; with not less than 0.375 in diameter steel hanger rods.
 - 4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.
- E. Outlet, Junction, and Pull Boxes:
- 1. **Provide PVC coated or stainless-steel components due to heavy sea salt environment.**
 - 2. UL-50 and UL-514A.
 - 3. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.
 - 4. Sheet metal boxes: Galvanized steel, except where otherwise shown.

5. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.
- F. Wireways: Equip with hinged covers, except where removable covers are shown. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:

1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the Architect prior to drilling through structural elements.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except where permitted by the Engineer as required by limited working space.

B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight, as specified in Section 07 92 05, JOINT SEALANTS.

3.2 INSTALLATION, GENERAL

A. In accordance with UL, NEC, as shown, and as specified herein.

B. Emergency raceway systems shall be entirely independent of other raceway systems, except where shown on drawings.

C. Install conduit as follows:

1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.

4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 8 ft on centers. Do not use other supports, i.e., suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts.
7. Support within 12 in [300 mm] of changes of direction, and within 12 in [300 mm] of each enclosure to which connected.
8. Close ends of empty conduit with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
9. Conduit installations under fume and vent hoods are prohibited.
10. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
11. Flashing of penetrations of the roof membrane is specified in Section 07 62 00, FLASHING AND SHEET METAL.
12. Conduit bodies shall only be used for changes in direction, and shall not contain splices.

D. Conduit Bends:

1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

E. Layout and Homeruns:

1. Install conduit with wiring, including homeruns, as shown on drawings.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted approved by the Engineer.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:

1. Conduit: Rigid steel, IMC, or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only:
 - a. Where shown on the structural drawings.
 - b. As approved by the Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of conduit in concrete that is less than 3 in thick is prohibited.
 - a. Conduit outside diameter larger than one-third of the slab thickness is prohibited.
 - b. Space between conduits in slabs: Approximately six conduit diameters apart, and one conduit diameter at conduit crossings.

- c. Install conduits approximately in the center of the slab so that there will be a minimum of 0.75 in of concrete around the conduits.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to ensure low resistance ground continuity through the conduits. Tightening setscrews with pliers is prohibited.

B. Above Furred or Suspended Ceilings and in Walls:

1. Conduit for conductors above 600 V: Rigid steel. Mixing different types of conduits indiscriminately in the same system is prohibited.
2. Conduit for conductors 600 V and below: Rigid steel, IMC or EMT. Mixing different types of conduits indiscriminately in the same system is prohibited.
3. Align and run conduit parallel or perpendicular to the building lines.
4. Connect recessed lighting fixtures to conduit runs with maximum 6 ft of flexible metal conduit extending from a junction box to the fixture.
5. Tightening setscrews with pliers is prohibited.

3.4 EXPOSED WORK INSTALLATION

A. **Provide PVC coated or stainless-steel components due to heavy sea salt environment.**

B. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.

C. Conduit for Conductors above 600 V: Rigid steel. Mixing different types of conduits indiscriminately in the system is prohibited.

D. Conduit for Conductors 600 V and Below: Rigid steel, IMC or EMT. Mixing different types of conduits indiscriminately in the system is prohibited.

E. Align and run conduit parallel or perpendicular to the building lines.

F. Install horizontal runs close to the ceiling or beams and secure with conduit straps.

G. Support horizontal or vertical runs at not over 8 ft intervals.

H. Surface metal raceways: Use only where shown.

I. Painting:

1. Paint exposed conduit as specified in Section 09 91 23, INTERIOR PAINTING.
2. Paint all conduits containing cables rated over 600 V safety orange. Refer to Section 09 91 23, INTERIOR PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 2 in high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 20 ft intervals in between.

3.5 DIRECT BURIAL INSTALLATION

Refer to Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION.

3.6 HAZARDOUS LOCATIONS

- A. Use rigid steel conduit only, notwithstanding requirements otherwise specified in this or other sections of these specifications.
- B. Install UL approved sealing fittings that prevent passage of explosive vapors in hazardous areas equipped with explosion-proof lighting fixtures, switches, and receptacles, as required by the NEC.

3.7 WET OR DAMP LOCATIONS

- A. Unless otherwise shown, use conduits of rigid steel or IMC.
- B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.
- C. Unless otherwise shown, use rigid steel or IMC conduit within 5 ft of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or re-tape any damaged areas of coating.

3.8 MOTORS AND VIBRATING EQUIPMENT

- A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.
- B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water. Provide a green equipment grounding conductor with flexible metal conduit.

3.9 EXPANSION JOINTS

- A. Conduits 3 in and larger that are secured to the building structure on opposite sides of a building expansion joint require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
- B. Provide conduits smaller than 3 in with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5 in vertical drop midway between the ends. Flexible conduit shall have a

bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for conduits 15 in and larger are acceptable.

- C. Install expansion and deflection couplings where shown.

3.10 CONDUIT SUPPORTS, INSTALLATION

- A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 200 lbs. Attach each conduit with U-bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
 - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 - 2. Existing Construction:
 - a. Steel expansion anchors not less than 0.25 in bolt size and not less than 1.125 in embedment.
 - b. Power set fasteners not less than 0.25 in diameter with depth of penetration not less than 3 in.
 - c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts.
- G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
- H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- K. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.
- L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.11 BOX INSTALLATION

- A. Boxes for Concealed Conduits:
 - 1. Flush-mounted.
 - 2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 24 in center-to-center lateral spacing shall be maintained between boxes.
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4 in square x 2.125 in deep, with device covers for the wall material and thickness involved.
- F. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example, "SIG-FA JB No. 1."
- G. On all branch circuit junction box covers, identify the circuits with black marker.

END OF SECTION 26 05 33

SECTION 26 05 41
UNDERGROUND ELECTRICAL CONSTRUCTION

PART 1 – GENERAL

1.1. DESCRIPTION

- A. This section specifies the furnishing, installation and connection of handholes and ducts to form a complete underground raceway system.
- B. “Duct” and “conduit”, and “rigid metal conduit” and “rigid steel conduit are used interchangeably in this specification and have the same meaning.

1.2. RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings and boxes for raceway systems.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3. SUBMITTALS

- A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include handholes, duct materials, and hardware. Proposed deviations from details on the drawings shall be clearly marked on the submittals.
 - 3. If necessary to locate ducts or handholes at locations other than shown on the drawings, show the proposed locations accurately on scaled site drawings, and submit four copies to the Resident Project Engineer for approval prior to construction.
- C. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Resident Project Engineer:

1. Certification that the materials are in accordance with the drawings and specifications.
2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

1.4. APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

A. American Concrete Institute (ACI):

Building Code Requirements for Structural Concrete

318/318M-2005 Building Code Requirements for Structural Concrete & Commentary

SP-66-04 ACI Detailing Manual

B. American Society for Testing and Materials (ASTM):

C478/C478M 2009(b) Standard Specification for Precast Reinforced Concrete Manhole Sections

C990 REV A 2008 Standard Specification for joints concrete pipe, Manholes and Precast Box using performed flexible Joint sealants.

C. Institute of Electrical and Electronic Engineers (IEEE):

C2-2002 National Electrical Safety Code

D. National Electrical Manufacturers Association (NEMA):

RNI 2005 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

TC 2 2003 Electrical Polyvinyl Chloride (PVC) Tubing And Conduit

TC 3-2004 PVC Fittings for Use With Rigid PVC Conduit And Tubing

TC 6 & 8 2003 PVC Plastic Utilities Duct For Underground Installations

TC 9-2004 Fittings For PVC Plastic Utilities Duct For Underground Installation

E. National Fire Protection Association (NFPA):

70 2008 National Electrical Code (NEC)

F. Underwriters Laboratories, Inc. (UL):

6-2007 Electrical Rigid Metal Conduit-Steel

467-2007 Standard for Grounding and Bonding Equipment

651-2005..... Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings

651A-2000..... Type EB and A Rigid PVC Conduit and HDPE Conduit, (RTRC)

651B-2007..... Continuous Length HDPE Conduit

G. U.S. General Services Administration (GSA):

SS-S-210A-1981 Sealing Compound, Preformed Plastic for Expansion joints And Pipe Joints

PART 2 - PRODUCTS

1. DUCTS

A. Number and sizes shall be as shown on drawings.

B. Ducts (concrete encased):

1. Plastic Duct:

a. UL 651 and 651A Schedule 40 PVC.

b. Duct shall be suitable for use with 90 degree C rated conductors.

2. Conduit Spacers: Prefabricated plastic.

C. Ducts (direct burial):

1. Plastic duct:

a. NEMA TC2 and TC3

b. UL 651, 651A and 651B, Schedule 40, Schedule 80 PVC or HDPE.

c. Duct shall be suitable for use with 75 degree C rated conductors.

2. Rigid metal conduit, PVC-coated: UL6 and NEMA RN1 galvanized rigid steel, threaded type, coated with PVC sheath bonded to the galvanized exterior surface, nominal 1 mm (0.040 inch) thick.

2. GROUNDING

A. Rods: Per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS and UL 467

B. Ground Wire: Stranded bare copper 16 mm² (6 AWG) minimum.

3. WARNING TAPE:

A. Standard 4-mil polyethylene 76 mm (3 inch) wide tape, detectable type, red with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW".

- 4. PULL ROPE:
 - A. Plastic with 890N (200 pound) minimum tensile strength.

PART 4 - EXECUTION

4.1. HANDHOLE CONSTRUCTION AND INSTALLATION

- A. General Requirements:
 - 1. Locate handholes at the approximate locations shown on the drawings with due consideration given to the location of other utilities, grades, and paving.
- B. Access for Handholes: Make the top of frames and covers flush with finished grade.

4.2. TRENCHING

- A. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.
- B. Cut the trenches neatly and uniformly.
- C. For Concrete Encased Ducts:
 - 1. After excavation of the trench, stakes shall be driven in the bottom of the trench at
 - 2. 1200 mm (4 foot) intervals to establish the grade and route of the duct bank.
 - 3. Pitch the trenches uniformly towards manholes or both ways from high points between manholes for the required duct line drainage. Avoid pitching the ducts towards buildings wherever possible.
 - 4. The walls of the trench may be used to form the side walls of the duct bank provided that the soil is self-supporting and that concrete envelope can be poured without soil inclusions. Forms are required where the soil is not self-supporting.
 - 5. After the concrete encased duct has sufficiently cured, the trench shall be backfilled to grade with earth, with appropriate warning tape attached.
- D. Conduits to be installed under existing paved areas, roads, and railroad tracks that are not to be disturbed shall be jacked into place. Conduits shall be PVC-coated rigid metal.

4.3. DUCT INSTALLATION

- A. General Requirements:
 - 1. Ducts shall be in accordance with the NEC and IEEE C2, as shown on the drawings and as specified.

2. Slope ducts to drain towards handholes, and away from building and equipment entrances. Pitch not less than 100 mm (4 inches) in 30 M (100 feet).
3. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be PVC-coated galvanized rigid steel, and shall extend a minimum of 1500 mm (5 feet) outside of building foundation.
4. Stub-ups, sweeps, and risers to equipment mounted on outdoor concrete slabs shall be PVC-coated galvanized rigid steel, and shall extend a minimum of 1500 mm (5 feet) away from edge of slab.
5. Install insulated grounding bushings on the terminations.
6. PVC-coated rigid steel conduits shall be coupled to the ducts with suitable adapters, and the whole encased with 75 mm (3 inches) of concrete.
7. PVC coated rigid steel conduit turns of direction for all duct lines shall have minimum 1200 mm (4 feet) radius in the horizontal and vertical directions. PVC conduit sweeps for all duct lines shall have a minimum 12000 mm (40 feet) radius in the horizontal and 1200 mm (4 feet) in the vertical directions. Where a 12000 mm (40 feet) radius is not possible, horizontal turns of direction shall be rigid steel.
8. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly a minimum of 75 mm (3 inches) above bottom of trench during the concrete pour. Spacer spacing shall not exceed 1500 mm (5 feet).
9. Duct lines shall be installed no less than 300 mm (12 inches) from other utility systems, such as water, sewer, and chilled water.
10. Clearances between individual ducts:
 - a. For like services, not less than 75 mm (3 inches).
 - b. For power and signal services, not less than 150 mm (6 inches).
 - c. Provide plastic spacers to maintain clearances.
 - d. Provide nonferrous tie wires to prevent displacement of the ducts during pouring of concrete. Tie wires shall not act as substitute for spacers.
11. Duct lines shall terminate as shown on the drawings. All ducts shall be fitted with end bells.
12. Couple the ducts with proper couplings. Stagger couplings in rows and layers to insure maximum strength and rigidity of the duct bank.
13. Keep ducts clean of earth, sand, or gravel during construction, and seal with tapered plugs upon completion of each portion of the work.

14. Duct Bank Markers:

- a. Duct bank markers, where required, shall be located at the ends of duct banks except at handholes at approximately every 60 meter (200 feet) along the duct run and at each change in direction of the duct run. Markers shall be placed 600 mm (2 feet) to the right of the duct bank, facing the longitudinal axis of the run in the direction of the electrical load.
- b. The letter "D" with two arrows shall be impressed or cast on top of the marker. One arrow shall be located below the letter and shall point toward the ducts. Second arrow shall be located adjacent to the letter and shall point in a direction parallel to the ducts. The letter and arrow adjacent to it shall each be approximately 75 mm (2 inches) long. The letter and arrows shall be V-shaped, and shall have a width of stroke at least 6 mm (1/4 inch) at the top and a depth of 6 mm (1/4 inch).
- c. In paved areas, the top of the duct markers shall be flush with the finished surface of the paving.
- d. Where the duct bank changes direction, the arrow located adjacent to the letter shall be cast or impressed with an angle in the arrow the same as the angular change of the duct bank.

B. Direct Burial Duct and Conduits:

1. Install direct burial ducts and conduits only where shown on the drawings. Provide direct burial ducts only for low voltage systems.
2. Join and terminate ducts and conduits with fittings recommended by conduit manufacturer.
3. Direct burial ducts and conduits are prohibited under railroad tracks.
4. Tops of ducts and conduits shall be:
 - a. Not less than 600 mm (24 inches) and not less than shown on the drawings, below finished grade.
 - b. Not less than 750 mm (30 inches) and not less than shown on the drawings, below roads and other paved surfaces.
5. Do not kink the ducts or conduits.

- C. Concrete-Encased and Direct Burial Duct and Conduit Identification: Place continuous strip of warning tape approximately 300 mm (12 inches) above ducts or conduits before backfilling trenches. Warning tape shall be preprinted with proper identification.
- D. Spare Ducts and Conduits: Where spare ducts are shown, they shall have a nylon pull rope installed. They shall be capped at each end and labeled as to location of the other end.
- E. Duct and Conduit Cleaning:
 - 1. Upon completion of the duct bank installation or installation of direct buried ducts, a standard flexible mandrel shall be pulled through each duct to loosen particles of earth, sand, or foreign material left in the line. The mandrel shall be not less than 3600 mm (12 inches) long, and shall have a diameter not less than 13 mm (1/2 inch) less than the inside diameter of the duct. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than the diameter of the duct.
 - 2. Mandrel pulls shall be witnessed by the Resident Project Engineer.
- F. Duct and Conduit Sealing: Seal the ducts and conduits at building entrances, and at outdoor terminations for equipment, with a suitable non-hardening compound to prevent the entrance of moisture and gases.
- G. Connections to Existing Manholes: For duct bank connections to existing structures, break the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.
- H. Connections to Existing Ducts: Where connections to existing duct banks are indicated, excavate around the duct banks as necessary. Cut off the duct banks and remove loose concrete from the conduits before installing new concrete-encased ducts. Provide a reinforced concrete collar, poured monolithically with the new duct bank, to take the shear at the joint of the duct banks.
- I. Partially Completed Duct Banks: During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud and dirt from entering ducts by providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of 600 mm (2 feet) back into the envelope and a minimum of 600 mm (2 feet) beyond the end of the envelope. Provide one No. 4 bar in each corner, 75 mm (3 inches) from the edge of the envelope. Secure

corner bars with two No. 3 ties, spaced approximately 300 mm (1 foot) apart. Restrain reinforcing assembly from moving during pouring of concrete.

END OF SECTION 26 05 47

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of panelboards.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS:

Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND

CABLES: Low-voltage conductors.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS:

Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

E. Section 26 09 23, LIGHTING CONTROLS: Lighting controls integral to panelboards.

F. Section 26 43 13, SURGE PROTECTIVE DEVICES: Surge protective devices integral to panelboards.

1.3 QUALITY ASSURANCE

A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:

a. Submit sufficient information to demonstrate compliance with drawings and specifications.

b. Include electrical ratings, dimensions, mounting details, materials, required

clearances, terminations, weight, circuit breakers, wiring and connection diagrams, accessories, and nameplate data.

2. Manuals:
 - a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering circuit breakers and replacement parts.
 - 1) Include schematic diagrams, with all terminals identified, matching terminal identification in the panelboards.
 - 2) Include information for testing, repair, troubleshooting, assembly, and disassembly.
 - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
 - a. Certification by the manufacturer that the panelboards conform to the requirements of the drawings and specifications.
 - b. Certification by the Contractor that the panelboards have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. International Code Council (ICC):
 - IBC-12..... International Building Code
- C. National Electrical Manufacturers Association (NEMA):
 - PB 1-11 Panelboards
 - 250-08..... Enclosures for Electrical Equipment (1,000V Maximum)
- D. National Fire Protection Association (NFPA):
 - 70-11 National Electrical Code (NEC)
 - 70E-12..... Standard for Electrical Safety in the Workplace
- E. Underwriters Laboratories, Inc. (UL):
 - 50-95..... Enclosures for Electrical Equipment

67-09.....	Panelboards
489-09.....	Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.
- B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.
- C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.
- D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.
- E. Bus bar connections to the branch circuit breakers shall be the “distributed phase” or “phase sequence” type.
- F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they will be connected.
- G. Neutral bus shall be 100% rated, mounted on insulated supports. Provide 200% neutral bus for computer panelboards as show on the plans
- H. Grounding bus bar shall be equipped with screws or lugs for the connection of equipment grounding conductors.
- I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.
- J. In two-section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type panelboards, and have field-installed cable connections to the second section as shown on the drawings. Panelboard sections with tapped bus or crossover bus are not acceptable.
- K. Series-rated panelboards are not permitted.

2.2 ENCLOSURES AND TRIMS

A. Enclosures:

1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
2. Enclosures shall not have ventilating openings.
3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.
5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:

1. Hinged "door-in-door" type.
2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
4. Inner and outer doors shall open left to right.
5. Trims shall be flush or surface type as shown on the drawings.

2.3 MOLDED CASE CIRCUIT BREAKERS

A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.

B. Circuit breakers shall be bolt-on type.

C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than:

1. 120/208 V Panelboard: 10,000 A symmetrical.
2. 120/240 V Panelboard: 10,000 A symmetrical.
3. 277/480 V Panelboard: 14,000 A symmetrical.

D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A frame. Circuit breakers with 400 A frames and above shall have magnetic trip, adjustable from 5x to 10x. Breaker magnetic trip setting shall be set to maximum, unless otherwise noted.

E. Circuit breaker features shall be as follows:

1. A rugged, integral housing of molded insulating material.

2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates closed, tripped, and open positions.
8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.
9. Ground fault current interrupting breakers, shunt trip breakers, lighting control breakers (including accessories to switch line currents), or other accessory devices or functions shall be provided where shown on the drawings.
10. For circuit breakers being added to existing panelboards, coordinate the breaker type with existing panelboards. Modify the panel directory accordingly.

2.4 SURGE PROTECTIVE DEVICES

- A. Where shown on the drawings, furnish panelboards with integral surge protective devices. Refer to Section 26 43 13, SURGE PROTECTIVE DEVICES.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.
- B. Locate panelboards so that the present and future conduits can be conveniently connected.
- C. Install a printed schedule of circuits in each panelboard after approval by the //Resident Engineer. Schedules shall reflect final load descriptions, room numbers, and room names connected to each circuit breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards
- D. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 1980 mm (78 inches).
- E. Provide blank cover for each unused circuit breaker mounting space.
- F. Panelboard enclosures shall not be used for conductors feeding through, spliced, or tapping off to other enclosures or devices.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests:
 - a. Compare equipment nameplate data with specifications and approved shop drawings.
 - b. Inspect physical, electrical, and mechanical condition.
 - c. Verify appropriate anchorage and required area clearances.
 - d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
 - e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method or perform thermographic survey after energization.
 - f. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3 FOLLOW-UP VERIFICATION

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

END OF SECTION 26 24 16

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation and connection of wiring devices.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.
- B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits and outlets boxes.
- C. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, mounting details, construction materials, grade and termination information.
- C. Manuals: Two weeks prior to final inspection, deliver four copies of the following to the Engineer: Technical data sheets and information for ordering replacement units.

- D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Engineer: Certification by the Contractor that the devices comply with the drawings and specifications, and have been properly installed, aligned, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

- B. National Fire Protection Association (NFPA):

70	National Electrical Code (NEC)
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- C. National Electrical Manufacturers Association (NEMA):

WD 1	General Color Requirements for Wiring Devices
WD 6	Wiring Devices – Dimensional Requirements

- D. Underwriter’s Laboratories, Inc. (UL):

5	Surface Metal Raceways and Fittings
20	General-Use Snap Switches
231	Power Outlets
467	Grounding and Bonding Equipment
498	Attachment Plugs and Receptacles
943	Ground-Fault Circuit-Interrupters

PART 2 - PRODUCTS

2.1 RECEPTACLES

- A. General: All receptacles shall be listed by Underwriters Laboratories, Inc., and conform to NEMA WD 6.

1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four min.) and side wiring from four captively held binding screws.

- B. Duplex Receptacles: Heavy Duty grade, single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 6. The duplex type shall have break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.

1. Bodies shall be ivory in color.
2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The remaining receptacle shall be unswitched.

3. Duplex Receptacles on Emergency Circuit:
 - a. In rooms without emergency powered general lighting, the emergency receptacles shall be of the self-illuminated type.
 4. Ground Fault Interrupter Duplex Receptacles: Shall be an integral unit, suitable for mounting in a standard outlet box.
 - a. Ground fault interrupter shall be consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. Device shall have nominal sensitivity to ground leakage current of five milliamperes and shall function to interrupt the current supply for any value of ground leakage current above five milliamperes (+ or – 1 milliamp) on the load side of the device. Device shall have a minimum nominal tripping time of 1/30th of a second.
 5. Safety Type Duplex Receptacles:
 - a. Bodies shall be gray in color.
 - 1) Shall permit current to flow only while a standard plug is in the proper position in the receptacle.
 - 2) Screws exposed while the wall plates are in place shall be the standard type.
 6. Duplex Receptacles: Shall be the same as follows.
 - a. Bodies shall be brown phenolic compound supported by a plated steel mounting strap having plaster ears.
- C. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete with appropriate cord grip plug. Devices shall meet UL 231.
- D. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged in-use flap. The weatherproof integrity shall not be affected when heavy duty specification attachment plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.
- E. TVSS Receptacles. Shall comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 1449, with integral TVSS in line to ground, line to neutral, and neutral to ground.
1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 volts and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
 2. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

2.2 TOGGLE SWITCHES

- A. Toggle Switches: Shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles shall be ivory in color unless otherwise specified. The rocker type switch is acceptable.
1. Switches installed in hazardous areas shall be explosion proof type in accordance with the NEC and as shown on the drawings.

2. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plaster ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
3. Ratings:
 - a. 120 volt circuits: 20 amperes at 120-277 volts AC.
 - b. 277 volt circuits: 20 amperes at 120-277 volts AC.

2.3 MANUAL DIMMING CONTROL

- A. Slide dimmer with on/off control, single-pole or three-way as shown on plans. Faceplates shall be ivory in color unless otherwise specified.
- B. Manual dimming controls shall be fully compatible with electronic dimming ballasts and approved by the ballast manufacturer, shall operate over full specified dimming range, and shall not degrade the performance or rated life of the electronic dimming ballast and lamp.

2.4 WALL PLATES

- A. Wall plates for switches and receptacles shall be type 302 stainless steel. Oversize plates are not acceptable.
- B. Color shall be ivory unless otherwise specified. Coordinate color with Architect before ordering.
- C. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD 6.
- D. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- E. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.
- F. Duplex Receptacles on Emergency Circuit:
 1. Bodies shall be red in color. Wall plates shall be red with the word "EMERGENCY" engraved in 1/4 inch white letters.

2.5 SURFACE MULTIPLE-OUTLET ASSEMBLIES

- A. Assemblies shall conform to the requirements of NFPA 70 and UL 5.
- B. Shall have the following features:
 1. Enclosures:

- a. Thickness of steel shall be not less than 0.040 inch steel for base and cover. Nominal dimension shall be 1-1/2 by 2-3/4 inches with inside cross sectional area not less than 3.5 square inches. The enclosures shall be thoroughly cleaned, phosphatized and painted at the factory with primer and the manufacturer's standard baked enamel or lacquer finish.
2. Receptacles shall be duplex, general duty. See paragraph 'RECEPTACLES' in this section. Device cover plates shall be the manufacturer's standard corrosion resistant finish and shall not exceed the dimensions of the enclosure.
3. Unless otherwise shown on drawings, spacing of the receptacles along the strip shall be 24 inches [600mm] on centers.
4. Wires within the assemblies shall be not less than No. 12 AWG copper, with 600 volt ratings.
5. Installation fittings shall be designed for the strips being installed including bends, offsets, device brackets, inside couplings, wire clips, and elbows.
6. Bond the strips to the conduit systems for their branch supply circuits.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC and as shown as on the drawings.
- B. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the green equipment grounding conductor.
- C. Outlet boxes for light and dimmer switches shall be mounted on the strike side of doors.
- D. Provide barriers in multi-gang outlet boxes to separate systems of different voltages, Normal Power and Emergency Power systems, and in compliance with the NEC.
- E. Coordinate with other work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other work. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material. Pay special attention to installations in cabinet work, and in connection with laboratory equipment.
- F. Exact field locations of floors, walls, partitions, doors, windows, and equipment may vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Contractor shall coordinate exact field location of the above items with other trades. In addition, check for exact direction of door swings so that local switches are properly located on the strike side.
- G. Install wall switches 48 inches above floor, OFF position down.
- H. Install wall dimmers 48 inches above floor; derate ganged dimmers as instructed by manufacturer; do not use common neutral.

- I. Install convenience receptacles 18 inches above floor, and 6 inches above counter backsplash or workbenches. Install specific-use receptacles at heights shown on the drawings.
- J. Label device plates with a permanent adhesive label listing panel and circuit feeding the wiring device.
- K. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.
- L. Test GFCI devices for tripping values specified in UL 1436 and UL 943.

END OF SECTION 26 27 26

**SECTION 26 43 13
SURGE PROTECTIVE DEVICES**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of Type 2 Surge Protective Devices, as defined in NFPA 70, and indicated as transient voltage surge suppression or TVSS in this section.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 23 00, LOW-VOLTAGE SWITCHGEAR: For factory-installed or external TVSS.
- C. Section 26 24 13, DISTRIBUTION SWITCHBOARDS: For factory-installed or external TVSS.
- D. Section 26 24 16, PANELBOARDS: For factory-installed or external TVSS.
- E. Section 26 26 00, POWER DISTRIBUTION UNITS FOR STATIC UNINTERRUPTIBLE POWER SYSTEMS: For factory-installed or external TVSS.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - 1. Shop Drawings:
 - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
 - b. Include electrical ratings and device nameplate data.
 - 2. Manuals:
 - a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering replacement parts.
 - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.
 - a. Certification by the manufacturer that the TVSS conforms to the requirements of the drawings and specifications.
 - b. Certification by the Contractor that the TVSS has been properly installed.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplement and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Institute of Engineering and Electronic Engineers (IEEE):
 - IEEE C62.41.2-02 Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
 - IEEE C62.45-03 Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits
- C. National Fire Protection Association (NFPA):
 - 70-11 National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
 - UL 1283-05 Electromagnetic Interference Filters
 - UL 1449-06 Surge Protective Devices

SPEC WRITER NOTE: Delete between // ---- // if not applicable to project. Also delete any other item or paragraph not applicable to the section and renumber the paragraphs.

PART 2 - PRODUCTS

2.1 SWITCHGEAR/SWITCHBOARD TVSS

- A. General Requirements:
 1. Comply with IEEE and UL.
 2. Modular design with field-replaceable modules, or non-modular design.
 3. Fuses, rated at 200 kA interrupting capacity.
 4. Bolted compression lugs for internal wiring.
 5. Integral disconnect switch.
 6. Redundant suppression circuits.
 7. LED indicator lights for power and protection status.
 8. Audible alarm, with silencing switch, to indicate when protection has failed.

9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
 10. Four-digit transient-event counter.
- B. Surge Current per Phase: Minimum 240kA per phase.

2.2 PANELBOARD TVSS

- A. General Requirements:
1. Comply with UL 1449 and IEEE C62.41.2.
 2. Modular design with field-replaceable modules, or non-modular design.
 3. Fuses, rated at 200 kA interrupting capacity.
 4. Bolted compression lugs for internal wiring.
 5. Integral disconnect switch.
 6. Redundant suppression circuits.
 7. LED indicator lights for power and protection status.
 8. Audible alarm, with silencing switch, to indicate when protection has failed.
 9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
 10. Four-digit transient-event counter.
- B. Surge Current per Phase: Minimum 120kA per phase.

2.3 ENCLOSURES

- A. Enclosures: NEMA 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Factory-installed TVSS: Switchgear, switchboard, or panelboard manufacturer shall install TVSS at the factory.
- B. Field-installed TVSS: Contractor shall install TVSS with conductors or buses between TVSS and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
1. Provide a circuit breaker as a dedicated disconnecting means for TVSS as shown on drawings.

- C. Do not perform insulation resistance tests on switchgear, switchboards, panelboards, or feeders with the TVSS connected. Disconnect TVSS before conducting insulation resistance tests, and reconnect TVSS immediately after insulation resistance tests are complete.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests:
 - a. Compare equipment nameplate data with specifications and approved shop drawings.
 - b. Inspect physical, electrical, and mechanical condition.
 - c. Verify that disconnecting means and feeder size and maximum length to TVSS corresponds to approved shop drawings.
 - d. Verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method.
 - e. Vacuum-clean enclosure interior. Clean enclosure exterior.
 - f. Verify the correct operation of all sensing devices, alarms, and indicating devices.

3.3 FOLLOW-UP VERIFICATION

- A. After completion of acceptance checks and tests, the Contractor shall show by demonstration in service that TVSS are in good operating condition and properly performing the intended function.

3.4 INSTRUCTION

- A. Provide the services of a factory-trained technician for one 2-hour training period for instructing personnel in the maintenance and operation of the TVSS, on the date requested by the Owner.

---END---

**SECTION 26 51 00
INTERIOR LIGHTING**

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies the furnishing, installation and connection of the interior lighting systems.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General requirements that are common to more than one section of Division 26.
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.
- D. Section 26 27 26, WIRING DEVICES: Wiring devices used for control of the lighting systems.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:
- B. Product Data: For each type of lighting fixture (luminaire) designated on the LIGHTING FIXTURE SCHEDULE, arranged in order of fixture designation, submit the following information.
 - 1. Material and construction details include information on housing, optics system and lens/diffuser.
 - 2. Physical dimensions and description.
 - 3. Wiring schematic and connection diagram.
 - 4. Installation details.
 - 5. Energy efficiency data.

6. Photometric data based on laboratory tests complying with IESNA Lighting Measurements, testing and calculation guides.
 7. Lamp data including lumen output (initial and mean), color rendition index (CRI), rated life (hours) and color temperature (degrees Kelvin).
 8. Ballast data including ballast type, starting method, ambient temperature, ballast factor, sound rating, system watts and total harmonic distortion (THD).
- C. Manuals:
1. Submit, simultaneously with the shop drawings companion copies of complete maintenance and operating manuals including technical data sheets, and information for ordering replacement parts.
 2. Two weeks prior to the final inspection, submit four copies of the final updated maintenance and operating manuals, including any changes, to the Engineer.
- D. Certifications:
1. Two weeks prior to final inspection, submit four copies of the following certifications to the Engineer:
 - a. Certification by the Contractor that the equipment has been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. Institute of Electrical and Electronic Engineers (IEEE):
- | | |
|-----------|--|
| C62.41-91 | Guide on the Surge Environment in Low Voltage (1000V and less) AC Power Circuits |
|-----------|--|
- C. National Fire Protection Association (NFPA):
- | | |
|-----|--------------------------------|
| 70 | National Electrical Code (NEC) |
| 101 | Life Safety Code |
- D. National Electrical Manufacturer's Association (NEMA):
- | | |
|-----------|---|
| C82.1-97 | Ballasts for Fluorescent Lamps - Specifications |
| C82.2-02 | Method of Measurement of Fluorescent Lamp Ballasts |
| C82.4-02 | Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps |
| C82.11-02 | High Frequency Fluorescent Lamp Ballasts |
- E. Underwriters Laboratories, Inc. (UL):
- | | |
|---------|--|
| 496-96 | Edison-Base Lampholders |
| 542-99 | Lampholders, Starters, and Starter Holders for Fluorescent Lamps |
| 844-95 | Electric Lighting Fixtures for Use in Hazardous (Classified) Locations |
| 924-95 | Emergency Lighting and Power Equipment |
| 935-01 | Fluorescent-Lamp Ballasts |
| 1029-94 | High-Intensity-Discharge Lamp Ballasts |

1029A-06.....	Ignitors and Related Auxiliaries for HID Lamp Ballasts
1598-00.....	Luminaires
1574-04.....	Standard for Track Lighting Systems
2108-04.....	Standard for Low-Voltage Lighting Systems
8750-08.....	Light Emitting Diode (LED) Light Sources for Use in Lighting Products

- F. Federal Communications Commission (FCC):
Code of Federal Regulations (CFR), Title 47, Part 18

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES (LUMINAIRES)

- A. Shall be in accordance with NFPA 70 and UL 1598, as shown on drawings, and as specified.
- B. Sheet Metal:
 1. Shall be formed to prevent warping and sagging. Housing, trim and lens frame shall be true, straight (unless intentionally curved) and parallel to each other as designed.
 2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
 3. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner.
 4. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, latches shall function easily by finger action without the use of tools.
- C. Ballasts shall be serviceable while the fixture is in its normally installed position, and shall not be mounted to removable reflectors or wireway covers unless so specified.
- D. Lamp Sockets:
 1. LED drivers as specified in the Lighting Fixture Schedule.
- E. Recessed fixtures mounted in an insulated ceiling shall be listed for use in insulated ceilings.
- F. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, captive hinges or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.
- G. Metal Finishes:
 1. The manufacturer shall apply standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping or shearing processes shall be finished in a similar

corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking, and shall be applied after fabrication.

2. Interior light reflecting finishes shall be white with not less than 85 percent reflectances, except where otherwise shown on the drawing.
 3. Exterior finishes shall be as shown on the drawings.
- H. Lighting fixtures shall have a specific means for grounding metallic wireways and housings to an equipment grounding conductor.
- I. Lighting fixtures in hazardous areas shall be suitable for installation in Class and Group areas as defined in NFPA 70, and shall comply with UL 844.
- J. Compact fluorescent fixtures shall be manufactured specifically for compact fluorescent lamps with ballast integral to the fixture. Assemblies designed to retrofit incandescent fixtures are prohibited except when specifically indicated for renovation of existing fixtures (not the lamp). Fixtures shall be designed for lamps as specified.

2.2 EMERGENCY LIGHTING UNIT

- A. Complete, self-contained unit with batteries, battery charger, one or more local or remote lamp heads with lamps, under-voltage relay, and test switch. Comply with UL 924.
1. Enclosure: Shall be impact-resistant thermoplastic, which will protect components from dust, moisture, and oxidizing fumes from the battery. Enclosure shall be suitable for the environmental conditions in which installed.
 2. Lamp Heads: Horizontally and vertically adjustable, mounted on the face of the unit, except where otherwise indicated.
 3. Lamps: Shall be sealed-beam MR-16 halogen, rated not less than 12 watts at the specified DC voltage.
 4. Battery: Shall be maintenance-free nickel-cadmium. Minimum normal life shall be 10 years.
 5. Battery Charger: Dry-type full-wave rectifier with charging rates to maintain the battery in fully-charged condition during normal operation, and to automatically recharge the battery within 12 hours following a 1-1/2 hour continuous discharge.
 6. Integral Self-Test: Automatically initiates test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing LED.

2.3 LAMPS

- A. LED arrays as specified in the Lighting Fixture Schedule.

2.4 EXIT LIGHT FIXTURES

- A. Exit light fixtures shall meet applicable requirements of NFPA 101 and UL 924.
- B. Housing and Canopy:

1. Shall be made of polycarbonate thermoplastic.
 2. Optional steel housing shall be a minimum 20 gauge thick or equivalent strength aluminum.
 3. Steel housing shall have baked enamel over corrosion resistant, matte black or ivory white primer.
- C. There shall be no radioactive material used in the fixtures.
- D. Fixtures:
1. Maximum fixture wattage shall be 1 watt or less.
 2. Inscription panels shall be cast or stamped aluminum a minimum of 0.090 inch [2.25mm] thick, stenciled with 6 inch [150mm] high letters, baked with red color stable plastic or fiberglass. Lamps shall be luminous Light Emitting Diodes (LED) mounted in center of letters on red color stable plastic or fiberglass. The LED shall be rated minimum 25 years life.
 3. Double-Faced Fixtures: Provide double-faced fixtures where required or as shown on drawings.
 4. 4.Directional Arrows: Provide directional arrows as part of the inscription panel where required or as shown on drawings. Directional arrows shall be the "chevron-type" of similar size and width as the letters and meet the requirements of NFPA 101.
- G. Voltages: Refer to Lighting Fixture Schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC, manufacturer's instructions and as shown on the drawings or specified.
- B. Align, mount and level the lighting fixtures uniformly.
- C. Fluorescent bed light fixtures shall be attached to the studs in the walls. Attachment to gypsum board only is not acceptable.
- D. Lighting Fixture Supports:
1. Shall provide support for all of the fixtures. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
 2. Shall maintain the fixture positions after cleaning and relamping.
 3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
 4. Hardware for recessed fluorescent fixtures:
 - a. Where the suspended ceiling system is supported at the four corners of the fixture opening, hardware devices shall clamp the fixture to the ceiling system structural members, or plaster frame at not less than four points in such a manner as to resist spreading of the support members and safely lock the fixture into the ceiling system.

- b. Where the suspended ceiling system is not supported at the four corners of the fixture opening, hardware devices shall independently support the fixture from the building structure at four points.
 - 5. Hardware for surface mounting fluorescent fixtures to suspended ceilings:
 - a. In addition to being secured to any required outlet box, fixtures shall be bolted to a grid ceiling system at four points spaced near the corners of each fixture. The bolts shall be not less than 1/4 inch [6mm] secured to channel members attached to and spanning the tops of the ceiling structural grid members. Non-turning studs may be attached to the ceiling structural grid members or spanning channels by special clips designed for the purpose, provided they lock into place and require simple tools for removal.
 - b. In addition to being secured to any required outlet box, fixtures shall be bolted to ceiling structural members at four points spaced near the corners of each fixture. Pre-positioned 1/4 inch [6mm] studs or threaded plaster inserts secured to ceiling structural members shall be used to bolt the fixtures to the ceiling. In lieu of the above, 1/4 inch [6mm] toggle bolts may be used on new or existing ceiling provided the plaster and lath can safely support the fixtures without sagging or cracking.
- E. Furnish and install the specified lamps for all lighting fixtures installed.
- F. Coordinate between the electrical and ceiling trades to ascertain that approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed.
- G. Bond lighting fixtures and metal accessories to the grounding system as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- H. Exercise electronic dimming ballasts over full range of dimming capability by operating the control devices(s) in the presence of the Engineer. Observe for visually detectable flicker over full dimming range.
- I. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by County. Burn-in period to be 40 hours minimum, unless a lesser period is specifically recommended by lamp manufacturer. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage. Replace any lamps and ballasts which fail during burn-in.
- J. At completion of project, repair/replace fixtures which have failed lamps/drivers. Clean fixtures, lenses, diffusers and louvers that have accumulated dust/dirt/fingerprints during construction. Replace damaged lenses, diffusers with new.

END OF SECTION 26 51 00

SECTION 09800 - FUELING SYSTEM PROTECTIVE COATINGS

PART 1 - GENERAL

1.1 SCOPE

This Section covers field and shop applied external corrosion protection coating for storage tanks, piping, fittings, and materials installed aboveground, along with internal linings (coatings) for piping and fittings. It also covers external painting for all structural steel, conduits, boxes, supports, etc., installed aboveground. Plating for bolting hardware is covered in Section 15060: Fueling System - Pipe and Fittings.

This Section includes, but is not limited to the following:

- A. Externally coat at the mill or shop, all aboveground fuel storage tanks, pipe, and fittings. Field applied coatings for welded joints only.
- B. Internally line at the mill or shop, all fuel storage tanks, pipe, and fittings 2-½ inches and larger.
- C. The Contractor shall be responsible for containing all fugitive emissions (fallout) generated by their work within the project site boundaries. Provide containment shelters as necessary.

1.2 QUALITY ASSURANCE

- A. General. The Coating Contractor shall submit a written coating report, completed daily at each phase of the coating process beginning with surface preparation. This information shall be submitted on the attached form, found at the end of this Section.
 - 1. Field and shop applied coatings and blast medium shall meet Federal and local VOC requirements.
 - 2. Any materials that may come in contact with the fuel shall be free of galvanizing, copper, and zinc. All materials, items, and components specified herein shall be certified by the manufacturer to be suitable for exposure or immersion, where applicable, in Jet-A and mixtures of Jet-A and water.
 - 3. Paint Systems shall be “Lead Free”, “Chromate Free”, and “Asbestos Free.”
 - 4. Mildew Resistance. Organic coatings shall pass fungus growth test as specified in Federal Test Method Standard No. 141B, Method 6271.1.
 - 5. Inspections. The Owner and Inspector shall at all times have access to the Work. The Contractor shall provide proper facilities for such access and inspection. The Owner reserves the right to inspect the Work at any time to verify compliance with all the requirements of these Specifications. The Owner reserves the right to approve each phase of the Work before any further Work may be done, to halt all Work deemed to be improper or not in compliance with these Specifications, and to require the Contractor to promptly correct all improper practices or deficient Work.

Inspections will include witnessing of specified testing and wet and/or dry film thickness gauging, visual surface inspection by the naked eye and/or suitable magnifying instrument to detect runs, sags, drips, cracks or other defects in the coating system. Inspections may also include any other examination of the prepared surfaces or coating system deemed necessary by the Owner including random destructive testing and coating

adhesion checks.

- a. **Dry Film Thickness Readings.** Dry film thickness (DFT) readings of the coating are taken to provide reasonable assurance that the specified minimum DFT has been achieved. DFT readings shall be made in accordance with SSPC-PA2, Measurement of Dry Paint Thickness with Magnetic Gauges. A minimum of five (5) separate spot measurements shall be made over every 100 square feet in area. Each spot measurement shall consist of an average of three (3) gauge readings next to each other, no further than six (6) inches apart. Each spot measurement (average) must be within the specified minimum thickness; however, a single gauge readings making up the spot measurement is permitted to be not less than 80 percent of the specified minimum thickness. If film thickness is not found to be uniform and to specification, the Contractor shall be required apply additional coats at no cost to the Owner until the specified film thickness has been obtained. Dry film thickness is to be checked in the shop prior to shipment by the Contractor at his expense by the Independent Testing and Inspection firm.
- b. **Equipment.** The Contractor shall provide all necessary inspection equipment (at the discretion of the Owner), labor, rigging, lighting and other equipment to facilitate the inspection.
- c. **Expenses.** Any expenses incurred for corrective measures required as the result of improper practices and/or defective or deficient work shall be borne by the Contractor and the extent of these corrective measures shall be at the discretion of the Owner.

6. The Contractor shall secure the services of an approved Independent Testing and Inspection Laboratory or Manufacturer's Technical Representative to witness the application and testing and to certify that the pipe and fittings were prepared, cleaned and coated using methods and materials conforming to these Specifications.

Shop coating inspection shall be performed by an approved National Association of Corrosion Engineers (NACE) Certified Coatings Inspector. Inspection and testing reports shall be submitted to the Owner for review and approval prior to shipment of materials. After review of inspection and testing reports, the Owner will release materials for shipment.

7. All applications shall be in accordance with the manufacturer's published instructions. Materials used shall be listed as approved on the current Federal Quality Products List.
8. The ends of the pipe shall be capped using suitable plastic cap secured with a double wrap of 2-inch wide pressure sensitive tape. Maintain caps at all times until trench installation. Refer to Section 15060: Fueling System - Pipe and Fittings.
9. If, in the opinion of the Owner or Inspector, the coatings show ridges, waves runs or holidays indicating uneven coverage or improper application the Contractor shall be required to remove and reapply the coating at no cost to the Owner.

- B. **Coating Contractor Qualifications.** Coating Contractor shall be certified by the coating, lining and painting system manufacturer and shall submit documentation that the manufacturer will warrant the applied system.

All fueling system coating applications shall be by companies that have previously applied the specified coating systems on aboveground storage tanks and fueling systems.

1. All work done shall be performed by a company that has at least ten (10) years

experience, WITH COMPANY'S WORKFORCE, applying the specified coating systems.

2. Prior to any activity under this specification section and no later than fifteen (15) days before NTP, the Contractor shall provide a listing of jobs of similar nature required in this project which the company has performed which would qualify them to perform work under this specification section.

The Contractor shall submit the following information to the Owner for approval:

- a. The Contractor's address and description of business.
 - b. Years in business.
 - c. A list of the equipment owned by the Contractor that will be utilized in completing the work.
 - d. Bonding reference, name, address, and telephone number.
 - e. The Contractor's performance record over the past four (4) years, or the description and location of at least four (4) equivalent projects satisfactorily constructed by the Contractor, which includes location, description of work, Owner name and telephone number.
 - f. The technical experience of the employee in responsible charge of the work.
 - g. A list of three recent similar projects performed under the direction of a Professional Engineer or Registered Architect. The list should contain the names of the firms, the addresses, telephone numbers, and project contact names.
 - h. A list of three material suppliers, their names, addresses, and telephone numbers.
 - i. Such additional information as will assist the Owner in determining whether the Contractor is adequately prepared to fulfill the Contract(s).
3. The Contractor shall submit evidence that they have practical knowledge of the particular work bid upon and that they have a performance bond in the amount required to complete the proposed work. Failure on the part of any Contractor to carry out previous contracts satisfactorily, or his lack of experience or equipment necessary for the satisfactory and timely completion of these projects, may be deemed sufficient cause for disqualification of said Contractor. The Contractor shall readily and independently document that he possesses the experience, equipment and financial resources for a timely and professional completion of these projects.

- C. The coating system shall be warranted for a ten (10) year period.

1.3 REQUIRED SUBMITTALS

Submittals for equipment and materials specified herein are required. Format for submittals on materials and equipment shall be as specified in the MAA Standard Provisions.

- A. Submit manufacturer's product data and application instructions for all coatings, linings, and paint.
- B. Submit reports from an approved Independent Testing and Inspection Laboratory and Manufacturer's Technical Representative as specified herein.
- C. Submit on all materials and equipment including, but not limited to, the following items:
 1. Coating manufacturer's name with item code numbers for specified coatings to be used.

2. Color charts of materials to the Owner for selection and acceptance. One copy of data on selections to be at job site for reference.
3. Technical product data and Material Safety Data Sheets on each coating and diluent to be used.

D. Submit Coating Contractor qualifications.

1.4 MAINTENANCE MATERIALS

Turn over to the system operator not less than one unopened gallon of each product and color used. Containers shall be tightly sealed and clearly labeled for identification.

1.5 REFERENCE STANDARDS

The contractor shall comply with applicable provisions of the latest edition of the codes listed in Section 15000: Fueling System - Basic Mechanical Requirements.

PART 2 - PRODUCTS

2.1 GENERAL

Materials furnished for each coating system must be compatible to the substrate. When shop-applied surfaces are to be coated, ascertain whether finish materials will be compatible with shop coating. Inform the Owner of any unsuitable substrate or coating conditions. Start of work by applicator will signify acceptance of surface to be painted.

2.2 SHOP-APPLIED EXTERNAL PROTECTIVE COATING

- A. General. Fuel storage tanks, all fuel piping and forged fittings shall have an external coating system applied in the manufacturer's mill. Pipe weld joints, remaining fittings, flanges, and equipment requiring field applied coatings shall be as described in Paragraph 2.4 below.

The Contractor shall secure the services of an Independent Testing and Inspection Laboratory to witness the coating application and testing and to certify that the surfaces were prepared, cleaned, and coated using methods and materials conforming to the Specifications.

Shop coating inspection shall be performed by a National Association of Corrosion Engineer (NACE) Certified Coatings Inspector, provided by the Contractor. Inspection and testing reports are to be submitted to the Owner for review and approval, prior to shipment of materials. After review of inspection and testing reports, the Owner will release materials for shipment.

The coating shall be Holiday tested in the shop prior to shipment by a NACE Certified Coatings Inspector, provided by the Contractor, and shall be certified to be Holiday free in accordance with NACE RP0490-95.

In addition to shop testing, Holiday test all exposed coatings as specified in Section 15150 – Flushing, Testing and Flushing.

- B. Coating System. Coating system shall meet the following specifications:

1. Provide coating of aboveground storage tanks, aboveground piping, pipe supports, filter separators, and miscellaneous metal and equipment. Color of finish coat shall be white. Do not paint stainless steel, galvanized or aluminum surfaces.
2. Storage tank and piping coating system shall be an epoxy-polyamide coating system consist of two components that includes a pigmented polyamide resin portion (A component) and an epoxy resin portion (B component). Once they are mixed together and applied as a paint film, the coating cures to a hard film by chemical reaction between the epoxy and polyamide resins. Epoxy-polyamide coating (MIL-P-24441/GEN) consists of individual formulations, for example, Formula 150 is for green primer, and Formula 152 is for white topcoat.
3. Surfaces shall be abrasive-blasted, in accordance with SSPC SP-10-85, Near-White Metal Blast Cleaning, blast profile height shall be in accordance with manufacturers recommendations and SSPC Standards. Before any primer or coating is applied, metal surfaces shall be completely dry, dust free, inspected and approved by the Owner or Independent NACE Coatings Inspector.
4. Abrasive-blasting shall be coordinated with coating application which shall be applied as soon as possible after blasting. If blasted surface remains uncoated overnight, it shall be reblasted.
5. Care shall be taken to prevent grease, oil, or other organic matter from contacting the blasted surface prior to application of the prime coat.
6. All weld splatters, burrs and rough protrusions on the outer surface of the pipe shall be ground smooth prior to coating.
7. Apply coating to a uniform thickness per the Manufacturer's recommendations but not less than 12 mils DFT.
8. Procedures for taking the dry film thickness (DFT) readings of the coatings shall be as specified under Quality Assurance in this section. If film thickness is not found to be uniform and to specification, the Contractor shall be required to apply additional coats at no cost to the Owner until the specified film thickness has been obtained. Dry film thickness is to be checked in the shop prior to shipment by the Contractor at his expense by the Independent Testing and Inspection firm.
9. Provide a 3-inch cut back from each end.
10. If, in the opinion of the NACE Certified Coatings Inspector, the coatings show ridges, waves, runs of Holidays indicating uneven coverage or improper application, the Contractor shall be required to remove and reapply the coating at no cost to the Owner.
11. The ends of the pipe shall be capped using suitable plastic caps secured with a double wrap of 2-inch wide pressure sensitive tape.

2.3 SHOP-APPLIED INTERNAL EPOXY LINING

- A. General. Storage tanks, all fuel piping, and pipe fittings 2-½ inches and larger in size, shall be internally coated in the pipe manufacturer's mill or in the shop of an approved internal epoxy Applicator.

All applications shall be in accordance with the Manufacturer's published instructions. Materials used shall be listed as approved on the current federal Quality Products List (QPL). VOC content shall be in accordance with local and federal regulations. Coating systems shall not contain asbestos, lead, chromates, zinc, copper or galvanizing compounds.

The Contractor shall secure the services of an Independent Testing and Inspector Laboratory to witness the lining application and testing and to certify that the surfaces were prepared, cleaned and lined using methods as materials conforming with these Specifications. Shop coating inspection shall be performed by a National Association of Corrosion Engineers (NACE)

Certified Coatings Inspector. Inspection and testing reports are to be submitted to the Owner for review and approval, prior to shipment of material. After review of inspection and testing reports, the Owner will release materials for shipment.

B. Lining System.

1. Interior epoxy coating system shall be factory applied in accordance with API 5L7 using material complying with MS MIL-C-4556, Coating Kit, Epoxy for Interior of Steel Fuel Tanks, six to eight mils dry film thickness. Materials shall be a two component, chemically cured, epoxy system. The shop doing the application shall have a minimum of 5 years of experience at applying internal epoxy coating.
2. Remove all grease or oil by thorough cleaning using as oil-free solvent.
3. Abrasive-blast steel surfaces to “white” metal with a nominal profile height in accordance with Manufacturer’s recommendation and SSPC-SP-5-85: White Metal Blasting Specification. No rust preventative coating material or other temporary coating shall be applied after abrasive-blasting and before application of the internal epoxy coating. Care shall be taken to prevent grease, oil, or other organic matter from contacting the blasted surface prior to application of the prime coat. Blasting shall be coordinated with primer application which shall be applied as soon as possible after blasting. If the blasted surface remains uncoated overnight, it shall be reblasted. Before any primer or coating is applied, metal surfaces shall be completely dry, dust free, inspected, and approved by the Owner or Independent NACE Coatings Inspector.
4. The ends of the pipe and fittings shall have the paint wiped back 2-inches with cloth or other approved absorbent material. Masking the ends will not be acceptable as a thin film of paint is desired to prevent rust until installation of the material.
5. Apply primer coat of the two-component epoxy system. Color shall be beige, yellow or ivory. The thickness of the cured primer shall be not less than 4 mils, but shall not exceed the Manufacturer’s recommendation.
6. The prime coat shall be allowed to cure in accordance with manufacturer's recommendation for immersion service.
7. Apply top coat of a two-component epoxy system. Top coat color shall be white. The cured thickness of the top coat shall be not less than 4 mils, and shall not exceed the Manufacturer’s recommendations.
8. After the top coat has been cured in accordance with manufacturer's recommendation for immersion service in Jet-A, the internal epoxy lining shall be tested electrically using as approved Holiday detector and shall be free of missed spots, pinholes or Holidays, in accordance with NACE RP0188-90. Apply additional primer and top coats to areas requiring touch-up.
9. Procedures for taking the dry film thickness (DFT) readings of the coatings shall be as specified under Quality Assurance in this Section. If film thickness is not found to be uniform and to specification, the Contractor shall be required to apply additional coats at no cost to the Owner until specified film thickness has been obtained. Dry film thickness is to be checked in the shop prior to shipment by the Contractor at their expense by the Independent Testing and Inspector firm.
10. If, in the opinion of the NACE Certified Coatings Inspector, the coating shows ridges, waves, runs or Holidays indicating uneven coverage or improper application, the Contractor shall be required to remove and reapply the coating at no cost to the Owner.
11. The ends of the pipe shall be capped using suitable plastic caps secured with a double wrap of 2-inch wide pressure sensitive tape.

2.4 FIELD-APPLIED EXTERNAL PROTECTIVE COATING

- A. General. All non-shop coated fittings, flanges, and equipment field welds, areas of thermite welding, and where the shop coat has been damaged, shall receive a field-applied external protective coating as follows:
- B. Coating Procedure. Coating with two part Liquid Epoxy-Polyamide System as specified herein.
 - 1. Remove oil and grease with a suitable solvent.
 - 2. Clean equipment, pipe and fittings thoroughly of all loose scale, mud, dirt, or loose rust to SSPC SP-3. Surface profile shall be in accordance with manufacturer recommendations and SSPC Standards.
 - 3. Grind smooth all burrs and sharp protrusions.
 - 4. Pipe surface must be dry before applying the coating system.
 - 5. Apply the coating in such a manner as to not damage existing pipe surfaces.
 - 6. Total DFT shall be a minimum of 20 mils.
 - 7. All work shall be in accordance with Manufacturer's published instructions.
 - 8. Holiday test in accordance with NACE RP0188-90.

PART 3 - EXECUTION

3.1 COATING REPAIRS

Repair all damages to coating systems before holiday testing. Repair of piping internal epoxy lining at field welds is not required. Repair all cuts, breaks, voids, bruised or scarred spots, and any other damage caused prior to delivery, or resulting from handling or installation of the pipe and fittings, or from any cause whatsoever.

Repair the coating where welds are made and where the coating is damaged or broken by the installation of instrumentation or other accessories or appurtenances. Perform all repairs in accordance with the requirements specified under the section entitled: Field-Applied External Protective Coating. Repairs to shop-applied coating shall provide a thickness equal to or greater than the factory applied coating.

3.2 FACTORY COATINGS

Perform adhesion and solvent testing on equipment factory coating to verify suitability for exposure and immersion where applicable in Jet-A fuel. Remove any coatings that do not pass the testing and coat and line as specified in this section.

3.3 IDENTIFICATION

- A. Refer to Section 15190 for additional identification information.
- B. Letter Size. Block-style letters, all capitals, shall match existing.

3.4 INSPECTION

Use wet film gauges to verify each application coating at approximate 15 minute intervals. Immediate correct excessive or insufficient wet film thicknesses. Use dry film gauge to verify dry film thickness for each coat, and for the total system. Periodically check relative humidity and temperature limits with a sling psychrometer. Check substrate temperature at regular intervals to ensure surface is 5 degrees F or more above the dew point.

3.5 TESTING

In addition to testing specified elsewhere in this Section, Holiday test all external underground pipe coating, in accordance with the manufacturer requirements. Coatings shall be Holiday tested in the shop prior to shipment by a NACE Certified Coatings Inspector, provided by the Contractor, and shall be certified to be Holiday free in accordance with NACE RP0490-95. In addition to shop testing, Holiday test all exposed coatings and after installation in accordance with the applicable requirements of Section 15150: Fueling System - Inspection, Flushing and Testing.

3.6 WORKMANSHIP

- A. All Work of this Contract shall be done in a workmanlike manner, by skilled personnel experienced in the particular type of work being performed. The coating shall be performed in a manner satisfactory to the Owner and using approved methods, acceptable tools and practices.
- B. Working Conditions. Proceed with surface preparation and coating application only when air and surface temperatures are above the manufacturers recommended minimum surface temperature in degrees F and below 100 degrees F, and surface temperature is at least 5 degrees above dew point reading. Coating shall not be applied to dusty, wet, or damp surfaces, and shall not be applied in rain, snow, fog or mist, or when relative humidity exceeds 85 percent. No coating shall be applied when the air temperature will drop below 55 degrees F within eight (8) hours after the application of the coating. If working conditions are questionable, the Owner shall make the decision and the Contractor shall accept the Owner's interpretation as final and binding.

No surface preparation or coating application work shall be done under unfavorable weather conditions, unless the work is adequately protected, and then only with the specific approval of the Owner.

The Owner, through the Owner's representative or resident on-site inspector, intends to monitor temperature and humidity to insure Contractor's compliance with the listed conditions.

The Contractor shall record the relative humidity, air temperature, and surface temperature upon commencement and completion of coating application for each day said work is undertaken. The daily log shall be submitted to the Owner or resident on-site Inspector for comparison with the Owner's data and verification of compliance.

- C. Each coat shall be applied at the specified rate and in the manner recommended by the coating manufacturer and it shall be well worked into the surface to which applied. No laps or brush marks shall show. The film thickness of the coatings will be measured and any readings below the specified film thickness shall be corrected by applying an additional coat(s). Where thinning is necessary, only the products of the manufacturer furnishing the coating, and for that particular purpose, shall be allowed. All thinning shall be done strictly in accordance with the manufacturer's instructions, as well as with the full knowledge and approval of the Owner. Dry film thickness will be measured by means of the Positector Series 6000-F1, Type 2, fixed, single probe gauge as manufactured by the DeFelsko Corporation of Ogdensburg, New York or equivalent; and measurements of wet mil thickness will be accomplished by use of the Nordson wet film gauge or such other gauge as the Owner might determine as being satisfactory.
- D. Care shall be given to insure a uniform coating carefully worked with a brush around weld seams, scab marks, plate overlap, joints, and other irregularities in the surface. Each coat shall

be allowed to dry thoroughly before the next coat is applied as required by the coating manufacturer's written recommendations.

- E. If the lining is applied by spraying, use suitable nozzles to provide an adequate supply of air within the proper pressure range to the liquid in the container and to the atomizing nozzle, all as recommended by the coating and equipment manufacturers as being best suited or necessary for the production of good work. All necessary precautions must be taken to avoid spray fallout on and the consequent damage to any works, improvements, or properties of either the Owner or of other parties, wherever located. The Contractor shall be responsible for any and all damages resulting from drifting of the spray.
- F. **NO EXTERIOR SPRAY PAINTING WILL BE ALLOWED OUTSIDE OF ON-SITE CONTAINMENT SHELTER.** The exterior paint application shall be by brush and roller only. The Contractor shall take necessary precautions to avoid fallout on and the consequent damage to any works, improvements, or properties of either the Owner or of other parties, wherever located. The Contractor shall be responsible for any and all damage resulting from fallout of the paint, grindings or blast material. Provide canvas covers for vehicles parked in the surrounding areas and adjacent structures requiring protection from fallout.
- G. Brush applied coating shall be brushed on in one direction, and then smoothed in a direction at right angles thereto, so as to produce as uniform thickness of coating and as complete a coverage as possible. Such two-directional brushing shall be considered as one coat within the meaning of these Specifications.

3.7 DELIVERY AND STORAGE OF MATERIALS AND EQUIPMENT

- A. Delivery of Materials.
 - 1. Allow sufficient time for testing if required. Coordinate construction schedule with coating system shelf life. Allow a reasonable amount of time for anticipated weather related or construction related delays when ordering materials with limited shelf life.
 - 2. Deliver in sealed containers with labels and inscriptions legible and intact.
- B. Storage of Materials.
 - 1. Store only acceptable materials on project site.
 - 2. Provide separate area and suitable containers for storage of coating and related equipment.
 - 3. Do not apply any coatings until submittals have been approved.
 - 4. Legally dispose of any excess coating materials after work is complete.

COATING REPORTS

Unit _____ Identification _____

Project _____ Location _____ Date _____

Contractor _____ Foreman _____ Surface Prep _____

Profile: Spec _____; Obtained _____; Quality _____; Time Completed _____

Primer: Spec _____; Used _____; Air Temp _____ °F;

Surface _____ °F

Dew Point _____ °F; Dry Film: Spec _____ mils; Obtained _____ mils

Relative Humidity _____ % Time Completed _____

Field Touch-Up Contractor _____

Foreman _____ Date _____ Time _____ Air Temp _____ °F

Surface Temp _____ °F; Relative Humidity _____ %; Dew Point _____ °F

Spec Paint _____; Item Used _____; Dry Film: Spec _____ mils

Obtained _____ mils

Finish Coats: Contractor _____

Foreman _____ Date _____ Time _____ Air Temp _____ °F

Surface Temp _____ °F; Relative Humidity _____ %; Dew Point _____ °F

Spec Paint _____; Item Used _____; Dry Time before Recoat _____

Cure Time Allowed _____; Dry Film: Spec _____ mils; Obtained _____ mils

SECTION 15000 - FUELING SYSTEM BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

This section outlines the Contractor's responsibilities for the fueling system mechanical portion of this project, defines mechanical terms used in the Contract Documents and contains general requirements which govern the execution of the Aircraft Fueling System Specification Sections.

Installation to include all necessary apparatus, piping, and fittings herein described or called for on the Plans and Specifications and as necessary to make the installation complete. Consider the Plans and Specifications as supplementary, one to the other.

The Contractor shall submit an installation plan, coordinated with the project's phasing plan, for approval. The Contractor shall include all scheduling and phasing impacts in his bid price.

Work in this section includes, but not necessarily limited to, the following:

- A. Provide all materials, supervision, labor, tools, equipment, supplies, scaffolding and transportation required to execute the work specified herein and as indicated on the Plans. The Contractor shall include all labor and materials, including demolition, restoration, testing, and incidentals in his costs required to complete the contract.
- B. Install and place in successful operation and service the fueling system, miscellaneous piping systems, mechanical equipment and controls required by these Specifications and as indicated on the Plans.
- C. Provide mechanical systems which are completely installed, aligned, grouted, and adjusted, and are permanent, and of safe and satisfactory operation. Furnish and install components considered incidental, which may not be indicated in the Documents but are necessary for satisfactory operation of the system.
- D. Make all connections, except electrical power connections, necessary for the successful operation of the equipment. The Electrical Contractor shall perform electrical connections.
- E. Fit all apparatus, equipment, piping, etc., into the space provided at such time and in such a manner as to avoid damage to existing structures or property, and as required by the progress schedule.
- F. Cooperate and coordinate with the Owner and other trades in the scheduling of work, moving of material, delivery and location of anchor bolts, sleeves, etc.
- G. Submit all Fabrication Drawings, Product Data and Test Reports of materials and equipment to the Owner for approval in orderly sequence so as to not cause delays in the progress schedule.
- H. Interface the mechanical work of this contract with existing systems as required.
- I. Inspect, test and demonstrate the operation of the completed mechanical systems and instruct operator's personnel in its use.

- J. Obtain and pay for all permits, licenses, and easements, pay all fees and taxes, as required and noted in Specifications.
- K. Receive the approvals or acceptances from all authorities having jurisdiction over the work and deliver to the Owner all permits required.
- L. All equipment, materials, systems and appurtenances are subject to rigid inspection and approval by the Owner. Such approval shall not relieve the Contractor of the responsibility of furnishing materials and labor of the highest quality which are in strict compliance with code requirements and these Specifications. Materials, equipment, labor, or procedures rejected by the Owner shall be replaced or corrected by the Contractor at no charge to the Owner, including instances of late discovery of work not in compliance with the contract documents.

1.2 QUALITY ASSURANCE

- A. General. Conform with the Occupational Safety and Health Standards (OSHA) of the U.S. Department of Labor and all applicable ordinances, laws, regulations, and/or codes of the Local Authorities, the State of Florida, the National Fire Protection Association, Uniform Fire Codes, or any other governmental bodies having jurisdiction.

Provide mechanical work to the satisfaction of the Owner and inspecting authorities having jurisdiction.

Notify the Owner in writing of any instances in the Specifications or on the Plans that are in conflict with any of the aforementioned authorities; required changes to be adjusted before the Contract is awarded. If the Contractor performs any work contrary to such laws, rules, or regulations without notice, he shall bear all costs arising therefrom.

Deviations from the Plans and Specifications required for conformance with the applicable codes and laws are to be corrected immediately but not until such deviations have been brought to the attention of the Owner or authorized representative.

Applicable codes and laws to govern the minimum requirements only; where the Plans and Specifications call for materials, vents, piping, sizes, and other such information, in excess of the code requirements, the Contract Documents shall govern.

- B. Welder Qualifications. As specified in Section 15060: Pipe and Fittings.
- C. Mechanical Work Superintendent. Keep a competent superintendent and any necessary assistant satisfactory to the Owner or his authorized representative in charge during the progress of the work. Superintendent shall properly coordinate and time mechanical work with the work of other trades and in particular with electrical systems, concrete, masonry and form work to avoid errors and delay. Contractor shall pay cost involved due to failure to comply with these requirements or due to failure to acquaint themselves with the work and progress of other trades.

1.3 REQUIRED SUBMITTALS

All submittals shall be submitted and approved, unless otherwise stated, prior to fabrication or purchase of equipment.

Submittals shall include the drawing scale, general arrangement, physical description which clearly defines the item being submitted and a full scale nameplate, reproduced without color exactly as it will be manufactured.

Submittals shall include diagrams of wiring arrangements, actual arrangement of external connections as seen by the installer and terminal identification designation on actual product as well as diagrams for operation and control of work, including location and function of instrumentation and control devices.

A. Submittal Data: Shall be detailed with the following information:

1. Product name and model or catalog designation.
2. Manufacturer's name, telephone number, fax number and addresses.
3. Physical description, dimensions and weights.
4. Product properties, characteristics, capabilities and limitations.
5. Data for coordination with other project work.
6. Clear spaces required for handling, installing, operating and maintaining products.
7. Applicable reference standard designations.
8. Product specifications, including protective coatings.
9. Methods and details for anchorage to supporting construction.
10. Required installation clearances and tolerances, and the location and size of openings or sleeves necessary for installation.
11. Manufacturer's recommended spare parts data with costs for parts included.
12. Technical product data and Material Safety Data Sheets on materials.

B. Compliance Certificates. Compliance certificates shall be certified by issuing organization. Compliance certificates shall be submitted for the following, in addition to compliance certificates required by other sections of these specifications:

1. Mill Certifications and Welding Procedures and Certification: Submit qualified welding procedures and welder certifications as applicable for required type welding work, in accordance with Section 15060: Pipe and Fittings.
2. Products not of the manufacturer's standard design, modified to suit these requirements, manufacturer shall certify operating conditions, ratings, and capacity of the modified product(s).
3. Equipment bearing UL or FM Listing Mark.

C. Maintenance Products. The Contractor shall furnish maintenance products for mechanical work in accordance with the requirements of this Article.

All maintenance products shall be delivered to the Operator at completion of the work. Products shall be unloaded and placed in storage as directed. The following maintenance products shall be furnished in addition to maintenance products required by other sections of these specifications.

1. Special Tools: Two each of special tools required for servicing mechanical work.
2. Touch-Up Finish Paint: When major products are required to be factory finished, furnish one gallon of each type and color finish coat paint applied to product for field touch-up.

Furnish one gallon of identification Finish topcoat paint. Refer to Section 09800 - Protective Coatings.

- D. Product Data. The product data submitted shall consist of the manufacturer's specifications, recommendations and installation instructions for mechanical work products required by Division 15: Fueling System. The manufacturer's published data or certified laboratory test data indicating that each work product meets the specified requirements shall also be included. When required, product data shall be certified by product manufacturer. Data that affects design and construction of supporting structure, including maximum reactions imposed on supporting structures at each connection or bearing point, is to be submitted. Submittals format shall meet the requirements of this Article and the MAA Standard Provisions.
- E. Record (As-Built) Drawings:
 - 1. Maintain a complete and accurate record set of Drawings for the fuel system construction work.
 - 2. Record all work that is installed differently than shown on the Drawings.
 - 3. Upon completion of the work, make all changes on electronic file in AutoCAD format. Mark the Drawings ~RECORD DRAWINGS~ and submit them to the Project Manager when the electrical work is completed.
 - 4. Provide survey of pipe and fittings for location and final elevation for installed pipe.

1.4 DEFINITIONS

- A. Definitions related to mechanical work are as follows:
 - 1. Coating. An internal or external paint system, epoxy system, fusion bonded epoxy system applied to surface areas of ferrous metals for corrosion protection.
 - 2. Concealed. Hidden from sight within chases, or embedded in construction or buried underground, in the completed project.
 - 3. Contract Documents. Solicitation for Bids, Instructions to Contractors, Bid Form, Bid Bond, Contract, Performance Bond, Payment Bond, General Conditions, Special Provisions, Technical Specifications, Drawings, together with all Addenda, Change Orders, Bulletins, Field Orders and Work Orders.
 - 4. Design Pressure. Maximum coincident pressure in psig.
 - 5. Dusttight. Absence of dust ex-filtration and infiltration at joints and connections, and between components when system is operating at maximum design condition.
 - 6. Erect. To furnish and install.
 - 7. Equipment. Major machinery, devices, apparatus, or vessels (as contrasted to appurtenances).
 - 8. Excavation. The removal and disposal of materials encountered when establishing the required bottom.
 - 9. Exposed. Not concealed in completed project.
 - 10. Gastight. Absence of gas or air ex-filtration and infiltration at joints and connections, and between components when system is operating at maximum design condition.
 - 11. Install. Including assembly of fabricated parts and products, correct placement and permanent anchoring of mechanical work, and all mechanical work necessary for the systems and structures of the Contract Documents to be complete, permanent and of safe and satisfactory operation.
 - 12. Invert Elevation. Elevation measured at inside bottom of a pipe.
 - 13. Line. Piping run, electrical conduit run and like items as applicable.

14. Piping. All pipe, fittings, flanges, gaskets, hardware, fasteners, valves, specialties, supports and like accessories related to piping.
15. Pitch. Slope.
16. Provide. Furnish and install complete, in place and ready for service.
17. Psig. Pounds per square inch gage.
18. Singular Number. In all cases where a device, piece of equipment, individual, etc., is referred to in the singular number (such as the "pump"), such reference to be intended to apply to as many devices, etc. as required to complete the installation as specified and as shown in the Contract Documents.
19. Watertight. Absence of water ex-filtration and infiltration at joints and connections, and between components when system is operating at maximum design condition.
20. Working Pressure. Operating pressure in psig.

1.5 REFERENCE STANDARDS

The Contractor shall comply with the requirements of the reference standards (latest edition adopted by governing authorities) noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents.

A. Air Transport Association of America (ATA)

1. 103 - Standards for Jet Fuel Quality Control at Airports.

B. American Petroleum Institute (API)

1. 5L – Specification of Line Pipe
2. Spec 6D - Specification for Pipeline Valves (Steel Gate, Plug, Ball and Check Valves)
3. Spec 6FA - Specification for Fire Test for Valves
4. Standard 570 - Piping Inspection Code: Inspection, Rating, Repair and Alteration
5. Standard 601 - Metallic Gaskets for Raised Face Pipe Flanges and Flanged Connections
6. Standard 607 - Fire Test for Soft-Seated Quarter Turn Valves
7. Standard 1109 - Marking of Liquid Petroleum Pipelines
8. RP 5L7 – Unprimed Internal Fusion Bonded Epoxy Coating of Line Pipe
9. RP 5L9 – Recommended Practice for External Fusion Bonded Epoxy Coating of Line Pipe
10. RP 1110 - Pressure Testing of Liquid Pipelines
11. RP 1104 - Welding of Pipelines and Related Facilities
12. Bulletin 1542 - Airport Equipment Marking for Fuel Identification
13. RP 2003 - Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents
14. Standard 2009 – Safe Practices in Gas and Electric Cutting and Welding in Refineries, Gasoline Plants, Cycling Plants and Petrochemical Plants.
15. Standard 2201 - Procedures for Welding or Hot Tapping on Equipment Containing Flammables

C. American Society of Mechanical Engineers (ASME)

1. Boiler and Pressure Vessel Code Section IX of the ASME Code, 1989

D. American National Standards Institute (ANSI)

1. A13.1 - Scheme for Identification of Piping System
2. B2.1 - Pipe Threads
3. B16.5 - Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys.
4. B16.9 - Factory-Made Wrought Steel Buttwelding Fittings
5. B16.10 - Face-to-Face and End-to-End Dimensions of Ferrous valves
6. B16.11 - Forged Steel Fittings, Socket-Welding and Threaded
7. B16.21 - Non-Metallic Flat Gaskets for Pipe Flanges
8. B16.25 - Butt Welding Ends
9. B18.2.1 - Square and Hex Bolts and Screws, including Askew Head Bolts, Hexcap Screws and Lag Screws
10. B18.2.2 - Square and Hex Nuts
11. B31.3 - Chemical Plant and Petroleum Refinery Piping
12. B31.4 - Pipeline Transportation Systems for Liquid Hydrocarbons & Other Liquids.
13. B36.10 - Welded and Seamless Wrought Steel Pipe

E. American Society for Testing and Materials (ASTM)

1. A36 - Structural Steel
2. A53 - Pipe, Steel Black and Hot-Dipped, Zinc Coated, Welded and Seamless
3. A105 - Forgings, Carbon Steel for Piping Components
4. A123 - Specification for Zinc (noted dip galvanized) Coatings on Iron and Steel
5. A176 - Stainless and Heat Resisting Chromium Steel Plate, Sheet and Strip
6. A181 - Forgings, Carbon Steel, for General Purposes Piping
7. A182 - Forged or Rolled Steel Pipe Flanges. Forged Fittings, and Valves and Parts for High Temperature Service
8. A193 - Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
9. A194 - Carbon and Alloy Steel Nuts for Bolts for High-Temperature Service
10. A216 - Specification for Carbon Steel Castings
11. A234 - Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel
12. A285 - Pressure Vessel Plates, Carbon Steel, Low and Intermediate Tensile Strength
13. A352 - Steel Castings, Ferritic and Martensitic, for Pressure-Containing (Parts Suitable for Low Temperature Service)
14. A733 - Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
15. B61 - Steam or Valve Bronze Castings General Service
16. B766 - Electro-deposited Coatings of Cadmium on Steel
17. D229 - Rigid Sheet and Plate Materials Used for Electrical Insulation

F. American Welding Society (AWS)

1. D1.1 - Structural Welding Code

G. National Fire Protection Association (NFPA)

1. 30 - Flammable and Combustible Liquids Code
2. 70 - National Electrical Code
3. 101 - Life Safety Code
4. 407 - Aircraft Fuel Servicing
5. 415 - Airport Terminal Buildings
6. 704 - Identification of Fire Hazards of Materials

- H. National Association of Corrosion Engineers (NACE)
 - 1. NACE RP0169 Control of External Corrosion in Underground or Submerged Metallic Piping Systems.
 - 2. NACE RP0188-90 Discontinuing (Holiday) Testing of Protective Coatings
 - 3. NACE RP0394-94 Application Performance and Quality Control of Plant Applied, Fusion Bonded External Pipe Coating
 - 4. NACE RP0490-95 Holiday Detection, of Fusion Bonded External Pipeline Coating
- I. Steel Structures Painting Council (SSPC)
 - 1. PA1 - Paint Application Specification
 - 2. SP1 - Solvent Cleaning
 - 3. SP3 - Power Tool Cleaning
 - 4. SP5 - "White Metal" Blasting Specification
 - 5. SP6 - Commercial Blast Cleaning
 - 6. SP7 - Brush-Off Blast Cleaning
 - 7. SP10 - Blast Cleaning to Near-White Metal
 - 8. PA2 73-T - Paint Thickness Measurement Specification
 - 9. RP 0394 – Application, Performance, and Quality Control of Plant-Applied, Fusion-Bonded Epoxy External Pipe Coating
- J. Factory Mutual Corporation (FM)
- K. Underwriter’s Laboratories, Inc. (UL)
 - 1. UL 142
- L. Uniform Fire Code (UFC)
 - 1. Section 79
- M. Federal Supply Service, General Services Administration
 - 1. QQ-P-416 - Plating, Cadmium
 - 2. QQ-A601F - Cast Aluminum Alloy
- N. Occupational Safety and Health Standards (OSHA)
- O. Department of Transportation (DOT), Federal Aviation Administration
 - 1. AC 150/5320-6C
 - 2. AC 150/15230-4
- P. National Electrical Code (NEC)
- Q. National Electrical Manufacturer’s Association (NEMA)
- R. National Association of Pipe Coating Applications (NAPCA)
 - 1. Bulletin 6-69-94-5 Suggested Procedures for Coating Field Joints using Heat Shrinkable Materials

2. Bulletin 13-79-94 External Application Procedures for Plant applied (FBE) Coatings to Steel Pipe

1.6 JOB CONDITIONS

- A. Pre-Construction Meetings. Contractor shall conduct a mechanical work pre- construction meeting at project site prior to start of mechanical work. The meeting shall include review of construction conditions, environmental requirements and coordination required for installation of the work, and responsibilities for temporary operation of permanent mechanical systems required for the work. Meeting participants shall include the Owner, fuel system operator, installers of mechanical work, electrical work and related project work, and product manufacturer representative(s) as necessary.

A minimum of 24 hrs. prior to commencing each new portion of the work require Subcontractors and his installers of mechanical work to participate in other pre-work meetings at project site to review conditions of the project, in order to work out conflicts, interferences, adjustments and responsibilities prior to commencing work. Notify the Owner 48 hrs. prior to each pre-work meeting.

- B. Service. Installation assistance from a trained representative of the product manufacturer's factory shall be provided to give installation instructions, assistance in start-up operations, direct acceptance inspections and tests, and perform like services at project site as required.
- C. Existing Structures. Cutting, drilling or welding of existing structures for attachment of mechanical work shall not be allowed without authorization by Owner for each condition, except where specifically indicated. Requests for authorization shall be in writing, designating specific extent and limits of work, and components proposed to be cut, drilled or welded.
- D. Other Project Work. The Contractor shall coordinate all mechanical work with other project work. Changes required in mechanical work due to lack of coordination shall be at no additional charge to the Owner.

1.7 OPERATING AND MAINTENANCE DEMONSTRATIONS

- A. General. Provide instructions and demonstrations to designated operating personnel covering operation, adjustment and maintenance of mechanical work.
- B. Coverage. Operating personnel to gain a thorough knowledge and understanding of mechanical work. Instructions and demonstrations to include performance requirements, manufacturer's instructions and all phases of safe operation, control, adjustment and maintenance.
- C. Instructor Qualifications. Instructor shall be a competent technician in operation, adjustment and maintenance of each type of mechanical work. When required, product manufacturer's representative shall be furnished to provide instructions and demonstrations.
- D. Service. Furnish product manufacturer's factory trained representative to provide instructions and demonstrations when recommended by product manufacturer, required by installer, necessitated by project site conditions, or when product manufacturer warranty is contingent upon such service.

1.8 REQUIRED WARRANTY

- A. General. Warranty mechanical work meeting provisions of the Conditions of the Contract, and to include the additional provisions of this Article and Warranties.
- B. Extensions. Warranty to extend to corrections of the work found to be defective or nonconforming to the Contract Documents at no additional charge to the Owner. Included: Damages resulting from such defects or nonconformance with the Contract Documents. Excluded: Defects resulting from improper maintenance, operation, or normal wear. Corrective work to be performed by original installer.
- C. Warranty Period. Warranty period for the system and individual components shall begin on the date of final acceptance for the hydrant system as identified in Section 15150: Fueling System Inspection, Flushing, and Testing. Repairs or replacement made to mechanical work within the warranty period to be warranted for one year from date of final acceptance of each repair or replacement.

PART 2 - PRODUCTS

2.1 GENERAL

All equipment and material to be new and purchased specifically for this contract, undamaged, of the best grade, and of domestic manufacture. Unless otherwise specified, items of foreign origin shall not be permitted. Decision concerning quality, fitness of materials, or workmanship to be by the Owner. Items not complying with domestic manufacture requirement will not be accepted unless pre-approved by the Owner.

Where items exceed one in number, provide products with identical construction, model numbers, and appearance from the same manufacturer. In so far as possible, products are to be the standard design of the manufacturer. Manufacturer to be engaged in the manufacture of the product for a minimum of five years. When standard products are modified to suit these Contract Documents, manufacturer to certify operating conditions, ratings and capacities of the product and Contractor to submit compliance certificates.

All materials, items and components specified herein shall be certified by the manufacturer, suitable for use in aviation kerosene (Jet A Turbine Fuel ASTM D 1655) or at 275 psig, at 100 degrees F with a specific gravity of ± 0.81 for Jet A system or unleaded fuel (MOGAS) at 275 psig, at 100 degrees F with a specific gravity of $\pm .72$ for unleaded fuel system.

2.2 ACCEPTABLE PRODUCTS

Certain makes and manufacturers of material and equipment are specified herein and indicated on the accompanying Drawings as "Acceptable Products" or "Acceptable Manufacturer(s)". Prior to submittal, use manufacturer's published data to verify that the product meets the Specification. Notify the Owner of conflicts.

- A. Alternates. Submit the specified materials and equipment. Where "or equal" products are specified, alternate materials and equipment of other manufacturers may be submitted but are to be clearly distinguished in the submittal as "EXCEPTIONS". The final determination of the "equality" of a product shall be determined by the Owner.

2.3 HDPE Lining Specification:

- A. The containment lining material shall be GSE HD Liner minimum 60 mils thickness as identified in Florida DEP File No. EQ560 or approved equal. Any material submitted as an equivalent must include documentation of approval from Florida DEP.
- B. Liner attachment to all cast in place concrete shall be accomplished with HDPE embedment from the same manufacturer as the lining material, set into the concrete during forming.
- C. The liner shall be placed on a well compacted subgrade consisting of clean, well graded sand or natural fill free of sharp stones, trash or organic material.
- D. The lining material shall be installed and tested in accordance with the manufacturer's instructions and Geosynthetic Institute, Standard GM13, "Test Properties, Testing Frequency and Recommended Warrant for High Density Polyethylene (HDPE) Geomembranes," December, 2000.
- E. As built drawings indicating the liner panel layout, testing results and repairs completed during the installation shall be provided as part of the final submittal package for the tank systems.

PART 3 - EXECUTION

3.1 INSPECTION

- A. General. Examine the areas and conditions under which mechanical work is to be installed or performed, and remedy any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Existing Facilities. Verify existence, location and operation of existing mechanical facilities to be abandoned, removed or altered.

3.2 INSTALLATION

- A. General. Install mechanical work, meeting the requirements of the Contract Documents and in accordance with product manufacturer's instructions and recommendations. Meet requirements of final, reviewed submittals for the work.
- B. Workmanship. All equipment, materials, and specialties shall be installed in accordance with the best engineering practice and standards for this type of work. Follow the recommendations and instructions of the product manufacturer, unless otherwise specified or shown on the Drawings.

Only competent, orderly persons, satisfactory to the Owner or his authorized representative, who are particularly skilled in the class of work to be performed shall be employed. Any employee of the Contractor or subcontractors determined dishonest, careless, troublesome, or incompetent by the Owner or his authorized representative shall be permanently dismissed from this project. The Contractor shall bear all costs with providing replacement personnel.

- C. Miscellaneous Concrete. Provide miscellaneous concrete work as required. Concrete shall be as specified on the drawings.

- D. Welding. When required for safety, properly shield the welding area.
1. Fuel Pipe Welding: Refer to Section 15060: Pipe and Fittings.
 2. Miscellaneous Welding: Welding procedure to be governed by applicable service type specification of AWS D1.1 - Structural Welding Code.
- E. Surface Finishes. All surfaces and edges of miscellaneous steel, concrete, and other structural materials, to be smooth and free of marks, burrs, roughness, and other defects. Finish welds to match parent material. Where possible, grind welds smooth; remove flux, oxide, splatter or any other residue from the weld and adjacent areas of exterior and interior surfaces. Do not use synthetic type filler putty as metal filler.
- F. Painting. Prime and paint all piping and ferrous metal surfaces not already suitably primed and painted with the exception of galvanized, plated or machined surfaces, insulating unions and dielectric flange gaskets, nameplates, tags, labels, or explosion proof items. Paint items suitably primed and touch-up items furnished painted to provide a uniform protective coating system; refer to Section 09800: Protective Coatings. Meet manufacturer's instructions and recommended procedures.
- G. Coatings. Coat all machined surfaces with a suitable rust preventative.
- H. Setting and Aligning Equipment. All equipment supplied shall be set and aligned in accordance with manufacturer's recommendations and applicable standards of good practice. All equipment shall be set true and level at the locations indicated on the Drawings. Adequate leveling of installed equipment shall be demonstrated.
- I. Cutting and Patching. In addition to the requirements of Division 2 specifications, perform all cutting, patching, carpentry, and masonry work required to accommodate mechanical work. Patching to conform to the surrounding surfaces in every respect, including painting, etc. Perform no cutting or patching without first obtaining approval of Owner or his authorized representative.
- Openings in existing concrete or masonry to be core drilled, or perimeter scored, both sides, prior to removing construction from opening area.
- Metallic components, such as electrical conduits, piping and reinforcing steel embedded in concrete for masonry construction shall not be cut except after metallic components are identified and determined to be out of service or otherwise suitable for cutting.
- Fluid associated with cutting tools shall not be permitted to migrate outside of immediate cutting area or into embedded conduit or piping.
- J. Site Clean-Up. The project site shall be maintained cleaned. The work site shall be cleared of all miscellaneous construction equipment, dispose of all trash and unnecessary excavated material in a manner acceptable to the Owner or his authorized representative. The site shall be maintained as safe, clean and completely finished as possible.
- K. Inspections and Tests.
1. General. Test all of the equipment and piping installed under this Specification and demonstrate its proper operation to the Owner or his authorized representative. Furnish all required labor, testing, instruments and devices required for tests and pay for all

expenses involved in conducting such tests. If tests show work or equipment to be defective, immediately make all changes necessary to correct work and performance to the satisfaction of the Owner or his authorized representative. Provide 48-hours notice in writing, to the Owner or his authorized representative of all tests and demonstrations. Provide safe access to the test area if the work is in preparation or in progress. Contractor to be given reasonable time to correct defects. If such corrections of defects or performance requirements are neglected, the Owner reserves the right to have defects remedied and to charge the cost of same against the account of the Contractor.

2. **Concealed Joints and Equipment.** No pipe or equipment to be covered until required tests have been completed and approved. Where the Contractor considers this procedure unfeasible, he shall request a waiver from this requirement in writing which clearly defines the exception to the procedure and the extent of the work involved. Where it is determined that taking exception to the procedure results in an increase in the cost of the project either in the first cost material and labor or as a result of defects in the pipe or equipment which could have been corrected in a less costly fashion through the required tests prior to covering, the Contractor shall bear all costs associated with the exception to the procedure.
 3. **Inspection.** Inspection includes but is not limited to:
 - a. **Alignment:** Check whether equipment and piping has been properly aligned.
 - b. **Lubrication:** Check lubricant types and levels.
 - c. **Tightening:** Tighten bolts, cap screws and other fasteners.
 - d. **Safety Guards:** Check safety guards.
 - e. **Operation and functioning.**
 4. **Start-up.** Perform equipment start-up meeting requirements of equipment manufacturer. If manufacturer's representative is required to be present, coordinate with same. Start-up to be made without load, except when detrimental to equipment.
 5. **Final Condition.** Before final acceptance, top-off all fluids, check all connections, and remove all remaining debris.
- L. **Equipment Installation Acceptance.** Equipment installation will be accepted by Owner or their authorized representative after running equipment under load in permanent operation. After equipment installation acceptance and when requested, additional work shall be performed to correct deficiencies or improper operation of equipment. Payment shall be excluded for work relative to time spent correcting deficiencies or improper operation of equipment covered under the work. Additional work not related to deficiencies may be requested by the Owner and will be paid on basis of contract conditions relative to changes in the work.

3.3 DELIVERY AND STORAGE OF MATERIAL AND EQUIPMENT

- A. **General.** The Contractor shall provide and pay for all freight, express, trucking, transportation, cartage and handling of equipment and materials. The Contractor shall assure delivery of all materials to the job site in ample quantities to insure uninterrupted progress of work. The Contractor shall provide and pay for extra handling and shipping expenses incurred in expediting materials, etc., to prevent interruption of the overall job progress.

All equipment, materials, specialties shall be protected from the elements and other damages caused during shipment, storage, and erection until final acceptance by the Owner. Responsibility for damages or losses incurred by these or other causes shall be that of the Contractor's. Equipment shall also be protected from deterioration, paint or coating spills or spots, corrosion, or harm from any other source.

- B. **Fuel Piping.** Fuel piping shall be segregated from all other steel on the project. Special

handling requirements shall be followed as stated in Section 15060: Pipe and Fittings.

3.4 IDENTIFICATION

Labels and signs shall be provided as required by all local codes and as called for in the Contract Documents. Labels and signs are to be permanently attached or supported. Refer to Section 15190 for piping identification.

3.5 SYSTEM TESTING

All fabricated assemblies and all equipment items shall be cleaned thoroughly before operating or testing. Prior to acceptance of any installation, the Contractor shall test and demonstrate all equipment to be correctly connected and installed. All testing and check-out procedures recommended by the manufacturer shall be carried out by the Contractor and witnessed by the Owner. The Owner shall be notified 48 hours in advance of all testing. All equipment and surrounding areas shall be protected from damage resulting from testing operations. Clean up and spills for leakage from testing.

All tested equipment found to be defective or inoperable (to any extent) shall be reported to the Owner. Any operating difficulty or defective item as a result of the Contractor's work shall be repaired or replaced and put into proper operation by the Contractor immediately.

Upon completion of the installation and successful testing, the Contractor shall demonstrate to the satisfaction of the Owner the operation and performance of the entire fueling system.

-- END OF SECTION --

SECTION 15060 - FUELING SYSTEM PIPE AND FITTINGS

PART 1 - GENERAL

1.1 SCOPE

This Section covers the piping for aircraft fueling system as well as related fittings, materials and construction procedures, welded and threaded connections, welding and radiographing requirements, related codes and standards.

1.2 QUALITY ASSURANCE

The Contractor shall comply with applicable provisions (latest edition) of the codes listed in Section 15000: Fueling System - Basic Mechanical Requirements. All pipe and piping materials shall be new and produced by a domestic manufacturer approved by the Owner.

1.3 REQUIRED SUBMITTALS

Submittals for equipment and materials specified herein are required. Format for submittals on materials and equipment shall be as specified.

- A. Certifications. All materials and equipment furnished under this contract shall be accompanied by a manufacturer's certification, attesting to its conformance to the requirements of these specifications. Materials and equipment not accompanied by said certification will be rejected and not permitted to be installed on the job. No payment will be made for rejected materials and equipment.
- B. Welding Procedure. As specified in this section under Welded Joints for Pipe and Welded Joints.
- C. Shop Drawings. Contractor shall submit complete pipe fabrication drawings. All dimensions, locations of supports and other appurtenances shall be accurately shown.

1.4 REQUIRED WARRANTY

The Contractor shall provide Guarantees and Warranties in accordance with the requirements of the General Conditions. Warranty period for the system and individual components shall begin on the date of final acceptance for the fuel system.

PART 2 - PRODUCTS

2.1 PIPE

- A. General. Fuel pipe, 2 ½-inches and larger shall be manufactured in conformance with the requirements of ASTM A53 Grade B, or API 5L Grade B, Type S (seamless) or Type E (electric resistance welded). Pipes shall be furnished in double random lengths, or as required. Pipe 2 ½-inches through 10-inches shall be Schedule 40. Pipe 2-inches and smaller shall be A106, Grade B or ASTM A53 Grade B, Type S (seamless only), Schedule 80. Pipes and fittings in the fuel

piping system shall not be galvanized.

Stamp all pipe with specification and grade as specified under “Certification”. Shop-coated pipes shall be stenciled continuously along the entire length. Pipe shall be manufactured from domestic steel and produced in the United States of America.

- B. Joints. Piping 2 ½-inches and larger shall have butt welded joints. Piping 2-inches and smaller shall have socket weld connections. Miter joints shall not be permitted.
- C. Coating. Jet fuel pipe and fittings shall be externally coated and internally lined as specified in Section 09800: Fueling System - Protective Coatings.
- D. Certification. All pipe and fittings shall be new and purchased specifically for this contract. Additionally, they should be tested and certified at the Mill for conformance with the specified API or ASTM standard. Mill certification of all piping and fittings and copy of the purchase orders shall be submitted to the Owner for approval prior to shipping and delivery. An additional copy of the pipe Mill certification shall be supplied by the Contractor, at the time of each delivery, for all pipe and pipe fittings along with the shipping manifest. Mill identification on the pipe shall be directly traceable to the mill certification report, in order to specifically identify each piece of pipe or fitting as being fabricated from the steel tested under the Mill certification. All costs in connection with these certifications shall be included in the project cost.

2.2 FITTINGS FOR WELDED PIPE

- A. General. For pipe sizes 2 ½-inches and larger, fittings shall be butt welded type, manufactured of carbon steel and shall meet the requirements of ASTM A234 Grade B and conform to ANSI B16.9. Wall thickness of fittings shall match wall thickness of pipe. Elbows shall be long radius (1.5xD) type. Fittings shall be manufactured from domestic steel and produced in the United States of America.

For pipe sizes 2-inches and smaller, fittings shall be socket welded type and shall be manufactured of carbon steel, meeting the requirements of ASTM A105 Grade II conforming to ANSI B16.11, and shall be 3000-pound class.

- B. Elbows. Elbows other than 45 degrees or 90 degrees, shall be made with long radius weld ells cut to the proper angle and shop bevel weld ends in accordance with ANSI B16.25. Miter joints and short radius elbows shall not be used.
- C. Branch Connections. Forged fittings may be used in lieu of welding tees for branch connections. Branch connections shall be manufactured of forged carbon steel, meeting the requirements of ASTM A105 Grade II, with standard weight class conforming to ANSI B16.9 and 3000-pound class conforming to ANSI B16.11. Branch connections shall be butt weld insert weldolets, sweepolets, sockolets, elbolets, or butt weld vesselets.

The fittings shall be externally coated and internally lined as specified in Section 09800: Protective Coatings. All fittings shall be protected from water damage and from contamination at all times.

2.3 FLANGES AND GASKETS

Flanges shall be standard weldneck type Class 150, forged carbon steel, meeting the requirements of ASTM A182 Grade F-5a conforming to ANSI B16.5 manufactured from domestic steel produced in the United States of America. Finish of the flange surface mating the gasket shall phonographically serrated. Flange facings and position of bolt holes shall correspond to the equipment to which the piping is joined and shall, unless otherwise required, be standard 1/16-inch raised face flanges. Spectacle blinds (flanges) shall be constructed of A-36 steel plate, made to pivot on the top flange bolt. Submit drawings for approval.

Flange gaskets shall be manufactured of compressed graphite conforming to ANSI B16.21 and shall bear UL listing. No asbestos shall be permitted. Full face gaskets shall be used for flat face flanged joints. Ring gaskets with centering ring shall be used for steel flanged joints with raised face flanges. Non-insulating gaskets shall be 1/16 inch in thickness (minimum). Flanges and gaskets shall be protected from water damage and contamination at all times.

A. Gasket Characteristics

1. Fire resistant, Hydrocarbon resistant
2. Tensile strength: ASTM F152, greater than or equal to 1500 psi
3. Density: 70 lb/ft³
4. Max. Service Temperature: Greater than or equal to 900°F
5. Min. Service Temperature: -40°F
6. Max. Pressure: Greater than or equal to 1900 psi
7. Sealability: ASTM F37A, 0.20 ml/hr

B. Acceptable Manufacturers: Manufacturer shall be Klinger or approved equal.

2.4 FLANGE BOLTS AND NUTS

- A. Machine bolts and stud bolts shall be high strength steel, heavy hex head, meeting the requirements of ASTM A193, Grade B7, conforming to ANSI B18.2.1. Nuts shall be high strength carbon steel, heavy hex head, meeting the requirements of ASTM A194, Grade 7, conforming to ANSI B18.2.2. Flat washers shall be cadmium plated hardened carbon steel, circular type and meet the requirements of ASTM F436, Type 1, conforming to ANSI B18.2.1. Cadmium coatings shall conform to ASTM B766, Class 8, Type II.

2.5 UNIONS

Steel pipe unions shall conform to ASTM A105, Grade II, 3000-pound class, socket weld ends.

2.6 PIPE NIPPLES

- A. Carbon steel pipe nipples shall be of the same material as the pipe it joins to and shall conform to the requirements of ASTM A733.

2.07 TEMPORARY PLUGS AND WELD CAPS

- A. Temporary Plugs. When work is not in progress, securely close open ends of pipe, or fittings using approved expanding type waterproof, (rated minimum 20 psi) watertight plugs to prevent water, or other foreign substance from entering the pipe, or fittings.
- B. Temporary Weld Caps. Contractor shall provide temporary butt-weld caps to properly seal the pipe from the environment. All costs associated to weld and maintain temporary caps shall be the responsibility of the Contractor. Conditions requiring the use of temporary weld caps are as follows:
 - 1. Construction phase terminates.
 - 2. Pipe installation will cease for periods longer than twenty-four hours.
 - 3. Weather conditions threaten to fill the pipe trench with storm water (i.e. within containment area).
 - 4. As required for hydrostatic and pneumatic tests.

2.8 PIPE SLEEVE PATCHES

Full encirclement pipe patches shall be constructed of ASTM A-36 rolled steel plate. 4" patch plate shall be 0.237-inch thick, minimum.

2.9 PIPE SUPPORTS

A. General. Pipe hangers and supports shall conform to MSS SP-58 and MSS SP-69. Provide supports in accordance with the spacing information indicated below. In addition provide supports within one foot of unsupported equipment such as strainers, elbows and valves. Support channels for drain lines shall be epoxy coated on all surfaces or hot-dip galvanized after the channels are cut to length. Coated supports shall be coated with fusion bonded epoxy resin applied by the fluidized bed method. Thickness of the coating shall be not less than 10 mils. Surface preparation and coating application shall be in accordance with the epoxy manufacturer's instructions. The coating shall be pinhole free when tested with a low voltage holiday detector set at no more than 100 times the mil thickness of the coating. All pinholes shall be marked, repaired and retested to ensure a pinhole free film. The coating material shall be a 100% solids, thermosetting, fusion-bonded, dry powder epoxy resin. The manufacturer shall certify that the material is suitable for fluidized bed application and that it is approved by the Environmental Protection Administration.

Maximum allowable pipe support spacing provided below:

Pipe Size	Maximum Spacing
Under 1"	5'-0"
1"	7'-0"
1-1/2"	9'-0"
2"	10'-0"
2-1/2"	11'-0"
3"	12'-0"
4"	14'-0"
6"	17'-0"

B. Low Friction Supports. Low friction supports shall be self-lubricating antifriction element composed of reinforced TFE. Units shall be factory designed and manufactured.

C. Concrete and Grout. Concrete and grout for anchors and supports shall be as specified in Division 03 Section, Cast in Place Concrete.

PART 3 - EXECUTION

3.1 FUEL PIPE

A. Fuel Pipe Installation. The Contractor shall lay out, and maintain all piping as required to the flow-line elevation and grades. Pipelines shall be graded uniformly between pipe elevations determined by contractor. Any pipe that has the grade or joint disturbed after being laid shall be taken up and re-laid. Arrange all piping with proper slopes, true to line and grade, without sags, traps, or pockets, and pitched to drain at the lowest points, so that the entire system can be drained and emptied as required. Unless otherwise noted on the plans, piping shall be laid on a uniform slope (0.50 percent minimum). Provide high point vents and low point drains where shown on the Drawings and as required.

Install pipe complete with fittings, and accessories and make all necessary connections. Provide offsets, fittings, and accessories in the pipeline as required to eliminate interference at structures and, as required, to match actual equipment connections, locations and arrangements. All fabrication and installation shall conform to the requirements of ANSI B31.4. Do not expose pipe to unsuitable conditions, or lay it in water.

1. Conflicts. Install pipe so as to be clear of physical contact with other pipes, pipe sleeves, casings, reinforcing steel, conduits, cables, or other metallic structures.
2. Spotter. Contractor to provide spotter with each backhoe operator. Spotter's responsibility shall be to notify backhoe operator of unsatisfactory work conditions and of utility conflicts.
3. Other Utilities. Prior to commencing work in the vicinity of other utilities, the Contractor shall notify individual companies and request that they locate isolation valves for the utilities in conflict and arrange for a pre-work meeting. The Contractor shall also offer the opportunity to have utility representatives present and provide documentation of the attempt to contact them. Provide a contingency plan to shut-off, re-route and repair the utilities if they are damaged by the work.

B. Pipe Cleaning. The Contractor shall clean each joint before welding, and shall remove all rust, loose debris and contaminants. The Contractor shall keep the pipe line clean at all times; pipe lines shall be capped at the end of each work day. The Contractor shall remove materials such as welding rods, equipment, tools, etc., left inside the pipes while installing lines. Expenses incurred by the Owner for removal of such objects after cleaning the inside of the pipes shall be deducted from monies due to the Contractor. Refer to specification Section 15150: Fueling System - Inspection, Flushing, and Testing for additional pipe cleaning required.

3.2 WELDED JOINTS FOR PIPE

A. General. This subsection applies to all fuel and all fuel drain and vent pipe. Welding electrodes shall be suitably shielded and designed for use with the specific pipe metal to which it

is applied and shall conform to the applicable AWS Specifications for welding rods and electrodes. All stock electrodes or rods shall be stored in the containers in which received and are to be kept in a clean, dry area. The handling of electrodes or rods shall be such as to avoid physical damage or contamination with dirt, oil, water or other foreign matter. Coated electrodes received in hermetically sealed containers may be used as removed from the containers. Low hydrogen electrodes shall be stored and handled in accordance with the provisions of AWS D1.1. Electrodes that have become damp or wet shall be discarded. Backing rings shall not be used. Align pipe joints with pipe clamps. Clamps or other alignment devices shall not reduce the internal pipe diameter. All welds shall have full penetration and fusion and shall conform to ANSI B31.4 and API RP1104. Weld metal shall not project within the piping at completion of the welding. All weld material and burrs protruding outside the pipe's outer surface shall be ground smooth, this does not pertain; however, to normal stringer beads. Pipe supports shall not be welded directly to the piping. Miter joints shall not be permitted. Welding of grounding clips to the piping for welding shall not be permitted. Welding operations shall be protected from weather and field conditions that will impair the quality of the completed weld.

- B. Process. Welding shall be accomplished by the use of the Shielded Metallic Arc Weld for manual welding or Submerged Arc Weld for automatic welding and shall be performed in strict accordance with the requirements of ANSI B31.4. Welding process and/or procedures that comply with any other standard will not be accepted.
- C. Procedure. Not less than thirty (30) days prior to performing any shop or field welds the Contractor shall submit to the Owner for approval the Welding Procedure Specification, Procedure Qualification and Welder or Welding Operator Qualification, in accordance with Section IX of the ASME Code and meeting the requirements of ANSI B31.4. The Contractor's submittal shall include, as a minimum, the following:
 - 1. Current signed and certified copies of the Procedure and Welders Qualification Test Records confirming that the Procedures and Welders have been qualified specifically for this Contract in accordance with ANSI B31.4 "Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids" and Section IX "Welding and Brazing Qualifications" of the ASME Boiler and Pressure Vessel Code. These Codes shall appear on the Qualification Test Forms.
 - 2. Welding Procedure shall be designed for the conditions of this Contract and shall be complete and specific, and shall differentiate between shop, field welding, manual and automatic machine welding and include Butt and Fillet welds. The welding technique, diameter of electrodes and the mean amperage and voltage for each bead shall be noted on the welding Procedure Specification.
 - 3. The Contractor shall provide the services of an Independent Testing Laboratory, approved by the Owner, to certify each welder specifically for this Contract. Costs for these Procedures and the Welders Qualification Tests shall be borne by the Contractor. Welds shall be made and tested as required by ANSI B31.4 and Section IX of the ASME Code. Testing shall include Circumferential Butt Welds and Fillet Welds. The following conditions shall apply for qualification testing of each welder:
 - a. All welds shall be made in the downhill method.
 - b. All pipe groove welds shall be in test position 6G.
 - c. No backing rings shall be used.
 - d. All test welds shall be given a radiographic examination prior to the tensile and performance of bend tests.

- e. All test welds shall be given the tensile test and the performance bend test.
 - f. Welders failing to qualify after (2) unsuccessful attempts shall not be retested and shall not be permitted to perform any welds on this project.
 - g. All test results shall be submitted to the Owner for approval.
- 4. In addition to the above, each welder shall possess a currently approved certificate, meeting the requirements of these specifications, issued by an approved testing authority. Satisfactory evidence as to qualifications and certificate possession shall be presented to the Owner for each welder employed prior to any shop or field welding being performed.
 - 5. Any individual performing any production on the fuel piping, other than cadweld attachment of cathodic protection devices, who has not been qualified in accordance with the above procedures for this Contract shall be immediately and permanently barred from performing any work associated with this Contract.
- D. Non-Destructive Testing. The Contractor shall provide the services of a recognized testing laboratory, approved by the Owner, to test by radiographic methods 25% of aboveground circumferential butt welds and test by dye penetrant or magnetic particle methods all fillet welds. If 10% or greater of the welds inspected by radiographic methods fail, then 100% of the welds shall be inspected at no additional cost to the owner. All tests shall be conducted prior to installation of corrosion protection coatings.

Weldpass criteria shall be per ANSI 31.4. Costs for these procedures shall be borne by the Contractor. Certified copies of the test reports and the radiographs shall be submitted to the Owner. The Owner retains the right to witness and/or inspect all welding and fabrication, and to maintain one or more inspectors in the shop or at the site at any time this work is in progress. Such inspection may also include radiographing welds. The Contractor shall provide free unrestricted access to the Owner's personnel and agents to all parts of the shop or site where work is being performed and shall provide the inspectors any facilities and space needed to perform their work.

Test reports and radiograph exposure film negatives will be kept on file and submitted to the Owner at the completion of the work. A copy of all test reports shall be provided to the owner for review within 24 hours of the test. The record for such reports and negatives will show the date, location of tested weld (coordinate with weld location as shown on the Contractor's Record Drawings and in accordance with this Section), area, film number, serial number, film combination, time, source-film distance, angulation and other pertinent information for each weld tested.

- E. Identification. Each welder shall identify his weld with specific code marking signifying his name and assigned number. The Contractor shall maintain an up to date record of the welders and the code assigned to each welder. The welder shall mark his code on the pipe, not closer than 3-inches nor farther than 4-inches from a weld. The Contractor shall indicate, on his set of plans for submittal as Record Plans, the location of each weld by number and the respective welder's identification code. The identification methods to be used by the Contractor shall be submitted to the Owner along with the respective Welders Qualification Test Records.
- F. Preparation of Pipe Ends for Butt Welding. Preparation of pipe ends shall be in accordance with ANSI B16.25. Shop and field bevels shall be machine cut with a flame bevel tool; freehand manual flame cutting will not be permitted. The edges or surfaces of the parts to be welded shall be prepared by machining or grinding and shall be cleaned of all oil, grease, slag

and excessive amounts of scale or rust. Each weld layer shall be completed around the entire circumference of the groove before the next weld pass is made. Once the weld joint is started, the entire weld joint from root to cap should be completed during the same work shift or day. Incomplete weld joints remaining overnight shall be thoroughly cleaned by grinding.

Prior to tacking and welding the first pass, the weld joint shall be uniformly heated to a minimum of 70° F. This minimum shall be maintained during the balance of welding.

All slag shall be removed from each crater by means of a light cleaning hammer before proceeding with the next electrode or rod. Each completed bead or layer shall be thoroughly cleaned with a hammer, wire brush and/or grinder removing all spatter from the surface of the weld before applying the next successive layer.

- G. Defective Welds. Welds found to be defective shall be rejected and not used until after the welds have been satisfactorily repaired by the Contractor, in accordance with ANSI B31.4. Repairs to defective welds shall not be made prior to authorization, any weld or weld repair, once started, shall be continued until the weld has been completed. All cracked welds shall be completely recut and redone, no partial repairs are permitted. The Owner will determine if repairs may be made or if the entire joint must be cut out and welded again. All the arc burns shall be repaired in accordance with ANSI B31.4. Any welder producing the greater amount of the following shall be prohibited from performing additional welding on this Contract:

1. A total of three defective welds.

- H. Record Keeping. All construction records shall be kept in accordance with ANSI B31.4 and these specifications. Test reports and radiograph exposure film negatives will be kept on file with the Owner. The record for such reports and negatives will show the date, location of tested weld (coordinate with weld location as shown on the Contractor's Record Plans (As-Built Drawings) and in accordance with this Section), area, film number, serial number, film combination, time, source-film distance, angulation and other pertinent information for each weld tested. Record the total number of welds and welds tested. Include rejected welds and method of repairs.

3.3 "GAS FREE" CONDITIONS

- A. All operations in the construction area, where fuel is present in the system, that involve open flames or the possibility of arcing or sparking shall be conducted in a "Gas Free" condition. These operations shall include, but not be limited to, the following:
1. Use of internal combustion engines not equipped with Underwriters' Laboratories approved spark and flame eliminators.
 2. Use of electric motors or electric devices with arcing brushes or sliding contact that could produce arcing or sparking.
 3. Use of tools which may produce impact sparks.
 4. Electric or gas welding.
 5. Use of cutting or other torches or other open flame equipment.
 6. Holiday testing.
 7. Use of equipment with hot surfaces or glowing elements.
 8. Use of any other equipment or procedure that could create a fire hazard.

- B. The Contractor shall provide qualified personnel to monitor the use and suitability of the equipment and procedures on the job and certify to maintain a safe noncombustible "Gas Free" condition when necessary during construction. The Contractor shall provide certified equipment and personnel to verify "Gas Free" conditions. Proof of recent calibration and certification shall be furnished to the Owner.
- C. Prior to commencing any phase of the work requiring a "Gas Free" condition, the Contractor shall verify condition of fuel line's content prior to removing welded caps, blank plates, temporary plugs, or blind flange for interface connection. Empty pipes containing fuel and purge of all vapors. Provide any vents or drains as required for verification. The Contractor shall isolate, blank off, and adequately ventilate open piping sections so that no part containing fuel or vapors is exposed. The Contractor shall make certain that there are no open pools or reservoirs of fuels exposed in the vicinity of the work.
- D. Contractor shall perform all other safety precautions necessary to insure that these operations are conducted in a safe manner in accordance with all applicable codes. The Contractor shall provide two 150-pound fire-extinguishing bottles on wheeled carts. The Contractor shall utilize an approved combustible gas analyzer or detector to ensure no combustible gas concentrations exist in the construction area when performing these operations.

3.4 TESTING

- A. All new piping shall be pneumatically and hydraulically tested as specified in section 15150 Inspection, Flushing, and Testing.

3.5 DELIVERY AND STORAGE OF MATERIAL AND EQUIPMENT

- A. General. The Contractor shall furnish all labor, equipment and supplies to unload, haul, and string all material at the site of the work. All unloading, hauling, and stringing operations shall be as specified in this Section. If it becomes necessary to reload pipe and haul it to another area or return it to the Owner, this work shall be completely the responsibility of the Contractor. Any damage to the coating done by the Contractor or occurring while under the Contractor's responsibility shall be repaired at his expense.
- B. Hauling and Stringing Pipe. Perform the hauling and stringing of pipe and other materials in such a manner as to prevent damage to pipe and material and its protective coatings. Any damage to the pipe or pipe coating shall be repaired or replaced by the Contractor at no additional cost. Plastic caps covering the ends of the pipe shall remain in place until just prior to the welding of the pipe or installation in trench. If any caps are damaged, missing or not in place, the inside of the pipe shall be re-cleaned; new caps shall be then re-secured to the pipe ends in order to prevent dirt, water, and other foreign material from contaminating the inside of the pipe.

The Contractor shall take all precautions to prevent entrance of dirt or debris into piping system during stringing and installation, and reimburse any expense incurred by the Owner for removal of such objects found during the warranty period. The Contractor shall string the pipe along the trench line in such a manner as to cause the least interference with the normal use of the area crossed. The Contractor shall leave gaps at suitable intervals to permit access to adjacent facilities and to provide for passage of equipment.

C. Handling Coated Pipe.

1. Storage Racks. Storage rack material shall be 6-inches in bearing width and placed not more than 6-feet apart. Do not rack pipes 10-inches in diameter and larger more than two sections in height; and pipes 8-inches and under not more than four sections in height.

Protect and prevent movement of all racked pipe by use of suitable padded material between sections.

2. Handling Operation. All trucks handling coated pipe shall have properly padded bolsters, padded chains, and padded binders so as to not damage the coating. Pipe shall not be dropped or rolled off the truck, but shall be carefully lowered onto skids using padded mechanical equipment. Coated and wrapped sections of pipe must be lifted with nylon slings of approved width and shall not be dragged or pulled into position.

3.6 IDENTIFICATION

- A. General. Shop coated pipes shall be stenciled with specification and grade continuously along the entire length.
- B. Mill Identification shall be stenciled and clearly visible within 2-inches of the pipe or fitting end. The Mill identification on the pipe shall be directly traceable to the mill certification report, in order to specifically identify each piece of pipe or fitting as being fabricated from the steel tested under the Mill certification.

-- END OF SECTION --

SECTION 15100 - FUELING SYSTEM VALVES

PART 1 - GENERAL

1.1 SCOPE

A. This section specifies the following valves related to the fueling system:

1. Plug Valve
2. Ball Valves

All other valves shown on drawings shall be installed and operated per manufacturer's specifications. Contractor shall ensure proper installation and utilization per manufacturer's specifications allows system to operate at design specifications prior to purchase and installation.

1.2 QUALITY ASSURANCE

The Contractor shall comply with applicable provisions (latest adopted edition) of the codes listed in Section 15000: Fueling System - Basic Mechanical Requirements.

1.3 REQUIRED SUBMITTALS

Submittals for all equipment and materials specified herein are required. Format for submittals on materials and equipment shall be as specified.

PART 2 - PRODUCTS

2.1 PLUG VALVE

- A. Design Requirements. Rotation of the actuator toward open shall lift the plug without wiping the seals and retract the sealing slips so that during rotation of the plug clearance is maintained between the sealing slips and the valve body. Rotation of the actuator toward closed shall lower the plug after the sealing slips are aligned with the valve body and force the sealing slips against the valve body for positive closure. When valve is closed, the slips shall form a secondary fire-safe metal-to-metal seat on both sides of the resilient seal. Valves 6" and larger shall be provided with worm gear actuators and hand wheels.
- B. Construction. API SPEC 6D, Type III, ANSI Class 150, non-lubricated, resilient, double seated, trunnion mounted, tapered lift plug capable of two-way shutoff. Valve shall have carbon steel body with manufacturer coated interior, tapered plug of steel or ductile iron with similar coating and plug supported on upper and lower. Sealing slips shall be steel or ductile iron, with Viton seals which are held in place by dovetail connections. Valve design shall permit sealing slips to be replaced from the bottom with the valve mounted in the piping. Valves shall operate from fully open to fully closed by rotation of the hand-wheel or motor operator to lift and turn the plug. Minimum bore size shall be not less than 65% of the internal cross sectional area of a pipe of the same nominal diameter unless bore height of plug equals the nominal pipe diameter and manufacturer can show equal or better flow characteristics of the reduced bore size design.

C. Appurtenances

1. Relief Valves, ANSI Class 150. Provide plug valves with automatic thermal relief valves to relieve the pressure build up in the internal body cavity when the plug valve is closed. Relief valves shall open at 25 psi differential pressure and shall discharge to the throat of, and to the downstream side, of the plug valve.
2. Bleed Valves, ANSI Class 150, stainless steel body valve. Provide manually operated bleed valves that can be opened to verify that the plug valves are not leaking when in the closed position.

D. Acceptable Manufacturer. Plug Valves: General Twin Seal, Orbit TruSeal, or Western Valve Dan-ex.

2.2 BALL VALVE

- A. Design Requirements. Ball valve shall have 100% full ports and be capable of bi-directional flow at same flow characteristics. Valve assembly shall be rated for 275 psig, suitable for Jet-A service. Firesafe valves shall be UL and API 607 listed and shall meet the requirements of FM Corp. Provide valve lever operator with padlocking device.
- B. Construction. Ball valve size shall be as indicated on the Plans. Valve shall be a three-piece, swing-away type, 90 degree rotation from fully open to fully close position. Valve body shall be ASTM A 216 GR WCB cast carbon steel. Ball and stem shall be Type 316 stainless steel, seats and seals shall be reinforced TFE. End connections shall conform to drawing requirements. Valves shall have retained top and bottom low friction bearings. Retainer rings must recessed in the body so that the line gasket prevents any potential external leakage.
- C. Acceptable Manufacturer. Ball valves for drain, isolation and vent service shall be Velan Valve, or the "Miser" or approved equal as manufactured Worcester Valve Co., of Marlborough, Massachusetts, "SWING DEAL" as manufactured by the Jamesbury Valve Corp. of Worcester, Massachusetts, or WKM "Dyna Seal," and meeting the requirements specified herein.

PART 3 - EXECUTION

3.1 INSTALLATION

Install all valves as indicated on the Drawings and in strict accordance with manufacturer's recommendations. Examine equipment and material for concealed damage and report any damage to the Owner.

The Contractor shall furnish all labor, materials, and equipment necessary to make a complete valve installation as indicated and specified. Provide all necessary supports, brackets, or foundations for properly installing all equipment. Align, adjust and lubricate all equipment before final acceptance. Furnish all bolts, studs, nuts, welding rods and gaskets for makeup of all connections to the equipment, and replace all gaskets damaged during storage, inspection, cleaning or placing into service. The Contractor shall be responsible for all added expenses due to his choice of equipment and materials.

Arrange all valves during installation such that operating handles and controls are accessible and in the correct orientation for operation. Butterfly valves in horizontal pipes shall be installed so that shaft is horizontal and the bottom of the disc opens in the direction of flow. Spool pieces or spaces shall be provided in the piping as necessary to ensure that valve parts or butterfly discs have operating clearances inside piping.

Clean and spot paint all equipment where the shop paint has been damaged or flaked off in accordance with Section 09800: Fueling System Protective Coatings. Clean and repair coating where shop-applied coating and tape has been damaged. Replace factory coating if it is not compatible with aviation fuel as specified.

3.2 DELIVERY AND STORAGE OF MATERIALS AND EQUIPMENT

Protect all equipment and material during storage and prior to start up which shall include the coverings of all openings, protection against rust and other damage, etc.

Clean and spot paint all equipment where the shop paint has been damaged or flaked off in accordance with Protective Coatings Section. Clean and repair coating on all piping where the shop-applied coating has been damaged.

Contractor shall require representative from each manufacturer of control valves to be present at start up for start up services including on site valve adjustment.

3.3 TESTING

Replace valves found to be defective during testing.

-- END OF SECTION --

SECTION 15150 - FUELING SYSTEM INSPECTION, FLUSHING, AND TESTING

PART 1 - GENERAL

1.1 SCOPE

This Section covers inspection and testing of all piping and equipment related to the Jet-A fueling system. Testing of fuel piping shall be performed in accordance with the applicable ANSI, API, NACE, and ATA Standards.

Radiographing, Magnetic Particle and Dye Penetrant testing of pipe joints and welder qualifications are specified under Section 15060: Fueling System - Pipe and Fittings. This section also covers Holiday testing of the pipe coating. Additional testing of coatings is specified under Section 09800: Fueling System Protective Coatings.

Testing of fuel, piping shall be performed in accordance with ANSI B31.4. All testing and other operations specified herein are in addition to any shop testing performed by the manufacturer.

At the completion of the fuel line construction the entire new system shall be pressure tested.

1.2 QUALITY ASSURANCE

The Contractor shall comply with applicable provisions (latest edition) of the codes listed in Section 15000: Fueling System - Basic Mechanical Requirements.

A. The Contractor shall conform to any requirements and shall secure any permits required from airport operations.

1.3 REQUIRED SUBMITTALS

Submittals for all equipment and materials specified herein are required. Format for submittals on materials and equipment shall be as specified in The MAA General Provisions.

A. In addition to required submittals, the Contractor shall also submit a Health and Safety Plan for the work including the testing of the fuel lines. A certified industrial hygienist shall prepare, sign and seal the plan. The plan shall be in accordance with CFR 29, Department of Labor.

B. At least thirty (30) days prior to each of the operations specified, the Contractor shall submit a written procedure with a list of methods, equipment and labor to be used for the operation for approval by the Owner. After operations are completed, provide a written report describing each pipe section and the results of the tests performed, unless otherwise specified.

1. Pneumatic and Hydrostatic procedures and forms shall be as required by API 1110 and as modified by this Specification.
 - a. Type and location of test medium source.
 - b. Calibration of meter for the test medium.
 - c. Description of filling, venting and testing procedures.
 - d. Location of pressure and recording equipment

- e. Location and setting of pressure relief devices.
 - f. Provisions for shading exposed pipeline ends from direct sunlight
 - g. Weather forecasts (no testing during periods of rapid temperature swings).
Forecasts are not required earlier than 48 hours prior to testing.
 - h. Submit blank sample recorder chart.
 - i. Fill out in advance as much information as possible on the API 1110 forms.
 - j. Name of testing laboratory that will certify test results and any special requirements from them.
2. Submit all pressure/temperature testing equipment certificates of calibration along with samples of the charts to be used.
- C. Contractor shall submit to the Owner for approval detailed procedures for inspection, flushing and all testing before starting pipe installations, connections, or tie-ins. Final test results shall be furnished to the Owner within forty-eight (48) hours after completion of test. Preliminary results shall be furnished immediately upon completion of testing, unless otherwise specified.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. General. The Contractor shall furnish all temporary and permanent equipment required, including gauges, instruments, connections, air compressors, vacuum pumps, nitrogen cylinders or generators, fuel trucks and/or portable storage tanks, pipe and hose connections, and other items specified and detailed on the plans or required to provide the inspection, pigging and testing specified.
- 1. The Contractor shall provide flushing connections that are required to flush all fuel high point vents and low point drains.
 - 2. The Contractor shall provide clean and dry, non-contaminated, Jet-A fuel trucks and/or portable storage tanks (i.e. Baker Tanks) to receive fuel. Tankers identified by DOT for transport of fuel other than Jet-A fuel shall not be permitted. Portable storage tanks shall have a minimum capacity of 10,000 gallons, be internally coated, and include all necessary appurtenances and fittings for flush operation. Any fuel dyes or contaminants present in the vessel or its sump piping shall be removed prior to commencing operations. After testing and acceptance of the fuel by the tank farm operator, transport the accepted fuel back to the tank farm for the operator to return to bulk.
 - 3. Pressure/temperature recorders and charts shall be 0 - 450 psig and 0 - 200°F direct reading and directly proportional to each other. The recorder shall print temperature and pressure readings on the same chart. Use contrasting pen colors on charts for pressure and temperature recordings. Strip or circular charts can be used as required by the recording equipment.
 - 4. The contractor shall provide the required testing equipment to perform fuel quality testing as specified.
- B. Testing. All pneumatic testing operations shall be performed with dry nitrogen or dry compressed air. Air compressors shall be equipped with a refrigerated condensate dryer system and filter capable of generating oil-free air at -20 degrees F dew point.

Compressors used for pneumatic testing shall have sufficient capacity to bring the system being tested up to the test pressure in approximately 60 minutes.

2.2 MATERIAL

- A. General. The Contractor shall provide sufficient quantity of dry nitrogen or dry compressed air to perform the pressure testing specified. The Contractor shall use appropriate safety devices and procedures when using compressed nitrogen or air.

The Contractor is expressly advised that nitrogen displaces air in enclosed environments. Use appropriate safety procedures.

- B. Wasted, Spilled, or Contaminated Fuel. The Contractor shall observe diligent care not to waste, spill, or contaminate the fuel. The cost of any fuel spilled, wasted, or contaminate shall be paid for by the Contractor at the Airports' replacement purchase rate times a 1.15 multiplier. The Contractor shall also be responsible for any and all required remediation caused by his spill as deemed necessary. Any fuel spilled in the containment areas shall be cleaned up and shall be legally disposed of by the Contractor in accordance with federal, state and local regulations. Contractor shall notify the Owner's Representative and fuel system operator and follow their instructions for fuel disposal.

- C. System Line Fill With Fuel (Test Fuel). The Jet-A (ASTM D 910) fuel (ASTM D 1655) for line hydrostatic testing and flushing shall be owner furnished. Receipt, return or disposal and quality testing of the fuel shall be provided for by the Contractor and witnessed by the Owner.

1. The Contractor shall be required to receive the line fill into the new system.
2. Gravity fill only all lines, venting system high points and flushing system low points.

- D. Connectors and Hoses. All new, un-deteriorated, specifically purchased for this project and as detailed on the plans.

PART 3 - EXECUTION

3.1 GENERAL

The Contractor shall perform holiday testing of coating systems on all piping under this Contract. Provide all meters and connections required. Sectionalize pipe lines as required to facilitate testing. Contractor shall perform preliminary pneumatic testing and holiday testing before piping joints are coated.

During hydrostatic and pneumatic testing, provide temporary shelters for shading to prevent direct sunlight from contacting testing equipment and all exposed sections of pipe. Provide pressure relief safety devices to prevent sudden rises in pressure beyond the pressure rating of the equipment. Do not test during periods of rapid temperature changes.

- A. The Contractor shall notify the proper authorities and the Owner that items are ready for inspection and testing. Advance notice of the approximate testing time shall be given to the Owner at least fourteen (14) days in advance of testing followed by not less than forty-eight (48) hours notice prior to actual time of performing any inspections and tests.

1. Furnish all necessary equipment, materials and personnel. Valves to remain during testing shall be suitable to hold test pressure for the specified time without leakage. Conduct the tests of all systems in a safe manner and correct all deficiencies. Apply the specified test pressures by means of a pump or compressor connected to the piping off highest elevation.
2. Be fully responsible for providing qualified and experienced personnel to operate the equipment throughout the testing operations. Obtain all necessary approvals, acceptances, and permits.

3.2 HOLIDAY TESTING

- A. Inspection of Coatings (Holiday Testing). The Contractor shall make a detailed inspection with an electronic holiday tester of all pipe and fitting coating and joint field coating prior to backfilling after installation in the trench in accordance with NACE RP0490-95 and RP0188-90. Holiday-tester voltage shall not be higher than the manufacturer's recommended voltage for the coating tested. Testing shall be for holidays only and not to test the dielectric strength of the coating materials. Refer to Section 09800: Fueling System - Protective Coatings for additional coating inspection requirements.
- B. Patching. All holidays and damaged coating shall be repaired in a manner approved by the Owner at the Contractor's expense, as shall be as specified under Section 09800: Fueling System - Protective Coatings.

3.4 PNEUMATIC TESTING

- A. General. Prior to hydrostatic testing all new fuel piping system shall be pneumatically pressure tested after all joints are completed. Sections of the system may be segmented, tested and accepted in order to expedite the work. These sections shall be tagged by the Contractor to indicate compliance with the tests.

Install temporary closures or other fittings, including caps, blind flanges, etc., as necessary for the integrity of the piping system to be tested. Permanent valves and adapters rated for the test pressure shall be in place for testing.

Tests shall be made with clean dry-filtered and oil-free compressed air (minus 20°F pressure dew point) or compressed nitrogen gas for each applicable pipe segment. Tests shall be made in accordance with all applicable codes particularly with regard to safety precautions and the following:

- B. Procedure. Pressure testing shall be performed as follows:
 1. A preliminary check of connections shall be made & held at 25 psig.
 2. The pressure shall be increased gradually in steps, providing sufficient time to allow the piping to equalize strains during the test, and to be checked for leaks. Final test pressure shall be 100 psig unless otherwise approved by the Owner.
 3. Maintain the required test pressure for twenty-four (24) hours; continuously record temperature and pressure.
 4. Soap each exposed joint and carefully inspect to detect leaks.

5. The Contractor shall provide certified and calibrated temperature and pressure instruments and chart recorders and a deadweight tester to provide continuous calibration and direct readings of time, temperature and pressure on the same chart during the tests. Instruments shall be calibrated for temperature and pressure immediately prior to each test. Test Certifications and recorder charts shall be submitted to the Owner for approval prior to final acceptance of the piping. Calibrated thermocouples may be surface applied.
6. Repair any leaks detected. Retest 24-hour pressure cycle, as described above, after all leaks have been repaired. Repeat the repair and retesting cycle until the system is acceptable to the Owner.
7. Equipment which is not rated by the manufacturer for the test pressure shall be removed or isolated prior to testing. Install temporary connections as necessary. All permanent butterfly and plug valves and equipment which are rated at the test pressure or greater shall be in place during the tests.
8. Tests shall be witnessed and approved by the Owner.
9. The 24-hour recordings shall be made after temperature and pressure have stabilized and shall be conducted in accordance with NFPA Codes and API RP1110 and this specification. Pressure and temperature readings shall be taken:
 - a. Temperatures shall be representative of actual conditions.
 - b. Readings shall not be taken during times of rapid atmospheric changes. Rapid changing during test cycle will require retesting.
 - c. There shall be no indication of reduction in test pressure after corrections for temperature and pressure have been made according to the relationship $T_1 P_2 = T_2 P_1$ where T and P are absolute temperatures and pressures and subscripts refer to initial and final readings.

3.5 HYDROSTATIC TESTING

- A. Fuel System. Upon completion of Pneumatic Pressure test perform a hydrostatic test using fuel. Contractor shall coordinate with Owner, Airport Operations and fuel system operator two weeks prior to commencing work.
- C. Procedure. Provide safety relief devices set at a relief pressure not to exceed system rating. Pressure testing shall be performed as follows:
 1. Equipment which is not rated by the manufacturer for the test pressure shall be removed or isolated prior to hydrostatic testing. Install pressure relief devices and temporary connections as necessary. All permanent butterfly and plug valves and equipment which are rated at the test pressure or greater shall be in place during the hydrostatic tests. Provide temporary shelter to block direct sunlight on equipment and piping.
 2. Tests shall be witnessed and approved by the Owner.
 3. Gravity fill only all lines, venting system high points and flushing system low points.
 4. A preliminary check of the fuel pipe at 100 psig shall be made.
 5. The pressure shall be increased gradually in steps, providing sufficient time to allow the piping to equalize strains during the test, and to be checked for leaks. Final test pressure shall be 275 psig.
 6. Maintain the required test pressure for two twenty-four (24) hour test cycles; continuously record temperature and pressure.
 7. After initial 24 hour period, decrease pressure to 50 psig or less by venting at high points.

8. Increase pressure again in gradual steps to the final test pressure; maintain it for another twenty-four (24) hour period, continuously record temperature and pressure.
9. The Contractor shall provide certified and calibrated temperature and pressure instruments, chart recorders and deadweight tester to provide continuous direct readings of time, temperature and pressure on the same chart during the tests. Instruments shall be calibrated for temperature and pressure immediately prior to each test. Test Certifications and recorder charts shall be submitted to the Owner for approval prior to final acceptance of the piping. Calibrated thermocouples may be surface applied.
10. Repair any leaks detected. Retest two twenty-four (24) hour pressure cycles, as described above, after all leaks have been repaired. Repeat the repair and retesting cycles until the system is acceptable to the Owner.
11. The recordings shall be made after temperature and pressure have stabilized and shall be conducted in accordance with NFPA Codes and API RP1110. Pressure and temperature readings shall be taken:
 - a. Temperatures shall be representative of actual conditions.
 - b. Readings shall not be taken during times of rapid atmospheric changes or under conditions that hinder the ability to visually detect leaks. Rapid changes during test cycle will require retesting.
 - c. There shall be no indication of reduction in test pressure after corrections for temperature and pressure have been made according to the relationship $T_1P_2 = T_2P_1$ where T and P are absolute temperatures and pressures and subscripts refer to initial and final readings.

3.6 FLUSHING

- A. General. Upon the completion of the hydrostatic testing, perform the flushing operations as specified herein. The flushing procedure shall be performed during off-peak hours (nighttime) and coordinated with Airport Operations. Fuel piping shall be flushed to maximum flow rates achievable with the permanent system pumps. Flushing for each system shall continue until fuel is free of contamination.
- B. Procedure.
 1. The Contractor shall take every possible precaution to ensure safe flushing operation. Conform with fire safety requirements of NFPA 30 and 101, all applicable ordinances, laws regulations and codes of FAA, local and state authorities having jurisdiction. Contractor shall ensure that no equipment, valves, pumps, and like items are operated beyond their intended design capability or limitations.
 2. A minimum of three new system piping volume changes of fuel shall be required for flushing. Fuel will be stored and provided by the tank farm operator. Coordinate with the tank farm operator to schedule and store the flushing fuel. Record the quality of the fuel upstream and downstream prior to commencing flushing operations, in order to provide a baseline for comparison. Flushing operations shall continue as directed by the Owner and until the fuel meets the requirements of these specifications.
 3. New system piping shall be flushed into fuel tanker trucks or temporary storage tanks located on pavement or concrete (no bare soil).
 4. Provide sufficient number of single compartment fuel tanker trucks or temporary storage tanks as required to connect enough hoses to achieve required. Said vehicles and/or tanks

and their operation to and from the tank farm for return of fuel to storage shall be included in the Contract Price.

5. The Contractor shall be responsible for cleaning the interior of all fuel trucks and/or storage tanks as required during and after flushing.
6. All low point drains shall be flushed at least once an hour during all flushing operations and at the completion of all flushing before system is put into operation. Vent, drain, and pump-out piping shall be flushed through hoses to an appropriate tank vehicle, as required to remove water and solid contaminant from fuel pipe.
7. Two consecutive, back to back tests are required to ensure piping cleanliness. The system being flushed must be displaced with clean fuel prior to taking second test.
8. Fuel for filling the system and for flushing shall meet ASTM D-1655 specs for aviation kerosene, Jet-A, type aviation turbine fuel or ASTM D-910 100LL aviation gasoline depending on system. This fuel will be tested by the Contractor to ensure quality and shall provide a basis for the determination of successful flushing.
9. All general service valves shall be in place throughout the flushing procedure. Contractor shall remove blind flanges prior to initiating flush and replace them with flushing assemblies as detailed on the drawings.
10. Location of test personnel:
 - a. One person per each tank truck to monitor fuel level in tank.
 - b. One person at main pump control station to shut down pumps in emergency.
 - c. One person manning fire extinguishers.
 - d. One person removed from manual tasks in command of flushing operation.
11. Contractor shall coordinate operation of system pumps, closing and opening of system valves as required to flush system.

D. Scheduling. It is the Contractor's responsibility to schedule and coordinate all personnel required for this flushing operation. The Contractor shall provide fuel contaminate tests, tank vehicles, labor to return fuel to tank storage.

E. Temporary Equipment. Any temporary cross connections, special fabrication, adapters, or other equipment required for flushing shall be provided by the Contractor. After flushing has been completed and approved, the Contractor shall remove all temporary cross connections, remove all other temporary equipment, and install valves and other permanent equipment required for system operation.

F. Test Samples.

1. Test samples are to be drawn immediately ahead of outbound filtration and immediately ahead of fuel trucks used for flushing activities.
2. The Contractor shall arrange for Millipore, Gravimetric, Aqua-Glo, and Microsep tests to be taken as specified during the fuel flushing operation. All tests shall be performed by a testing laboratory provided by the Contractor and witnessed by the Owner. The Contractor shall continue flushing until the fuel meets or exceeds the test criteria as specified
3. A two test minimum back to back is required to ensure piping cleanliness. The system being flushed must be displaced with clean fuel prior to taking second test.

Contractor
herein.

G. Flushing Sequence. This procedure is intended as a guideline and is not necessarily all

inclusive. The Owner may vary, add to, or delete any of the following steps as are necessary to properly flush system to the cleanliness level required.

1. Flushing Into Tank Trucks from Fill Stands.

Caution: All electrical and motorized equipment in area should be shut down in case of a mishap or fuel spill. For safety, all persons not involved in the flushing operation must be kept a minimum of 100 feet away from tank trucks used in the flushing operation.

- a. All quick release type couplings are to be safety wired when coupled to the bottom load receptacle and flush adapter.
- b. Hoses are to be secured in a manner to prevent whipping during flush.
- c. Bond and ground truck to system piping.
- d. Start product flow slowly before reaching flushing velocity to check for leaks and system tightness.
- e. Fire extinguishers are to be in place in case of emergency.
- f. All test personnel shall be equipped with two-way radios.

2. Flushing Into Tanks from Off-Load Trucks.

Caution: All electrical and motorized equipment in area should be shut down in case of a mishap or fuel spill. For safety, all persons not involved in the flushing operation must be kept a minimum of 100 feet away from tank trucks used in the flushing operation.

- a. All quick release type couplings are to be safety wired when coupled to the bottom load receptacle and flush adapter.
- b. Hoses are to be secured in a manner to prevent whipping during flush.
- c. Bond and ground truck to system piping.
- d. Start product flow slowly before reaching flushing velocity to check for leaks and system tightness.
- e. Fire extinguishers are to be in place in case of emergency.
- f. All test personnel shall be equipped with two-way radios.
- g. All water draw offs from tank bottoms shall be drained.

3. Test Requirements.

- a. Fuel shall be tested visually for contamination per ASTM D 4176.
- b. Fuel shall be tested for contamination per ASTM D-2276 and Appendix X, Figure 2 using Millipore test equipment as manufactured by Gammon Technical Products. Millipore tests shall be made using a 3 gallon sample. Gravimetric testing shall be in accordance with ASTM D 5452.
- c. Fuel shall be checked for water entrainment per ASTM Standard 3240 using "Aqua-Glo" instrument manufactured by Gammon Technical Products.
- d. Fuel shall be tested for water separation characteristics using Micro-separometer instrument, by EMCEE Electronics, Inc., in accordance with ASTM D 3948.

4. Acceptance Specifications.

- a. Visual - All fuel samples must be clear and bright. Other visual clues must be observed and acted upon accordingly based on feel, color, and odor.
- b. Solids - Particle Assessment - A2, B2, G2 or better color rating rated wet with three gallon sample.

Note: If color rating exceeds the above limits or is in dispute a matching weight gravimetric rating (not to exceed 0.5 mg/liter) shall govern.

- c. Water - 5 mg/liter Maximum.
- d. Water Separation (Microsep) Rating - 85 Minimum.

Note: Prior to commencing Microsep testing, ensure that the fuel is free from the additive STADIS-450 by contacting the supplier of the fuel.

- 5. Final Acceptance. It will be the responsibility of the airport operations fuel Quality Assurance representative, or his designee, to have final decision on system cleanliness and acceptance before aircraft fuel servicing is permitted.

3.7 PERFORMANCE TESTING

- A. The Contractor shall subject the new fueling system to such operating tests (flow demonstration into trucks or storage tanks) as required to demonstrate satisfactory functioning and operating performance of the fueling system and its components. Tests shall include checks to determine that all valves are properly adjusted. All instruments required to conduct the tests shall be furnished and operated by the Contractor using experienced and qualified personnel. All tests will be witnessed by the Owner. Submit typed copies of test reports to the Owner for approval.

-- END OF SECTION --

SECTION 15170 - FUELING SYSTEM METERS, GAUGES, AND EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

- A. This section specifies the following Mechanical Equipment:
 - 1. Overfill Prevention Valve
- B. The Contractor shall provide all the additional labor, piping, fittings, valves and gauges required to complete, the low point drain and high point vent service pit assembly as whole and functional assemblies and as detailed in the Drawings, along with all other work required to complete the Contract.

1.2 QUALITY ASSURANCE

- A. The Contractor shall comply with applicable provisions (latest adopted edition) of the codes listed in Section 15000: Fueling System - Basic Mechanical Requirements.

1.3 REQUIRED SUBMITTALS

- A. Submittals for all equipment and materials specified herein are required. Format for submittals on materials and equipment shall be as specified.

1.4 SPARE PARTS

- A. Where spare, replacement or additional parts are required for the equipment specified, these items shall be delivered to the Owner immediately upon receipt at the job site. Parts shall be packaged and sealed for long storage and be securely and visibly labeled as to part, function and name of equipment to which they apply. Provide spare parts lists and maintenance for valves and equipment specified in this Section.

PART 2 - PRODUCTS

2.1 OVERFILL PREVENTION VALVE

- A. Provide an overfill prevention valve for the aboveground storage tank fill tube connection. The internal valve shall be designed to prevent tank overfill from a pressurized fill application and include an air break anti-siphon feature. Coordinate length with tank manufacturer. Acceptable manufacturer: EBW model 708-320 or OPW Fueling Components OPW 61 OR Remote, or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all equipment in strict accordance to the manufacturer's recommendations. Examine equipment for concealed damage and report any damage to the Government. Furnish all necessary labor, materials, and equipment necessary to make a complete installation as indicated and specified. Provide all necessary supports, brackets, or foundations for properly installing all equipment. Align, adjust, and lubricate all equipment before final acceptance.

- B. Furnish all bolts, nuts, studs, welding rods and gaskets for makeup of all connections to the equipment, and replace all gaskets damaged during storage, inspection, cleaning, or placing into service. The Contractor shall be responsible for all added expenses due to his choice of equipment and materials.

3.2 DELIVERY AND STORAGE OF MATERIAL AND EQUIPMENT

- A. Protect all equipment during storage and prior to start up which shall include the coverings of all openings, protection against rust and other damage. Equipment may be stored outdoors when approved by the Owner. Clean and spot paint all equipment where the shop paint has been damaged or flaked off. Clean and repair coating on all piping where the shop-applied coating and tape has been damaged as specified in Section 09800: Fueling System Protective Coatings.

3.3 TESTING

- A. Replace all equipment found to be defective during testing.

-- END OF SECTION --

SECTION 15180 - FUELING SYSTEM MONITORING AND CONTROLS

PART 1 - GENERAL

1.1 SCOPE

- A. This section specifies the following Mechanical Equipment:
 - 1. Fuel Management System
 - 2. Meters
 - 3. Software
- B. The Contractor shall provide all the additional labor, piping, fittings, wiring and conduit required to complete, the controls as whole and functional systems and as detailed in the Drawings, along with all other work required to complete the Contract.

1.2 QUALITY ASSURANCE

- A. The Contractor shall comply with applicable provisions (latest adopted edition) of the codes listed in Section 15000: Fueling System - Basic Mechanical Requirements.

1.3 REQUIRED SUBMITTALS

- A. Submittals for all equipment and materials specified herein are required. Format for submittals on materials and equipment shall be as specified. For all components both hardware and software for the complete controls system.

1.4 SPARE PARTS

- A. Where spare, replacement or additional parts are required for the equipment specified, these items shall be delivered to the Owner immediately upon receipt at the job site. Parts shall be packaged and sealed for long storage and be securely and visibly labeled as to part, function and name of equipment to which they apply. Provide spare parts lists and maintenance for valves and equipment specified in this Section.

PART 2 - PRODUCTS

2.1 AUTOMATIC TANK MONITORING SYSTEM

- A. Summary: The tank-monitoring system shall provide complete tank monitoring, inventory management through the incorporation of the latest computer technology, which allows users to view data in real-time remotely. It shall be equal to an O.P.W. Integra 100 Automatic Monitoring System.
- B. Approval, Certification and Accreditation: Probes and Sensors: Level 1 Magnetostrictive tank probes and sensors must be approved for use in the following Hazardous Location Classifications:

EEX ia IIA T4
Class 1, Division 1, Group D

The manufacturer shall maintain an ISO-9001 certification, ensuring quality management of design manufacturing.

The manufacturer shall calibrate rigid probes in a laboratory that maintains an ISO/IEC-17025 accreditation.

The tank-monitoring system has attained the following Certifications and Listings:

- Electronic Testing Labs (ETL), per Underwriters Laboratories UL 1238
- ATEX approval for use in hazardous atmospheres
- CE certification
- IEC certification

C. Testing: The automated tank-gauge system shall be tested by an independent third-party in accordance with test procedures of the applicable national and/or local standards. Tests performed will include, but will not be limited to, applicable sections, standards and requirements of the following agencies:

U.S. Environmental Protection Agency (EPA)
National Bureau of Standards (NBS)
National Electrical Code (NEC)
Underwriters Laboratories Inc. (UL)
Federal Communications Commission (FCC)
International Standards Organization (ISO-9001)

D. System Description: The tank-monitoring system shall consist of a Controller that allows all digital devices to be detected and configured automatically through the use of the touch-screen interface on the Controller. The tank-monitoring system shall have statistical leak detection (SLD) that can be connected to the system's internal I.S. module.

E. Technical Specifications:

1. Graphics Display: The tank-monitoring system shall have a 15" (38.1 cm) graphic touch-screen display that uses international user-friendly icons (MIL-STD-1472). The touch-screen graphics display shall provide one-touch access to real-time inventory data, delivery status, alarm conditions and leak-detection information.
2. Software: The tank-monitoring system shall offer software that allows the configuration of an entire fueling site from a PC. This software shall allow:
 - Statistical Leak Detection (SLD)
 - Automatic Leak Detection (ALD)
 - Real-time, accurate inventory information
 - Gross and net-corrected tank volume, product level, water level and temperature for individual tanks
 - Configurability to meet localized date/time formats and

- metric/English units
 - Downloadable and Flash-upgradeable capabilities
 - Communication with industry-standard, third-party POS protocols
 - Programmable correction factors for restrapping tanks; maximum number of correction points shall be 2,000
 - An Address Book of contacts that the unit can send text messages, fax and/or emails on any alarms or events
 - The ability to schedule reports to automatically run at specific times
 - Non-volatile memory for event storage up to 10 years
 - Compliance calendar accessible with a single touch
3. Additional Components: The Controller shall have the following module capacity:
- One (1) output and one (1) input internal relay connection
 - Communication ports:
 - Ethernet
 - RS-232
 - USB
4. Leak Test Certification: The tank-monitoring system shall be certified using the EPA Static Leak and Continuous Test, using ATGS and CITLDS methods, to the following parameters:
- 0.2 gph (0.76 L/hr) Statistical Leak test at 397,000 gallons (1,502,809 liters)/month throughput for single-tank, two-tank or three-tank manifold installations with a combined maximum capacity of 30,000 gallons (113,562 liters)
 - 0.1 gph (0.38 L/hr) Static Leak Test

F. System Capabilities: The capabilities of which the tank-monitoring system shall possess is as follows:

1. Products: The Controller shall measure API-listed products, including but not limited to, motor fuels, and alcohol blends.
2. Units: The controller shall allow for the of US measurement units.
3. Installation: The tank-monitoring system's installation must be in accordance with the following:
 - National Electric Code (NFPA No. 70)
 - Automotive and Marine Service Station Code (NFPA No. 30A)
4. Precision Leak Test: A precision leak test shall be performed on each tank before the installation of the tank-monitoring system. This test shall ensure that leak data generated by the tank-monitoring system is accurate and reliable.

5. Alarm Thresholds: The Controller shall feature sensors that are serialized and no compliance or alarm data shall be lost if the sensor needs to be replaced. The following shall be the specific Alarm Thresholds:

- Interstitial hydrocarbon liquid sensor with water indicator
 - Hydrocarbon
 - Water
 - Disconnect/Communication Loss

6. Alarm Escalation: The Controller shall allow for the definition of contacts (SMS, Fax, and Email) to notify in the event that an alarm goes unacknowledged or is not ended. The Controller shall allow for initial alarm event then up to three (3) designated alarm escalations above initial alarm.

G. System Components:

1. Probes: The probe shall have five-point temperature-sensing elements that provide accurate temperature compensation for product-volume expansion and contraction for accurate inventory management and in-tank leak detection. The probes shall be installed without requiring calibration, special filtering or alignment devices. The calibration of the probes shall take place in a laboratory that is accredited by A2LA (American Association of Laboratory Accreditations) to the requirements of ISO/IEC 17025.

2. Rigid Magnetostrictive Probes: The Level 1 Magnetostrictive Probes shall be evaluated per EPA 40 CFR, Part 290, have Class I, Division 1, Group D classification, and have IECEx UL 11.0012X and DEMKO 11 ATEX 1012670X certifications. The rigid probe shall have the following capabilities:

- Measure product level change to a resolution of 0.00005" (0.0127 mm)
- Measure product temperature change to a resolution of 0.018° F (0.01° C)
- Measure product accuracy to 0.09°F (0.5°C)
- Measure water level changes to a resolution of .04" (1.02 mm)
- Linearity over the entire probe length of ± 0.04" (±1 mm)
- Be able to operate in temperatures ranging from -40°F to 158°F (-40°C to 70°C)

The rigid probe shall be unsusceptible to programming errors, containing an EPROM database of the following specific setup data to be downloaded to the Controller during start-up:

- Probe serial number
- Probe length
- Probe velocity
- RTD locations

The rigid probe shall be constructed of welded stainless steel construction. The probe shall have five-point temperature-sensing elements that provide accurate

temperature compensation for product-volume expansion and contraction for accurate inventory management and in-tank leak detection.

3. Sensors: The Controller shall have the capability to automatically detect sensor type, part number and sensor serial number.

4. Interstitial Hydrocarbon Liquid Sensor with Water Indicator:

- Shall monitor for hydrocarbon liquid and/or water in the interstitial area of a double-walled tank
- The water sensor shall rely on the conductivity of water to detect the presence of water
- Shall be constructed of a long-life resistive element that increases in resistance in the presence of hydrocarbon liquid
- In the event of a break or short in the field wiring, the Controller shall activate an alarm

5. Fuel Management System: The system to be equal to an O.P.W FSC 3000. The system shall be able to control pumps, track fueling transactions, delivery, tank levels and have high-speed internet connection.

PV200

6. Mogas Terminal Control: The system shall be equal to an O.P.W ~~K-800~~. The system shall be able to control the 5 pumps with the dual hoses and communicate with the fuel management system. Provide 200 spare proximity cards

7. Site Software: The software shall be equal to O.P.W Phoenix SQL. The software shall be a web-based multi-user interface with controlled user access. The software shall preform multiple tasks simultaneously so the data is continuously updated.

8. Meters: The meters shall be equal to Liquid Controls M-30 meters. The meters shall be positive displacement type with a repeatability of .05% of reading over a 100:1 range from maximum nominal meter capacity. The meter shall have construction tolerances and seal materials based on product being measured.

H. Manufacturers Support and Service

1. The manufacturer shall provide technical phone support to Authorized Warranty Service Organizations, Authorized Distributors and their service personnel.

2. The distributor or service organization shall be available to offer on-site training of company maintenance personnel on installation, programming and troubleshooting of the system.

I. Warranty

1. The manufacturer warrants that all Tank Monitoring Systems supplied by the manufacturer to the Original Purchaser will be free from defects in

material and/or workmanship under normal use and service for a period of 12 months from the date of installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all equipment in strict accordance to the manufacturer's recommendations. Examine equipment for concealed damage and report any damage to the Government. Furnish all necessary labor, materials, and equipment necessary to make a complete installation as indicated and specified. Provide all necessary supports, brackets, or foundations for properly installing all equipment. Align, adjust, and lubricate all equipment before final acceptance.
- B. Furnish all bolts, nuts, studs, welding rods and gaskets for makeup of all connections to the equipment, and replace all gaskets damaged during storage, inspection, cleaning, or placing into service. The Contractor shall be responsible for all added expenses due to his choice of equipment and materials.

3.2 DELIVERY AND STORAGE OF MATERIAL AND EQUIPMENT

- A. Protect all equipment during storage and prior to start up which shall include the covering of all openings, protection against rust and other damage. Equipment may be stored outdoors when approved by the Owner. Clean and spot paint all equipment where the shop paint has been damaged or flaked off.

3.3 TESTING

- A. Replace all equipment found to be defective during testing.

-- END OF SECTION --

SECTION 17026 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Grounding conductors.
 - 2. Grounding connectors.
 - 3. Grounding busbars.
 - 4. Grounding rods.
 - 5. Grounding labeling.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:
 - 1. Ground rods.
 - 2. Ground and roof rings.
 - 3. BCT, TMGB, TGBs, and routing of their bonding conductors.
- B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Installation Supervision: Installation shall be under the direct supervision of ITS Technician, who shall be present at all times when Work of this Section is performed at Project site.
 - 2. Field Inspector: Currently registered by BICSI as a designer RCDD to perform the on-site inspection.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.
- C. Comply with TIA-607-B.

2.2 CONDUCTORS

- A. Comply with UL 486A-486B.
- B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
 - 1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
- C. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

- A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.
- B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
 - 1. Electroplated tinned copper, C and H shaped.
- C. Busbar Connectors: Cast silicon bronze, solderless compression or exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.
- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

- A. TMGB: Predrilled, wall-mounted, rectangular bars of hard-drawn solid copper, **1/4 by 4 inches (6.3 by 100 mm)** in cross section, length as indicated on Drawings. The busbar shall be NRTL listed for use as TMGB and shall comply with TIA-607-B.
 - 1. Predrilling shall be with holes for use with lugs specified in this Section.
 - 2. Mounting Hardware: Stand-off brackets that provide a **4-inch (100-mm)** clearance to access the rear of the busbar. Brackets and bolts shall be stainless steel.
 - 3. Stand-off insulators for mounting shall be Lexan or PVC. Comply with UL 891 for use in 600-V switchboards, impulse tested at 5000 V.

- B. Rack and Cabinet Grounding Busbars: Rectangular bars of hard-drawn solid copper, accepting conductors ranging from No. 14 to No. 2/0 AWG, NRTL listed as complying with UL 467, and complying with TIA-607-B. Predrilling shall be with holes for use with lugs specified in this Section.
 - 1. Cabinet-Mounted Busbar: Terminal block, with stainless-steel or copper-plated hardware for attachment to the cabinet.
 - 2. Rack-Mounted Horizontal Busbar: Designed for mounting in **19- or 23-inch (483- or 584-mm)** equipment racks. Include a copper splice bar for transitioning to an adjoining rack, and stainless-steel or copper-plated hardware for attachment to the rack.
 - 3. Rack-Mounted Vertical Busbar: **72 or 36 inches (1827 or 914 mm)** long, with stainless-steel or copper-plated hardware for attachment to the rack.

2.5 GROUND RODS

- A. Ground Rods: Copper-clad steel, sectional type; **3/4 inch by 10 feet (19 mm by 3 m)** in diameter.

2.6 IDENTIFICATION

- A. Comply with requirements for identification products in Section 17053 "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.
- B. Inspect the test results of the ac grounding system measured at the point of BCT connection.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

- D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.
- B. Comply with NECA 1.
- C. Comply with TIA-607-B.

3.3 APPLICATION

- A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
 - 1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
 - 2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, **<Insert number>** AWG minimum.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.
- D. Conductor Support:
 - 1. Secure grounding and bonding conductors at intervals of not less than **36 inches (900 mm)**.
- E. Grounding and Bonding Conductors:
 - 1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
 - 2. Install without splices.
 - 3. Support at not more than **36-inch (900-mm)** intervals.
 - 4. Install grounding and bonding conductors in **3/4-inch (21-mm)** PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.

- a. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in Section 270528 "Pathways for Communications Systems," and bond both ends of the conduit to a TGB.

3.4 GROUNDING ELECTRODE SYSTEM

- A. The BCT between the TMGB and the ac service equipment ground shall not be smaller than No. 3/0 AWG.

3.5 GROUNDING BUSBARS

- A. Indicate locations of grounding busbars on Drawings. Install busbars horizontally, on insulated spacers **2 inches (50 mm)** minimum from wall, **12 inches (300 mm)** above finished floor unless otherwise indicated.
- B. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.6 CONNECTIONS

- A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.
- B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
- C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
 - 1. Use crimping tool and the die specific to the connector.
 - 2. Pretwist the conductor.
 - 3. Apply an antioxidant compound to all bolted and compression connections.
- D. Primary Protector: Bond to the TMGB with insulated bonding conductor.
- E. Interconnections: Interconnect all TGBs with the TMGB with the telecommunications backbone conductor. If more than one TMGB is installed, interconnect TMGBs using the grounding equalizer conductor. The telecommunications backbone conductor and grounding equalizer conductor size shall not be less than **2 kcmils/linear foot (1 sq. mm/linear meter)** of conductor length, up to a maximum size of No. 3/0 AWG unless otherwise indicated.
- F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install top-mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.
- G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.

- H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each TGB to the ground bar of the panelboard.
- I. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA-568-C.1 and TIA-568-C.2 when grounding shielded balanced twisted-pair cables.
- J. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.
- K. Access Floors: Bond all metal parts of access floors to the TGB.

3.7 IDENTIFICATION

- A. Labels shall be preprinted or computer-printed type.
 - 1. Label TMGB(s) with "fs-TMGB," where "fs" is the telecommunications space identifier for the space containing the TMGB.
 - 2. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.
 - a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.
 - 3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.

- a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB. Maximum acceptable ac current level is 1 A.
- C. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify owner promptly and include recommendations to reduce ground resistance.
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 17026

SECTION 17028 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Optical-fiber-cable pathways and fittings.
 - 4. Metal wireways and auxiliary gutters.
 - 5. Nonmetallic wireways and auxiliary gutters.
 - 6. Metallic surface pathways.
 - 7. Nonmetallic surface pathways.
 - 8. Boxes, enclosures, and cabinets.

1.2 ACTION SUBMITTALS

- A. Product data for each type of product.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale and coordinated with each other, using input from installers of items involved.
- B. Qualification Data: For professional engineer.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Description: Metal raceway of circular cross section with manufacturer-fabricated fittings.
- B. General Requirements for Metal Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
 - 2. Comply with TIA-569-D.
- C. GRC: Comply with ANSI C80.1 and UL 6.

- D. ARC: Comply with ANSI C80.5 and UL 6A.
- E. IMC: Comply with ANSI C80.6 and UL 1242.
- F. PVC-Coated Steel Conduit: PVC-coated GRC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- G. EMT: Comply with ANSI C80.3 and UL 797.
- H. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel or die cast.
 - b. Type: compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- I. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Description: Nonmetallic raceway of circular section with manufacturer-fabricated fittings.
- B. General Requirements for Nonmetallic Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 - 2. Comply with TIA-569-D.
- C. RNC: Type EPC-80-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- D. Rigid HDPE: Comply with UL 651A.
- E. Continuous HDPE: Comply with UL 651A.
- F. RTRC: Comply with UL 2515A and NEMA TC 14.
 - 1. Fittings: Comply with NEMA TC 3; match to conduit or tubing type and material.

2.3 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

- A. Description: Comply with UL 2024; flexible-type pathway with a circular cross section, approved for riser installation unless otherwise indicated.
 - 1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 - 2. Comply with TIA-569-D.

2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Sheet metal trough of rectangular cross section fabricated to required size and shape, without holes or knockouts, and with hinged or removable covers.
- B. General Requirements for Metal Wireways and Auxiliary Gutters:
 - 1. Comply with UL 870 and NEMA 250, Type 3R unless otherwise indicated, and sized according to NFPA 70.
 - 2. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 - 3. Comply with TIA-569-D.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS

- A. Description: Fiberglass polyester, extruded and fabricated to required size and shape, without holes or knockouts. Cover shall be gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections shall be flanged and have stainless-steel screws and oil-resistant gaskets.
- B. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.
- C. General Requirements for Nonmetallic Wireways and Auxiliary Gutters:
 - 1. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
 - 2. Comply with TIA-569-D.
- D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

2.6 SURFACE METAL PATHWAYS

- A. Description: Galvanized steel with snap-on covers, complying with UL 5.

- B. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- C. Comply with TIA-569-D.

2.7 SURFACE NONMETALLIC PATHWAYS:

- A. Description: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC.
- B. Finish: Texture and color selected by Architect from manufacturer's standard colors.
- C. Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with TIA-569-D.

2.8 BOXES, ENCLOSURES, AND CABINETS

- A. Description: Enclosures for communications.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
 - 1. Comply with TIA-569-D.
 - 2. Boxes, enclosures, and cabinets installed in wet locations shall be listed and labeled as defined in NFPA 70, by an NRTL, and marked for use in wet locations.
 - 3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
 - 4. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
 - 5. Gangable boxes are allowed.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- G. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- H. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R, with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures:

- a. Material: Fiberglass.
 - b. Finished inside with radio-frequency-resistant paint.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- I. Cabinets:
1. NEMA 250, Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.
 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

- A. Minimum Pathway Size: **3/4-inch (21-mm)** trade size for copper and aluminum cables, and **1 inch (25 mm)** for optical-fiber cables.
- B. Pathway Fittings: Compatible with pathways and suitable for use and location.
- C. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- D. Install surface pathways only where indicated on Drawings.
- E. Do not install nonmetallic conduit where ambient temperature exceeds **120 deg F (49 deg C)**.

3.2 INSTALLATION

- A. Comply with the following standards for installation requirements except where requirements on Drawings or in this Section are stricter:
 1. NECA 1.
 2. NECA/BICSI 568.
 3. TIA-569-D.
 4. NECA 101
 5. NECA 102.
 6. NECA 105.
 7. NECA 111.
- B. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- C. Comply with requirements in Section "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

- D. Comply with requirements in Section 17044 "Sleeves and Sleeve Seals for Communications Pathways and Cabling" for sleeves and sleeve seals for communications.
- E. Keep pathways at least **6 inches (150 mm)** away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- F. Complete pathway installation before starting conductor installation.
- G. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within **12 inches (300 mm)** of changes in direction. Utilize long radius ells for all optical-fiber cables.
- H. Conceal rigid conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- I. Support conduit within **12 inches (300 mm)** of enclosures to which attached.
- J. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for pathways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
- L. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.
- M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure, to assure a continuous ground path.
- N. Cut conduit perpendicular to the length. For conduits of **2-inch (50-mm)** trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- O. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than **200-lb (90-kg)** tensile strength. Leave at least **12 inches (300 mm)** of slack at each end of pull wire. Secure pull wire, so it cannot fall into conduit. Cap pathways designated as spare alongside pathways in use.
- P. Surface Pathways:
 - 1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
 - 2. Install surface pathway with a minimum **2-inch (50-mm)** radius control at bend points.
 - 3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding **48 inches (1200 mm)** and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

- Q. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:
1. **3/4-Inch (21-mm)** Trade Size and Smaller: Install pathways in maximum lengths of **50 feet (15 m)**.
 2. **1-Inch (25-mm)** Trade Size and Larger: Install pathways in maximum lengths of **75 feet (23 m)**.
 3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- R. Install pathway-sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway-sealing fittings according to NFPA 70.
- S. Install devices to seal pathway interiors at accessible locations. Locate seals, so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service pathway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- T. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
- U. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed **30 deg F (17 deg C)**, and that has straight-run length that exceeds **25 feet (7.6 m)**. Install in each run of aboveground RMC and EMT that is located where environmental temperature change may exceed **100 deg F (55 deg C)**, and that has straight-run length that exceeds **100 feet (30 m)**.
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: **125 deg F (70 deg C)** temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: **155 deg F (86 deg C)** temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: **125 deg F (70 deg C)** temperature change.
 - d. Attics: **135 deg F (75 deg C)** temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least **0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C)** of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least **0.000078 inch per foot of length of straight run per deg F (0.0115**

mm per meter of length of straight run per deg C) of temperature change for metal conduits.

4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- V. Mount boxes at heights indicated on Drawings. Install boxes with height measured to center of box unless otherwise indicated.
- W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- X. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
- Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- Z. Set metal floor boxes level and flush with finished floor surface.
- AA. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Install backfill.
2. After installing conduit, backfill and compact.
3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with **3 inches (75 mm)** of concrete around conduit for a minimum of **12 inches (300 mm)** on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of **60 inches (1500 mm)** from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
4. Underground Warning Tape: Comply with requirements in Section 17053 "Identification for Communications Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from **1/2-inch (12.5-mm)** sieve to **No. 4 (4.75-mm)** sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures **1 inch (25 mm)** above finished grade.
- D. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 17044 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section "Penetration Firestopping."

3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 17028

SECTION 17043 - UNDERGROUND PATHWAYS AND STRUCTURES FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduit and fittings, including GRC and PVC-coated GRC.
2. Rigid nonmetallic duct.
3. Flexible nonmetallic duct.
4. Duct accessories, including rigid innerduct and fabric innerduct.
5. Precast concrete handholes.
6. Polymer concrete handholes and boxes with polymer concrete cover.
7. Fiberglass handholes and boxes with polymer concrete cover.
8. Fiberglass handholes and boxes.
9. High density plastic boxes.
10. Utility structure accessories.

1.2 DEFINITIONS

- A. Direct-Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials, such as concrete.
- B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- C. Duct Bank:
1. Two or more ducts installed in parallel, with or without additional casing materials.
 2. Multiple duct banks.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Duct and Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
- B. Qualification Data: For professional engineer and testing agency responsible for testing nonconcrete handholes and boxes.
- C. Source quality-control reports.

- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. GRC: Comply with ANSI C80.1 and UL 6.
- B. PVC-Coated Steel Conduit: PVC-coated GRC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- C. General Requirements for Metal Conduits and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
 - 2. Comply with TIA-569-C and TIA-758-C.

2.2 RIGID NONMETALLIC DUCT

- A. Underground Plastic Utilities Duct: Type EPC-80-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.
- B. General Requirements for Nonmetallic Ducts and Fittings:
 - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
 - 2. Comply with TIA-569-C and TIA-758-C.

2.3 FLEXIBLE NONMETALLIC DUCT

- A. HDPE Duct: Type EPEC 80-HDPE complying with NEMA TC 7 and UL 651A.
- B. General Requirements for HDPE Duct
 - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
 - 2. Comply with TIA-569-C and TIA-758-C.

2.4 DUCT ACCESSORIES

- A. Duct Spacers: Factory-fabricated rigid PVC interlocking spacers, sized for type and size of duct with which used, and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.
- B. Underground-Line Warning Tape: Underground-line warning tape specified in Section 17053 "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate layout and installation of duct, duct bank, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Architect if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.
- B. Coordinate elevations of duct and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Architect.

3.2 UNDERGROUND DUCT APPLICATION

- A. Duct for Communications: Type EPC-80-PVC RNC, in direct-buried duct bank unless otherwise indicated.
- B. Duct for Communications: Type EPEC-80-HDPE duct in direct-bored duct bank unless otherwise indicated.
- C. Underground Duct Crossing Paved Paths Walks and Driveways Roadways: Type EPC-40-PVC RNC, encased in reinforced concrete.
- D. Stub-Ups for Communications: Concrete-encased RNC.

3.3 UNDERGROUND ENCLOSURE APPLICATION

3.4 EARTHWORK

- A. Excavation and Backfill: Comply with Section "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restoration: Replace area immediately after backfilling is completed or after construction in immediate area is complete.

- C. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated.
- D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with owners requirements.
- E. Cut and patch is not allowed.

3.5 DUCT AND DUCT-BANK INSTALLATION

- A. Where indicated on Drawings, install duct, spacers, and accessories into the duct configuration shown. Duct installation requirements in this Section also apply to duct bank.
- B. Install duct and duct bank according to NEMA TCB 2 and TIA-758-C.
- C. Slope: Pitch duct and duct bank a minimum slope of 1:100 down toward manholes and handholes and away from buildings and equipment. Slope duct and duct bank from a high point in runs between two manholes, to drain in both directions.
- D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of **48 inches (1200 mm)**, both horizontally and vertically, at other locations unless otherwise indicated.
 - 1. Duct and duct banks shall have maximum of two 90-degree bends, or the total of all bends shall be no more 180 degrees between pull points.
- E. Joints: Use solvent-cemented joints in duct and fittings, and make watertight according to manufacturer's written instructions. Stagger couplings, so those of adjacent ducts do not lie in same plane.
- F. Installation Adjacent to High-Temperature Steam Lines: Where duct or duct banks are installed parallel to underground steam lines, perform calculations showing the duct or duct bank will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct or duct bank crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.
- G. End-Bell Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately **6 inches (150 mm)** o.c. for **4-inch (100-mm)** duct, and vary proportionately for other duct sizes.
- H. Terminator Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately **6 inches (150 mm)** o.c. for **4-inch (100-mm)** duct, and vary proportionately for other duct sizes.
- I. Building Wall Penetrations: Make a transition from underground duct to GRC at least **10 feet (3 m)** outside the building wall, without reducing duct slope away from the building or forming a trap in the duct. Use fittings manufactured for RNC duct-to-GRC conduit transition. Install

GRC penetrations of building walls as specified in Section 17044 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

- J. Sealing: Provide temporary closure at terminations of duct that has cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least **15-psig (1.03-MPa)** hydrostatic pressure.
- K. Pulling Cord: Install **200-lbf- (1000-N-m)** test nylon cord in empty duct [**and innerduct**].
- L. Direct-Buried Duct and Duct Banks:
 - 1. Excavate trench bottom to provide firm and uniform support for duct and duct bank. Comply with requirements in Section 312000 "Earth Moving" for preparation of trench bottoms for duct less than **6 inches (150 mm)** in nominal diameter.
 - 2. Install duct with a minimum of **3 inches (75 mm)** between duct for like services and **6 inches (150 mm)** between power and signal duct.
 - 3. Width: Excavate trench **12 inches (300 mm)** wider than duct or duct bank on each side.
 - 4. Width: Excavate trench **3 inches (75 mm)** wider than duct or duct bank on each side.
 - 5. Depth: Install top of duct or duct bank at least **36 inches (900 mm)** below finished grade unless otherwise indicated.
 - 6. Set elevation of bottom of duct or duct bank below frost line.
 - 7. Support duct on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
 - 8. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per **20 feet (6 m)** of duct. Place spacers within **24 inches (600 mm)** of duct ends. Stagger spacers approximately **6 inches (150 mm)** between tiers. Secure spacers to earth and duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around duct or duct bank.
 - 9. Elbows: Install manufactured duct elbows for stub-ups, at building entrances through floor, and at changes of direction in duct unless otherwise indicated. Encase elbows for stub-ups throughout length of elbow. Extend encasement minimum of **36 inches (900 mm)** beyond elbow joints.
 - 10. After installing first tier of duct, backfill and compact. Start at tie-in point and work toward end of duct run, leaving duct at end of run free to move with expansion and contraction, as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to **4 inches (100 mm)** over duct and hand tamp. Firmly tamp backfill around duct to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction. Comply with requirements in Section 312000 "Earth Moving" for installation of backfill materials.
- M. Underground-Line Warning Tape: Bury conducting underground-line warning tape specified in Section 17053 "Identification for Communication Systems" no less than **12 inches (300 mm)** above all concrete-encased duct and duct bank and approximately **12 inches (300 mm)** below grade. Align tape parallel to and within **3 inches (75 mm)** of centerline of duct bank. Provide an additional warning tape for each **12-inch (300-mm)** increment of duct-bank width over a nominal **18 inches (450 mm)**. Space additional tapes **12 inches (300 mm)** apart, horizontally.
 - 1.

3.6 GROUNDING

- A. Ground underground duct, duct bank, and utility structures according to Section 17026 "Grounding and Bonding for Communications Systems."

3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank, and utility structures.
 - 2. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide a minimum 12-inch- (300-mm-) long mandrel equal to duct size minus 1/4 inch (6 mm). If obstructions are indicated, remove obstructions and retest.
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.8 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris.
- B. Clean internal surfaces of manholes, including sump.
 - 1. Sweep floor, removing dirt and debris.
 - 2. Remove foreign material.

END OF SECTION 17043

SECTION 17044 - SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for pathway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized-steel sheet.
2. Minimum Metal Thickness:

- a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
- b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
 1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Stainless steel.
 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pathway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for **1-inch (25-mm)** annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at pathway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 17044

SECTION 17053 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Color and legend requirements for labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes.
5. Signs.
6. Cable ties.
7. Fasteners for labels and signs.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Identification Schedule:

1. Outlets: Scaled drawings indicating location and proposed designation.
2. Backbone Cabling: Riser diagram showing each communications room, backbone cable, and proposed backbone cable designation.
3. Racks: Scaled drawings indicating location and proposed designation.
4. Patch Panels: Enlarged scaled drawings showing rack row, number, and proposed designations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70 and TIA 606-B.

B. Comply with ANSI Z535.4 for safety signs and labels.

C. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Equipment Identification Labels:

1. Black letters on a white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters of raceway or cable they identify, that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, **3-mil- (0.08-mm-)** thick, polyester flexible labels with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating protective shields over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof black ink marker recommended by tag manufacturer.
3. Marker for Labels: Machine-printed, permanent, waterproof black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Polyester, thermal, transfer-printed, **3-mil- (0.08-mm-)** thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:
 - a. **1-1/2 by 6 inches (37 by 150 mm)** for raceway and conductors.
 - b. **3-1/2 by 5 inches (76 by 127 mm)** for equipment.
 - c. As required by authorities having jurisdiction.

2.4 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
2. **1/4-inch (6.4-mm)** grommets in corners for mounting.
3. Nominal Size: **7 by 10 inches (180 by 250 mm)**.

B. Laminated-Acrylic or Melamine-Plastic Signs:

1. Engraved legend.
2. Thickness:
 - a. For signs up to **20 sq. in. (129 sq. cm)**, minimum **1/16 inch (1.6 mm)** thick.
 - b. For signs larger than **20 sq. in. (129 sq. cm)**, **1/8 inch (3.2 mm)** thick.
 - c. Engraved legend with black letters on white face.

- d. Punched or drilled for mechanical fasteners with 1/4-inch (6.4-mm) grommets in corners for mounting.
- e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black, except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C) according to ASTM D 638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Verify identity of each item before installing identification products.

- C. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- D. Apply identification devices to surfaces that require finish after completing finish work.
- E. Install signs with approved legend to facilitate proper identification, operation, and maintenance of communications systems and connected items.
- F. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- G. Vinyl Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
 - 3. Provide label **6 inches (150 mm)** from cable end.
- H. Snap-Around Labels:
 - 1. Secure tight to surface at a location with high visibility and accessibility.
 - 2. Provide label **6 inches (150 mm)** from cable end.
- I. Self-Adhesive Wraparound Labels:
 - 1. Secure tight to surface at a location with high visibility and accessibility.
 - 2. Provide label **6 inches (150 mm)** from cable end.
- J. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with **1/2-inch- (13-mm-)** high letters on **1-1/2-inch- (38-mm-)** high label; where two lines of text are required, use labels **2 inches (50 mm)** high.
- K. Cable Ties: General purpose, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.

3.2 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations with high visibility. Identify by system and circuit designation.

- C. Accessible Fittings for Raceways and Cables within Buildings: Identify covers of each junction and pull box with self-adhesive labels containing wiring system legend.
 - 1. System legends shall be as follows:
 - a. Telecommunications.
- D. Backbone Cables: Label each cable with a vinyl-wraparound label indicating the location of the far or other end of the backbone cable. Patch panel or punch down block where cable is terminated should be labeled identically.
- E. Horizontal Cables: Label each cable with a vinyl-wraparound label indicating the following, in the order listed:
 - 1. Room number.
 - 2. Colon.
 - 3. Faceplate number.
- F. Instructional Signs: Self-adhesive labels.
- G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures: Self-adhesive labels.
 - 1. Apply to exterior of door, cover, or other access.
- H. Equipment Identification Labels:
 - 1. Indoor Equipment: Self-adhesive label.
 - 2. Outdoor Equipment: Laminated-acrylic or melamine-plastic sign.
 - 3. Equipment to Be Labeled:
 - a. Communications cabinets.
 - b. Uninterruptible power supplies.
 - c. Computer room air conditioners.
 - d. Fire-alarm and suppression equipment.
 - e. Egress points.
 - f. Power distribution components.

END OF SECTION 17053

SECTION 17123 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. 62.5/125-micrometer, multimode, optical fiber cable (OM1).
2. 50/125 micrometer, multimode, optical fiber cable (OM2).
3. 850 nanometer laser-optimized 50/125 micrometer multimode optical fiber cable (OM3).
4. 850 nanometer laser-optimized 50/125 micrometer multimode optical fiber cable (OM4).
5. Singlemode fiber.
6. Optical fiber cable connecting hardware, patch panels, and cross-connects.
7. Cabling identification products.

1.2 OPTICAL FIBER BACKBONE CABLING DESCRIPTION

- A. Optical fiber backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Reviewed and stamped by RCDD.

1. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
2. Cabling administration drawings and printouts.
3. Wiring diagrams to show typical wiring schematics including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications grounding system
 - d. Cross-connects.
 - e. Patch panels.
 - f. Patch cords.
4. Cross-connects and patch panels.

C. Optical fiber cable testing plan.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.
- D. Product Certificates: For each type of product.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Technician, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.

1.7 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- C. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- D. Grounding: Comply with TIA-607-B.

2.2 62.5/125-MICROMETER, MULTIMODE, OPTICAL FIBER CABLE (OM1)

- A. Description: Multimode, 62.5/125-micrometer, 6-fiber, nonconductive, tight buffer, optical fiber cable.
- B. Standards:
 - 1. Comply with ICEA S-83-596 for mechanical properties.
 - 2. Comply with TIA-568-C.3 for performance specifications.
 - 3. Comply with TIA-492AAAA for detailed specifications.
- C. Conductive cable shall be aluminum armored type.
- D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
- E. Minimum Overfilled Modal Bandwidth-length Product: 200 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
- F. Jacket:
 - 1. Jacket Color: Orange.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed **40 inches (1000 mm)**.
- G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
 - 2. Plenum Rated, Nonconductive: Type OFNP in listed plenum communications raceway.
 - 3. Plenum Rated, Nonconductive: Type OFNP, or Type OFNR in metallic conduit.

4. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFNP, or Type OFNR in metallic conduit.
5. Riser Rated, Nonconductive: Type OFNP or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
6. Plenum Rated, Conductive: Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
7. Riser Rated, Conductive: Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit.

2.3 50/125 MICROMETER, MULTIMODE, OPTICAL FIBER CABLE (OM2)

- A. Description: Multimode, 50/125-micrometer, 6-fiber, nonconductive, tight buffer, optical fiber cable.
- B. Standards:
 1. Comply with ICEA S-83-596 for mechanical properties.
 2. Comply with TIA-568-C.3 for performance specifications.
 3. Comply with TIA-492AAAB for detailed specifications.
- C. Conductive cable shall be aluminum armored type.
- D. Maximum Attenuation: [3.50] dB/km at 850 nm; 1.5 dB/km at 1300 nm.
- E. Minimum Overfilled Modal Bandwidth-length Product: 500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
- F. Jacket:
 1. Jacket Color: Orange.
 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).
- G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 1. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFNP, or Type OFNR in metallic conduit.
 2. Riser Rated, Nonconductive: Type OFN, Type OFNG, Type OFNP, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 3. Plenum Rated, Conductive: Type OFC, Type OFN, Type OFCG, Type OFNG, Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 4. Riser Rated, Conductive: Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit.

- 2.4 850 NANOMETER LASER-OPTIMIZED, 50/125 MICROMETER, MULTIMODE OPTICAL FIBER CABLE (OM3)
- A. Description: Multimode, 50/125-micrometer, 6-fiber, nonconductive, tight buffer, optical fiber cable.
 - B. Standards:
 - 1. Comply with ICEA S-83-596 for mechanical properties.
 - 2. Comply with TIA-568-C.3 for performance specifications.
 - 3. Comply with TIA-492AAAC for detailed specifications.
 - C. Conductive cable shall be aluminum armored type.
 - D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
 - E. Minimum Overfilled Modal Bandwidth-length Product: 1500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
 - F. Minimum Effective Modal Bandwidth-length Product: 2000 MHz-km at 850 nm.
 - G. Jacket:
 - 1. Jacket Color: Aqua.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).
 - H. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFNP, or Type OFNR in metallic conduit.
 - 2. Riser Rated, Nonconductive: Type OFNP, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 - 3. Plenum Rated, Conductive: Type OFNG, Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 - 4. Riser Rated, Conductive: Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit.
- 2.5 850 NANOMETER LASER-OPTIMIZED, 50/125 MICROMETER, MULTIMODE OPTICAL FIBER CABLE (OM4)
- A. Description: Multimode, 50/125-micrometer, 6-fiber, nonconductive, tight buffer, optical fiber cable.
 - B. Standards:

1. Comply with ICEA S-83-596 for mechanical properties.
 2. Comply with TIA-568-C.3 for performance specifications.
 3. Comply with TIA-492AAAD for detailed specifications.
- C. Conductive cable shall be aluminum armored type.
- D. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
- E. Minimum Overfilled Modal Bandwidth-length Product: 3500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
- F. Minimum Effective Modal Bandwidth-length Product: 4700 MHz-km at 850 nm.
- G. Jacket:
1. Jacket Color: Aqua.
 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).
- H. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
1. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFN, Type OFNG, Type OFNP, or Type OFNR in metallic conduit.
 2. Riser Rated, Nonconductive: Type OFNP, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 3. Plenum Rated, Conductive: Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 4. Riser Rated, Conductive: Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit.
- 2.6 9/125 MICROMETER SINGLE-MODE, INDOOR-OUTDOOR OPTICAL FIBER CABLE (OS1)
- A. Description: Single mode, 9/125-micrometer, 6 fibers, single loose tube, armored optical fiber cable.
- B. Standards:
1. Comply with TIA-492CAA for detailed specifications.
 2. Comply with TIA-568-C.3 for performance specifications.
 3. Comply with ICEA S-104-696 for mechanical properties.
- C. Armored cable shall be aluminum armored type.
- D. Maximum Attenuation: 0.5 dB/km at 1310 nm; 0.5 dB/km at 1550 nm.

- E. Jacket:
 - 1. Jacket Color: Yellow.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

- F. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFN, Type OFNG, Type OFNP, or Type OFNR in metallic conduit.
 - 2. Riser Rated, Nonconductive: Type OFNP, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 - 3. Plenum Rated, Armored (Conductive): Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 - 4. Riser Rated, Armored (Conductive): Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit.

2.7 9/125 MICROMETER, SINGLE-MODE, INDOOR-OUTDOOR OPTICAL FIBER CABLE (OS2)

- A. Description: Single mode, 9/125-micrometer, 6 fibers, single loose tube, armored optical fiber cable.

- B. Standards:
 - 1. Comply with TIA-492CAAB for detailed specifications.
 - 2. Comply with TIA-568-C.3 for performance specifications.
 - 3. Comply with ICEA S-104-696 for mechanical properties.

- C. Armored cable shall be aluminum armored type.

- D. Maximum Attenuation: 0.5 dB/km at 1310 nm; 0.5 dB/km at 1550 nm.

- E. Jacket:
 - 1. Jacket Color: Yellow.
 - 2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
 - 3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches (1000 mm).

- F. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262; Type OFNP in listed plenum communications raceway; or Type OFN, Type OFNG, Type OFNP, or Type OFNR in metallic conduit.

2. Riser Rated, Nonconductive: Type OFNP, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
3. Plenum Rated, Armored (Conductive): Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
4. Riser Rated, Armored (Conductive): Type OFCP, Type OFNP, Type OFCR, or Type OFNR in metallic conduit.

2.8 OPTICAL FIBER CABLE HARDWARE

A. Standards:

1. Comply with Optical Fiber Connector Intermateability Standard specifications of the TIA-604 series.
2. Comply with TIA-568-C.3.

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

C. Patch Cords: Factory-made, dual-fiber cables in 36-inch (900-mm) lengths.

D. Connector Type: Type SC complying with TIA-604-3-B, Type ST complying with TIA-604-2-B, Type LC complying with TIA-604-10-B, Type MT-RJ complying with TIA-604-12, Type MPO complying with TIA-604-5-D, connectors.

E. Plugs and Plug Assemblies:

1. Male; color-coded modular telecommunications connector designed for termination of a single optical fiber cable.
2. Insertion loss not more than 0.25 dB.
3. Marked to indicate transmission performance.

F. Jacks and Jack Assemblies:

1. Female; quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of a single optical fiber cable.
2. Insertion loss not more than 0.25 dB.
3. Marked to indicate transmission performance.
4. Designed to snap-in to a patch panel or faceplate.

2.9 GROUNDING

A. Comply with requirements in Section 17026 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. Comply with TIA-607-B.

2.10 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test multimode optical fiber cables according to TIA-526-14-B and TIA-568-C.3.
- C. Factory test pre-terminated optical fiber cable assemblies according to TIA-526-14-B and TIA-568-C.3.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for pathways specified in Section 17028 "Pathways for Communications Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

- A. Comply with NECA 1, NECA 301, and NECA/BICSI 568.

B. General Requirements for Optical Fiber Cabling Installation:

1. Comply with TIA-568-C.1 and TIA-568-C.3.
2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
3. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
9. In the communications equipment room, provide a **10-foot- (3-m-)** long service loop on each end of cable.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

3.4 FIRESTOPPING

- A. Comply with requirements in Section "Penetration Firestopping."
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with BICSI ITSIMM, "Firestopping" Chapter.

3.5 GROUNDING

- A. Install grounding according to BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.
- B. Comply with TIA-607-B and NECA/BICSI-607.

- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least **2-inch (50-mm)** clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-B. Comply with requirements for identification specified in Section 17053 "Identification for Communications Systems."
 - 1. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 2 level of administration including optional identification requirements of this standard.
- C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- E. Cable and Wire Identification:
 - 1. Label each cable within **4 inches (100 mm)** of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding **15 feet (4.5 m)**.
 - 4. Label each unit and field within distribution racks and frames.
 - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Labels shall be preprinted/computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-B, for the following:
 - 1. Flexible vinyl or polyester that flexes as cables are bent.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Visually inspect optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Optical Fiber Cable Tests:
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Link End-to-End Attenuation Tests:
 - 1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in one direction according to TIA-526-14-B, Method B, One Reference Jumper.
 - 2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than those calculated according to equation in TIA-568-C.1.
- D. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- E. Remove and replace cabling where test results indicate that it does not comply with specified requirements.
- F. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

END OF SECTION 17123

SECTION 26 05 11
REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section applies to all sections of Division 26.
- B. Furnish and install electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, cable, switchboards, switchgear, panelboards, motor control centers, generators, automatic transfer switches, and other items and arrangements for the specified items are shown on drawings.
- C. Electrical service entrance equipment and arrangements for temporary and permanent connections to the utility's system shall conform to the utility's requirements. Coordinate fuses, circuit breakers and relays with the utility's system, and obtain utility approval for sizes and settings of these devices.
- D. Wiring ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are prohibited.

1.2 MINIMUM REQUIREMENTS

- A. References to the International Building Code (IBC), National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL) and National Fire Protection Association (NFPA) are minimum installation requirement standards.
- B. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the above standards.

1.3 TEST STANDARDS

- A. All materials and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., standards where test standards have been established. Equipment and materials which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

B. Definitions:

1. Listed; Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed equipment or materials or periodic evaluation of services, and whose listing states that the equipment, material, or services either meets appropriate designated standards or has been tested and found suitable for a specified purpose.
2. Labeled; Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
3. Certified; equipment or product which:
 - a. Has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Production of equipment or product is periodically inspected by a nationally recognized testing laboratory.
 - c. Bears a label, tag, or other record of certification.
4. Nationally recognized testing laboratory; laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.4 QUALIFICATIONS (PRODUCTS AND SERVICES)

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least three years.
- B. Product Qualification:
 1. Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years.
 2. The Airport reserves the right to require the Contractor to submit a list of installations where the products have been in operation before approval.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.5 APPLICABLE PUBLICATIONS

Applicable publications listed in all Sections of Division are the latest issue, unless otherwise noted.

1.6 MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts shall be available.
- B. When more than one unit of the same class or type of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 - 1. Components of an assembled unit need not be products of the same manufacturer.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.
- E. When Factory Testing Is Specified:
 - 1. The Engineer shall have the option of witnessing factory tests. The contractor shall notify the Engineer a minimum of 15 working days prior to the manufacturers making the factory tests.
 - 2. Four copies of certified test reports containing all test data shall be furnished to the Engineer prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When equipment fails to meet factory test and re-inspection is required, the contractor shall be liable for all additional expenses, including expenses of the Airport.

1.7 EQUIPMENT REQUIREMENTS

Where variations from the contract requirements are requested in accordance with Section 00 72 00, GENERAL CONDITIONS and Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, the connecting work and related components shall include, but not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.

1.8 EQUIPMENT PROTECTION

- A. Equipment and materials shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.

1. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Equipment shall include but not be limited to switchgear, switchboards, panelboards, transformers, motor control centers, motor controllers, uninterruptible power systems, enclosures, controllers, circuit protective devices, cables, wire, light fixtures, electronic equipment, and accessories.
2. During installation, equipment shall be protected against entry of foreign matter; and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
3. Damaged equipment shall be, as determined by the Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
5. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

- A. All electrical work must comply with the requirements of NFPA 70 (NEC), NFPA 70B, NFPA 70E, OSHA Part 1910 subpart J, OSHA Part 1910 subpart S and OSHA Part 1910 subpart K in addition to other references required by contract.
- B. Job site safety and worker safety is the responsibility of the contractor.
- C. Electrical work shall be accomplished with all affected circuits or equipment de-energized. When an electrical outage cannot be accomplished in this manner for the required work, the following requirements are mandatory:
 1. Electricians must use full protective equipment (i.e., certified and tested insulating material to cover exposed energized electrical components, certified and tested insulated tools, etc.) while working on energized systems in accordance with NFPA 70E.
 2. Electricians must wear personal protective equipment while working on energized systems in accordance with NFPA 70E.
 3. Before initiating any work, a job specific work plan must be developed by the contractor with a peer review conducted and documented by the Engineer staff. The work plan must include procedures to be used on and near the live electrical equipment, barriers to be installed, safety equipment to be used and exit pathways.
 4. Work on energized circuits or equipment cannot begin until prior written approval is obtained from the Engineer.
- D. For work on existing facilities, arrange, phase and perform work to assure electrical service for other buildings at all times. Refer to Article OPERATIONS AND STORAGE AREAS under Section 01 00 00, GENERAL REQUIREMENTS.

- E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Section 01 00 00, GENERAL REQUIREMENTS.
- F. Coordinate location of equipment and conduit with other trades to minimize interferences.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings.
- B. Working spaces shall not be less than specified in the NEC for all voltages specified.
- C. Inaccessible Equipment:
 - 1. Where the Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Airport.
 - 2. "Conveniently accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

1.11 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers (starters), fused and unfused safety switches, automatic transfer switches, separately enclosed circuit breakers, individual breakers and controllers in switchboards, switchgear and motor control assemblies, control devices and other significant equipment.
- B. Nameplates for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Nameplates for Essential Electrical System (EES) equipment, as defined in the NEC, shall be laminated red phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 1/2 inch [12mm] high. Nameplates shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires, and type of EES power branch as applicable. Secure nameplates with screws.
- C. Install adhesive arc flash warning labels on all equipment as required by NFPA 70E. Label shall indicate the arc hazard boundary (inches), working distance (inches), arc flash incident energy at the working distance (calories/cm²), required PPE category and description including the glove rating, voltage rating of the equipment, limited approach distance (inches), restricted approach distance (inches), prohibited approach distance (inches), equipment/bus name, date prepared, and manufacturer name and address.

1.12 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. The Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site.
- C. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
- D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION _____".
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. Submit each section separately.
- E. The submittals shall include the following:
 - 1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 - 2. Elementary and interconnection wiring diagrams for communication and signal systems, control systems and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 - 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer.
- F. Manuals: Submit in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
 - 1. Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test, and furnish the remaining manuals prior to contract completion.
 - 2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
 - 3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The

instructions shall be legible and easily read, with large sheets of drawings folded in.

4. The manuals shall include:
 - a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
 - b. A control sequence describing start-up, operation, and shutdown.
 - c. Description of the function of each principal item of equipment.
 - d. Installation instructions.
 - e. Safety precautions for operation and maintenance.
 - f. Diagrams and illustrations.
 - g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers and replacement frequencies.
 - h. Performance data.
 - i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
 - j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.
- G. Approvals will be based on complete submission of manuals together with shop drawings.

1.13 SINGULAR NUMBER

Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.14 ACCEPTANCE CHECKS AND TESTS

The contractor shall furnish the instruments, materials and labor for field tests.

1.15 TRAINING

- A. Training shall be provided in accordance with Article 1.25, INSTRUCTIONS, of Section 01 00 00, GENERAL REQUIREMENTS.
- B. Training shall be provided for the particular equipment or system as required in each associated specification.
- C. A training schedule shall be developed and submitted by the contractor and approved by the Engineer at least 30 days prior to the planned training.

END OF SECTION 26 05 11

SECTION 26 05 21
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
(600 VOLTS AND BELOW)

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of the low voltage power and lighting wiring.

1.2 RELATED WORK

- A. Section 07 84 00, FIRESTOPPING: Sealing around penetrations to maintain the integrity of fire-rated construction.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for cables and wiring.
- E. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Installation of low-voltage conductors and cables in manholes and ducts.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 FACTORY TESTS

Low voltage cables shall be thoroughly tested at the factory per NEMA WC-70 to ensure that there are no electrical defects. Factory tests shall be certified.

1.5 SUBMITTALS

In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

1. Manufacturer's Literature and Data: Showing each cable type and rating.
2. Certifications: Two weeks prior to the final inspection, submit four copies of the following certifications to the Engineer:
 - a. Certification by the manufacturer that the materials conform to the requirements of the drawings and specifications.
 - b. Certification by the contractor that the materials have been properly installed, connected, and tested.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.
- B. American Society of Testing Material (ASTM):

D2301-04	Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
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- C. National Fire Protection Association (NFPA):

70-08	National Electrical Code (NEC)
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- D. National Electrical Manufacturers Association (NEMA):

WC 70-09	Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy
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- E. Underwriters Laboratories, Inc. (UL):

44-05	Thermoset-Insulated Wires and Cables
83-08	Thermoplastic-Insulated Wires and Cables
467-071	Electrical Grounding and Bonding Equipment
486A-486B-03	Wire Connectors
486C-04	Splicing Wire Connectors
486D-05	Sealed Wire Connector Systems
486E-94	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
493-07	Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable
514B-04	Conduit, Tubing, and Cable Fittings
1479-03	Fire Tests of Through-Penetration Fire Stops

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Conductors and cables shall be in accordance with NEMA WC-70 and as specified herein.
- B. Single Conductor:

1. Shall be annealed copper.
2. Shall be stranded for sizes No. 8 AWG and larger, solid for sizes No. 10 AWG and smaller.
3. Shall be minimum size No. 12 AWG, except where smaller sizes are allowed herein.

C. Insulation:

1. XHHW-2 or THHN-THWN shall be in accordance with NEMA WC-70, UL 44, and UL 83.

D. Color Code:

1. Secondary service feeder and branch circuit conductors shall be color-coded as follows:

208/120 volt	Phase	480/277 volt
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

- a. Lighting circuit “switch legs” and 3-way switch “traveling wires” shall have color coding that is unique and distinct (e.g., pink and purple) from the color coding indicated above. The unique color codes shall be solid and in accordance with the NEC. Coordinate color coding in the field with the Engineer.
2. Use solid color insulation or solid color coating for No. 12 AWG and No. 10 AWG branch circuit phase, neutral, and ground conductors.
3. Conductors No. 8 AWG and larger shall be color-coded using one of the following methods:
 - a. Solid color insulation or solid color coating.
 - b. Stripes, bands, or hash marks of color specified above.
 - c. Color as specified using 0.75 in [19 mm] wide tape. Apply tape in half-overlapping turns for a minimum of 3 in [75 mm] for terminal points, and in junction boxes, pull-boxes, troughs, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.
4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.

2.2 SPLICES AND JOINTS

- A. In accordance with UL 486A, C, D, E, and NEC.

B. Aboveground Circuits (No. 10 AWG and smaller):

1. Connectors: Solderless, screw-on, reusable pressure cable type, rated 600 V, 220° F [105° C], with integral insulation, approved for copper and aluminum conductors.
2. The integral insulator shall have a skirt to completely cover the stripped wires.
3. The number, size, and combination of conductors, as listed on the manufacturer's packaging, shall be strictly followed.

C. Aboveground Circuits (No. 8 AWG and larger):

1. Connectors shall be indent, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
2. Field-installed compression connectors for cable sizes 250 KCMIL and larger shall have not fewer than two clamping elements or compression indents per wire.
3. Insulate splices and joints with materials approved for the particular use, location, voltage, and temperature. Splice and joint insulation level shall be not less than the insulation level of the conductors being joined.
4. Plastic electrical insulating tape: Per ASTM D2304, flame-retardant, cold and weather resistant.

D. Underground Branch Circuits and Feeders:

1. Submersible connectors in accordance with UL 486D, rated 600 V, 190° F [90° C], with integral insulation.

2.3 CONTROL WIRING

- A. Unless otherwise specified elsewhere in these specifications, control wiring shall be as specified for power and lighting wiring, except that the minimum size shall be not less than No. 14 AWG.
- B. Control wiring shall be large enough such that the voltage drop under in-rush conditions does not adversely affect operation of the controls.

2.4 WIRE LUBRICATING COMPOUND

- A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install in accordance with the NEC, and as specified.
- B. Install all wiring in raceway systems.
- C. Splice cables and wires only in outlet boxes, junction boxes, pull-boxes, manholes, or handholes.
- D. Wires of different systems (e.g., 120 V, 277 V) shall not be installed in the same conduit or junction box system.
- E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.
- F. For panel boards, cabinets, wireways, switches, and equipment assemblies, neatly form, train, and tie the cables in individual circuits.
- G. Seal cable and wire entering a building from underground between the wire and conduit where the cable exits the conduit, with a non-hardening approved compound.
- H. Wire Pulling:
 - 1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables. Use lubricants approved for the cable.
 - 2. Use nonmetallic ropes for pulling feeders.
 - 3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors, as approved by the Engineer.
 - 4. All cables in a single conduit shall be pulled simultaneously.
 - 5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- I. No more than three single-phase branch circuits shall be installed in any one conduit.

3.2 INSTALLATION IN MANHOLES

- A. Install and support cables in manholes on the steel racks with porcelain or equivalent insulators. Train the cables around the manhole walls, but do not bend to a radius less than six times the overall cable diameter.

3.3 SPLICE INSTALLATION

- A. Splices and terminations shall be mechanically and electrically secure.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque values.
- C. Where the Engineer determines that unsatisfactory splices or terminations have been installed, remove the devices and install approved devices at no additional cost to the County.

3.4 FEEDER IDENTIFICATION

- A. In each interior pull-box and junction box, install metal tags on all circuit cables and wires to clearly designate their circuit identification and voltage. The tags shall be the embossed brass type, 1.5 in [40 mm] in diameter and 40 mils thick. Attach tags with plastic ties.
- B. In each manhole and handhole, provide tags of the embossed brass type, showing the circuit identification and voltage. The tags shall be the embossed brass type, 1.5 in [40 mm] in diameter and 40 mils thick. Attach tags with plastic ties.

3.5 EXISTING WIRING

Unless specifically indicated on the plans, existing wiring shall not be reused for a new installation.

3.6 CONTROL AND SIGNAL WIRING INSTALLATION

- A. Unless otherwise specified in other sections, install wiring and connect to equipment/devices to perform the required functions as shown and specified.
- B. Except where otherwise required, install a separate power supply circuit for each system so that malfunctions in any system will not affect other systems.
- C. Where separate power supply circuits are not shown, connect the systems to the nearest panel boards of suitable voltages, which are intended to supply such systems and have suitable spare circuit breakers or space for installation.

3.7 CONTROL AND SIGNAL SYSTEM wiring IDENTIFICATION

- A. Install a permanent wire marker on each wire at each termination.
- B. Identifying numbers and letters on the wire markers shall correspond to those on the wiring diagrams used for installing the systems.
- C. Wire markers shall retain their markings after cleaning.
- D. In each manhole and handhole, install embossed brass tags to identify the system served and function.

3.8 ACCEPTANCE CHECKS AND TESTS

- A. Feeders and branch circuits shall have their insulation tested after installation and before connection to utilization devices, such as fixtures, motors, or appliances. Test each conductor with respect to adjacent conductors and to ground. Existing conductors to be reused shall also be tested.

- B. Applied voltage shall be 500VDC for 300-volt rated cable, and 1000VDC for 600-volt rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300-volt rated cable and 100 megohms for 600-volt rated cable.
- C. Perform phase rotation test on all three-phase circuits.
- D. The contractor shall furnish the instruments, materials, and labor for all tests.

END OF SECTION 26 05 21

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the general grounding and bonding requirements for electrical equipment and operations to provide a low impedance path for possible ground fault currents.
- B. "Grounding electrode system" refers to all electrodes required by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.
- C. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
- C. Section 26 24 16, PANELBOARDS: Low voltage panelboards.
- D. Section 26 32 13, ENGINE-GENERATORS: Engine-generators.
- E. Section 26 36 23, AUTOMATIC TRANSFER SWITCHES: Automatic transfer switches.
- F. Section 26 41 00, FACILITY LIGHTNING PROTECTION: Requirements for lightning protection.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

- B. Shop Drawings:
 - 1. Clearly present enough information to determine compliance with drawings and specifications.
 - 2. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.
- C. Test Reports: Provide certified test reports of ground resistance.
- D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Engineer:
 - 1. Certification that the materials and installation are in accordance with the drawings and specifications.
 - 2. Certification by the contractor that the complete installation has been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

- A. American Society for Testing and Materials (ASTM):
 - B1-07 Standard Specification for Hard-Drawn Copper Wire
 - B3-07 Standard Specification for Soft or Annealed Copper Wire
 - B8-04 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 81-1983 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
 - C2-07 National Electrical Safety Code
- C. National Fire Protection Association (NFPA):
 - 70-08 National Electrical Code (NEC)
 - 99-2005 Health Care Facilities
- D. Underwriters Laboratories, Inc. (UL):
 - 44-05 Thermoset-Insulated Wires and Cables
 - 83-08 Thermoplastic-Insulated Wires and Cables
 - 467-07 Grounding and Bonding Equipment
 - 486A-486B-03 Wire Connectors
- E. Motorola: R56 Standards and Guidelines for Communication Sites

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 44 or UL 83 insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.
- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes No. 10 AWG and smaller shall be ASTM B1 solid bare copper wire.
- C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.
- D. Ground (earth) bus conductors, including ground bus extension conductors, shall be a #2 AWG or larger, green-jacketed, solid or stranded copper conductor. When the conductors are insulated, they shall be listed for the space in which they are intended to be placed and the jacket shall be green or properly marked with a distinctive green color.
- A. The equipment grounding (earthing) conductor shall be a #6 AWG or larger, green jacketed, solid or stranded copper conductor

2.2 GROUND RODS

- A. Steel or copper clad steel, 0.75 in diameter by 10 ft long, conforming to UL 467.
- B. Quantity of rods shall be as required to obtain the specified ground resistance, as shown on the drawings.

2.3 CONCRETE ENCASED ELECTRODE

Concrete encased electrode shall be No. 4 AWG bare copper wire, installed per NEC.

2.4 MEDIUM VOLTAGE SPLICES AND TERMINATIONS

Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

2.5 GROUND CONNECTIONS

- A. Below Grade: Exothermic-welded type connectors.
- B. Above Grade:

1. Bonding Jumpers: Compression-type connectors, using zinc-plated fasteners and external tooth lockwashers.
2. Connection to Building Steel: Exothermic-welded type connectors.
3. Ground Busbars: Two-hole compression type lugs, using tin-plated copper or copper alloy bolts and nuts.
4. Rack and Cabinet Ground Bars: One-hole compression-type lugs, using zinc-plated or copper alloy fasteners.

2.6 EQUIPMENT RACK AND CABINET GROUND BARS

Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 0.375 in thick x 0.75 in wide.

2.7 GROUND TERMINAL BLOCKS

At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

2.8 GROUNDING BUS

Pre-drilled rectangular copper bar with stand-off insulators, minimum 0.25 in thick x 4 in high in cross-section, length as shown on drawings, with 0.281 in holes spaced 1.125 in apart.

PART 3 - EXECUTION

3.1 GENERAL

- A. Ground in accordance with the NEC, as shown on drawings, and as specified herein.
- B. System Grounding:
 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic structures, including ductwork and building steel, enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

Make grounding connections, which are normally buried or otherwise inaccessible (except connections for which access for periodic testing is required), by exothermic weld.

3.3 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
 - 1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building steel, and supplemental or made electrodes. Provide jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
 - 2. Provide a supplemental ground electrode and bond to the grounding electrode system.
- C. Service Disconnect (Separate Individual Enclosure): Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.
- D. Switchgear, Panelboards, Engine-Generators, and Automatic Transfer Switches:
 - 1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 - 2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
 - 3. Provide ground bars, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
 - 4. Connect metallic conduits that terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground bus.
- E. Transformers:
 - 1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
 - 2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from the transformer to the nearest component of the grounding electrode.

3.4 RACEWAY

- F. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
 2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
 3. Conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
 4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a bare grounding conductor to the equipment ground bus.
- G. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders and power and lighting branch circuits.
- H. Boxes, Cabinets, Enclosures, and Panelboards:
1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
 2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
- I. Wireway Systems:
1. Bond the metallic structures of wireway to provide 100% electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.
 2. Install insulated No. 6 AWG bonding jumpers between the wireway system, bonded as required above, and the closest building ground at each end and approximately every 50 ft.
 3. Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.
 4. Use insulated No. 6 AWG bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 49 ft.
- J. Receptacles shall not be grounded through their mounting screws. Ground receptacles with a jumper from the receptacle green ground terminal to the device box ground screw and a jumper to the branch circuit equipment grounding conductor.
- K. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

- L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.
- M. Raised Floors: Provide bonding of all raised floor components. See details on the drawings.

3.5 OUTDOOR METALLIC FENCES AROUND ELECTRICAL EQUIPMENT

- N. Outdoor Metallic Fences Around Electrical Equipment: Fences shall be grounded with a ground rod at each fixed gate post and at each corner post. Drive ground rods until the top is 12 in below grade. Attach a No. 4 AWG copper conductor by exothermic weld to the ground rods, and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 12 in of fence mesh and fasten by two approved bronze compression fittings, one to bond the wire to post and the other to bond the wire to fence. Each gate section shall be bonded to its gatepost by a 0.375 in x 1 in flexible, braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

3.6 CORROSION INHIBITORS

When making ground and ground bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.7 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.
- B. In operating rooms and at intensive care and coronary care type beds, bond the gases and suction piping at the outlets directly to the room or patient ground bus.

3.8 LIGHTNING PROTECTION SYSTEM

Bond the lightning protection system to the electrical grounding electrode system.

3.9 ELECTRICAL ROOM GROUNDING

Building Earth Ground Busbars: Provide ground busbar and mounting hardware at each electrical room and connect to pigtail extensions of the building grounding ring.

3.10 EXTERIOR LIGHT POLES

Provide 20 ft of No. 4 bare copper coiled at bottom of pole base excavation prior to pour, plus additional unspliced length in and above foundation as required to reach pole ground stud.

3.11 GROUND RESISTANCE

- A. Grounding system resistance to ground shall not exceed 25 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the County. Final tests shall ensure that this requirement is met.
- B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- C. Services at power company interface points shall comply with the power company ground resistance requirements.
- D. Below-grade connections shall be visually inspected by the Engineer prior to backfilling. The contractor shall notify the Engineer 24 hours before the connections are ready for inspection.

3.12 GROUND ROD INSTALLATION

- A. For outdoor installations, drive each rod vertically in the earth, until top of rod is 24 in [609 mm] below final grade.
- B. For indoor installations, leave 4 in of rod exposed.
- C. Where permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal joints. Make accessible ground connections with mechanical pressure-type ground connectors.
- D. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified resistance.

END OF SECTION 26 05 26

**SECTION 26 05 33
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.
- B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:

- A. Manufacturer's Literature and Data: Showing each cable type and rating. The specific item proposed and its area of application shall be identified on the catalog cuts.
- B. Shop Drawings:
 - 1. Size and location of main feeders.
 - 2. Size and location of panels and pull-boxes.
 - 3. Layout of required conduit penetrations through structural elements.
- C. Certifications:

1. Two weeks prior to the final inspection, submit four copies of the following certifications to the Contractor:
 - a. Certification by the manufacturer that the material conforms to the requirements of the drawings and specifications.
 - b. Certification by the contractor that the material has been properly installed.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American National Standards Institute (ANSI):

C80.1-05	Electrical Rigid Steel Conduit
C80.3-05	Steel Electrical Metal Tubing
C80.6-05	Electrical Intermediate Metal Conduit

C. National Fire Protection Association (NFPA):

70-08	National Electrical Code (NEC)
12-21	Standard for the Installation, Maintenance and Use of Emergency Communications Systems

D. Underwriters Laboratories, Inc. (UL):

1-05	Flexible Metal Conduit
5-04	Surface Metal Raceway and Fittings
6-07	Electrical Rigid Metal Conduit - Steel
50-95	Enclosures for Electrical Equipment
360-093	Liquid-Tight Flexible Steel Conduit
467-07	Grounding and Bonding Equipment
514A-04	Metallic Outlet Boxes
514B-04	Conduit, Tubing, and Cable Fittings
514C-96	Nonmetallic Outlet Boxes, Flush-Device Boxes and Covers
651-05	Schedule 40 and 80 Rigid PVC Conduit and Fittings
651A-00	Type EB and A Rigid PVC Conduit and HDPE Conduit
797-07	Electrical Metallic Tubing
1242-06	Electrical Intermediate Metal Conduit - Steel

E. National Electrical Manufacturers Association (NEMA):

TC-2-03	Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
TC-3-04	PVC Fittings for Use with Rigid PVC Conduit and Tubing
FB1-07	Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Conduit Size: In accordance with the NEC, but not less than 0.5 in unless otherwise shown. Where permitted by the NEC, 0.5 in flexible conduit may be used for tap connections to recessed lighting fixtures.
- B. Conduit:
1. Rigid steel: Shall conform to UL 6 and ANSI C80.1.
 2. Rigid intermediate steel conduit (IMC): Shall conform to UL 1242 and ANSI C80.6.
 3. Electrical metallic tubing (EMT): Shall conform to UL 797 and ANSI C80.3. Maximum size not to exceed 4 in [105 mm] and shall be permitted only with cable rated 600 V or less.
 4. Flexible galvanized steel conduit: Shall conform to UL 1.
 5. Liquid-tight flexible metal conduit: Shall conform to UL 360.
 6. Direct burial plastic conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high-density polyethylene (PE).
 7. Surface metal raceway: Shall conform to UL 5.
 8. **Exposed conduits, boxes and fittings shall be PVC coated or stainless steel, due to extreme sea salt environment.**
- C. Conduit Fittings:
1. Rigid steel and IMC conduit fittings:
 - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
 - b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
 - c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
 - d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
 - e. Erickson (union-type) and set screw type couplings: Approved for use in concrete are permitted for use to complete a conduit run where conduit is installed in concrete. Use set screws of case-hardened steel with hex head and cup point to firmly seat in conduit wall for positive ground. Tightening of set screws with pliers is prohibited.
 - f. Sealing fittings: Threaded cast iron type. Use continuous drain-type sealing fittings to prevent passage of water vapor. In concealed work, install fittings in flush steel boxes with blank cover plates having the same finishes as that of other electrical plates in the room.
 2. Electrical metallic tubing fittings:
 - a. Fittings and conduit bodies shall meet the requirements of UL 514B, ANSI C80.3, and NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Compression couplings and connectors: Concrete-tight and rain-tight, with connectors having insulated throats.
 - d. Indent-type connectors or couplings are prohibited.

- e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
- 3. Flexible steel conduit fittings:
 - a. Conform to UL 514B. Only steel or malleable iron materials are acceptable.
 - b. Clamp-type, with insulated throat.
- 4. Liquid-tight flexible metal conduit fittings:
 - a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
 - b. Only steel or malleable iron materials are acceptable.
 - c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.
- 5. Direct burial plastic conduit fittings:
 - a. Fittings shall meet the requirements of UL 514C and NEMA TC3.
- 6. Surface metal raceway fittings: As recommended by the raceway manufacturer. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, conduit entry fittings, accessories, and other fittings as required for complete system. **Exposed raceways, boxes and fittings shall be PVC coated or stainless steel due to heavy sea salt environment.**
- 7. Expansion and deflection couplings:
 - a. Conform to UL 467 and UL 514B.
 - b. Accommodate a 0.75 in [19 mm] deflection, expansion, or contraction in any direction, and allow 30 degree angular deflections.
 - c. Include internal flexible metal braid, sized to guarantee conduit ground continuity and a low-impedance path for fault currents, in accordance with UL 467 and the NEC tables for equipment grounding conductors.
 - d. Jacket: Flexible, corrosion-resistant, watertight, moisture and heat-resistant molded rubber material with stainless steel jacket clamps.

D. Conduit Supports:

- 1. Parts and hardware: Zinc-coat, **stainless steel** or provide equivalent corrosion protection.
- 2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.
- 3. Multiple conduit (trapeze) hangers: Not less than 1.5 x 1.5 in, 12-gauge steel, cold-formed, lipped channels; with not less than 0.375 in diameter steel hanger rods.
- 4. Solid Masonry and Concrete Anchors: Self-drilling expansion shields, or machine bolt expansion.

E. Outlet, Junction, and Pull Boxes:

- 1. **Provide PVC coated or stainless-steel components due to heavy sea salt environment.**
- 2. UL-50 and UL-514A.
- 3. Cast metal where required by the NEC or shown, and equipped with rustproof boxes.
- 4. Sheet metal boxes: Galvanized steel, except where otherwise shown.

5. Flush-mounted wall or ceiling boxes shall be installed with raised covers so that the front face of raised cover is flush with the wall. Surface-mounted wall or ceiling boxes shall be installed with surface-style flat or raised covers.
- F. Wireways: Equip with hinged covers, except where removable covers are shown. Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for a complete system.

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:

1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the Architect prior to drilling through structural elements.
2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except where permitted by the Engineer as required by limited working space.

B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight, as specified in Section 07 92 05, JOINT SEALANTS.

3.2 INSTALLATION, GENERAL

A. In accordance with UL, NEC, as shown, and as specified herein.

B. Emergency raceway systems shall be entirely independent of other raceway systems, except where shown on drawings.

C. Install conduit as follows:

1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
2. Unless otherwise indicated on the drawings or specified herein, installation of all conduits shall be concealed within finished walls, floors, and ceilings.
3. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material.

4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 8 ft on centers. Do not use other supports, i.e., suspended ceilings, suspended ceiling supporting members, lighting fixtures, conduits, mechanical piping, or mechanical ducts.
7. Support within 12 in [300 mm] of changes of direction, and within 12 in [300 mm] of each enclosure to which connected.
8. Close ends of empty conduit with plugs or caps at the rough-in stage until wires are pulled in, to prevent entry of debris.
9. Conduit installations under fume and vent hoods are prohibited.
10. Secure conduits to cabinets, junction boxes, pull-boxes, and outlet boxes with bonding type locknuts. For rigid and IMC conduit installations, provide a locknut on the inside of the enclosure, made up wrench tight. Do not make conduit connections to junction box covers.
11. Flashing of penetrations of the roof membrane is specified in Section 07 62 00, FLASHING AND SHEET METAL.
12. Conduit bodies shall only be used for changes in direction, and shall not contain splices.

D. Conduit Bends:

1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

E. Layout and Homeruns:

1. Install conduit with wiring, including homeruns, as shown on drawings.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted approved by the Engineer.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:

1. Conduit: Rigid steel, IMC, or EMT. Do not install EMT in concrete slabs that are in contact with soil, gravel, or vapor barriers.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only:
 - a. Where shown on the structural drawings.
 - b. As approved by the Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
4. Installation of conduit in concrete that is less than 3 in thick is prohibited.
 - a. Conduit outside diameter larger than one-third of the slab thickness is prohibited.

- b. Space between conduits in slabs: Approximately six conduit diameters apart, and one conduit diameter at conduit crossings.
 - c. Install conduits approximately in the center of the slab so that there will be a minimum of 0.75 in of concrete around the conduits.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to ensure low resistance ground continuity through the conduits. Tightening setscrews with pliers is prohibited.

B. Above Furred or Suspended Ceilings and in Walls:

- 1. Conduit for conductors above 600 V: Rigid steel. Mixing different types of conduits indiscriminately in the same system is prohibited.
- 2. Conduit for conductors 600 V and below: Rigid steel, IMC or EMT. Mixing different types of conduits indiscriminately in the same system is prohibited.
- 3. Align and run conduit parallel or perpendicular to the building lines.
- 4. Connect recessed lighting fixtures to conduit runs with maximum 6 ft of flexible metal conduit extending from a junction box to the fixture.
- 5. Tightening setscrews with pliers is prohibited.

3.4 EXPOSED WORK INSTALLATION

A. **Provide PVC coated or stainless-steel components due to heavy sea salt environment.**

B. Unless otherwise indicated on the drawings, exposed conduit is only permitted in mechanical and electrical rooms.

C. Conduit for Conductors above 600 V: Rigid steel. Mixing different types of conduits indiscriminately in the system is prohibited.

D. Conduit for Conductors 600 V and Below: Rigid steel, IMC or EMT. Mixing different types of conduits indiscriminately in the system is prohibited.

E. Align and run conduit parallel or perpendicular to the building lines.

F. Install horizontal runs close to the ceiling or beams and secure with conduit straps.

G. Support horizontal or vertical runs at not over 8 ft intervals.

H. Surface metal raceways: Use only where shown.

I. Painting:

- 1. Paint exposed conduit as specified in Section 09 91 23, INTERIOR PAINTING.
- 2. Paint all conduits containing cables rated over 600 V safety orange. Refer to Section 09 91 23, INTERIOR PAINTING for preparation, paint type, and exact color. In addition, paint legends, using 2 in high black numerals and letters, showing the cable voltage rating. Provide legends where conduits pass through walls and floors and at maximum 20 ft intervals in between.

3.5 DIRECT BURIAL INSTALLATION

Refer to Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION.

3.6 HAZARDOUS LOCATIONS

- A. Use rigid steel conduit only, notwithstanding requirements otherwise specified in this or other sections of these specifications.
- B. Install UL approved sealing fittings that prevent passage of explosive vapors in hazardous areas equipped with explosion-proof lighting fixtures, switches, and receptacles, as required by the NEC.

3.7 WET OR DAMP LOCATIONS

- A. Unless otherwise shown, use conduits of rigid steel or IMC.
- B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.
- C. Unless otherwise shown, use rigid steel or IMC conduit within 5 ft of the exterior and below concrete building slabs in contact with soil, gravel, or vapor barriers. Conduit shall be half-lapped with 10 mil PVC tape before installation. After installation, completely recoat or re-tape any damaged areas of coating.

3.8 MOTORS AND VIBRATING EQUIPMENT

- A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.
- B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water. Provide a green equipment grounding conductor with flexible metal conduit.

3.9 EXPANSION JOINTS

- A. Conduits 3 in and larger that are secured to the building structure on opposite sides of a building expansion joint require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.

- B. Provide conduits smaller than 3 in with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 5 in vertical drop midway between the ends. Flexible conduit shall have a bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for conduits 15 in and larger are acceptable.
- C. Install expansion and deflection couplings where shown.

3.10 CONDUIT SUPPORTS, INSTALLATION

- A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.
- B. Use pipe straps or individual conduit hangers for supporting individual conduits.
- C. Support multiple conduit runs with trapeze hangers. Use trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 200 lbs. Attach each conduit with U-bolts or other approved fasteners.
- D. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.
- E. Fasteners and Supports in Solid Masonry and Concrete:
 - 1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
 - 2. Existing Construction:
 - a. Steel expansion anchors not less than 0.25 in bolt size and not less than 1.125 in embedment.
 - b. Power set fasteners not less than 0.25 in diameter with depth of penetration not less than 3 in.
 - c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.
- F. Hollow Masonry: Toggle bolts.
- G. Bolts supported only by plaster or gypsum wallboard are not acceptable.
- H. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
- I. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
- J. Chain, wire, or perforated strap shall not be used to support or fasten conduit.
- K. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.

- L. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

3.11 BOX INSTALLATION

- A. Boxes for Concealed Conduits:
 - 1. Flush-mounted.
 - 2. Provide raised covers for boxes to suit the wall or ceiling, construction, and finish.
- B. In addition to boxes shown, install additional boxes where needed to prevent damage to cables and wires during pulling-in operations.
- C. Remove only knockouts as required and plug unused openings. Use threaded plugs for cast metal boxes and snap-in metal covers for sheet metal boxes.
- D. Outlet boxes mounted back-to-back in the same wall are prohibited. A minimum 24 in center-to-center lateral spacing shall be maintained between boxes.
- E. Minimum size of outlet boxes for ground fault interrupter (GFI) receptacles is 4 in square x 2.125 in deep, with device covers for the wall material and thickness involved.
- F. Stencil or install phenolic nameplates on covers of the boxes identified on riser diagrams; for example, "SIG-FA JB No. 1."
- G. On all branch circuit junction box covers, identify the circuits with black marker.

END OF SECTION 26 05 33

**SECTION 26 05 41
UNDERGROUND ELECTRICAL CONSTRUCTION**

PART 1 – GENERAL

1.1. DESCRIPTION

- A. This section specifies the furnishing, installation and connection of handholes and ducts to form a complete underground raceway system.
- B. “Duct” and “conduit”, and “rigid metal conduit” and “rigid steel conduit are used interchangeably in this specification and have the same meaning.

1.2. RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits, fittings and boxes for raceway systems.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3. SUBMITTALS

- A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include handholes, duct materials, and hardware. Proposed deviations from details on the drawings shall be clearly marked on the submittals.
 - 3. If necessary to locate ducts or handholes at locations other than shown on the drawings, show the proposed locations accurately on scaled site drawings, and submit four copies to the Resident Project Engineer for approval prior to construction.

C. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Resident Project Engineer:

1. Certification that the materials are in accordance with the drawings and specifications.
2. Certification, by the Contractor, that the complete installation has been properly installed and tested.

1.4. APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

A. American Concrete Institute (ACI):

Building Code Requirements for Structural Concrete

318/318M-2005 Building Code Requirements for Structural Concrete & Commentary

SP-66-04 ACI Detailing Manual

B. American Society for Testing and Materials (ASTM):

C478/C478M 2009(b) Standard Specification for Precast Reinforced Concrete Manhole Sections

C990 REV A 2008 Standard Specification for joints concrete pipe, Manholes and Precast Box using performed flexible Joint sealants.

C. Institute of Electrical and Electronic Engineers (IEEE):

C2-2002 National Electrical Safety Code

D. National Electrical Manufacturers Association (NEMA):

RNI 2005 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

TC 2 2003 Electrical Polyvinyl Chloride (PVC) Tubing And Conduit

TC 3-2004 PVC Fittings for Use With Rigid PVC Conduit And Tubing

TC 6 & 8 2003 PVC Plastic Utilities Duct For Underground Installations

TC 9-2004 Fittings For PVC Plastic Utilities Duct For Underground Installation

E. National Fire Protection Association (NFPA):

70 2008 National Electrical Code (NEC)

F. Underwriters Laboratories, Inc. (UL):

- 6-2007 Electrical Rigid Metal Conduit-Steel
- 467-2007 Standard for Grounding and Bonding Equipment
- 651-2005 Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings
- 651A-2000..... Type EB and A Rigid PVC Conduit and HDPE Conduit, (RTRC)
- 651B-2007..... Continuous Length HDPE Conduit

G. U.S. General Services Administration (GSA):

- SS-S-210A-1981 Sealing Compound, Preformed Plastic for Expansion joints And Pipe Joints

PART 2 - PRODUCTS

1. DUCTS

A. Number and sizes shall be as shown on drawings.

B. Ducts (concrete encased):

1. Plastic Duct:

- a. UL 651 and 651A Schedule 40 PVC.
- b. Duct shall be suitable for use with 90 degree C rated conductors.

2. Conduit Spacers: Prefabricated plastic.

C. Ducts (direct burial):

1. Plastic duct:

- a. NEMA TC2 and TC3
- b. UL 651, 651A and 651B, Schedule 40, Schedule 80 PVC or HDPE.
- c. Duct shall be suitable for use with 75 degree C rated conductors.

2. Rigid metal conduit, PVC-coated: UL6 and NEMA RN1 galvanized rigid steel, threaded type, coated with PVC sheath bonded to the galvanized exterior surface, nominal 1 mm (0.040 inch) thick.

2. GROUNDING

A. Rods: Per Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS and UL 467

B. Ground Wire: Stranded bare copper 16 mm² (6 AWG) minimum.

3. WARNING TAPE:
 - A. Standard 4-mil polyethylene 76 mm (3 inch) wide tape, detectable type, red with black letters, imprinted with "CAUTION BURIED ELECTRIC CABLE BELOW".
4. PULL ROPE:
 - A. Plastic with 890N (200 pound) minimum tensile strength.

PART 4 - EXECUTION

4.1. HANDHOLE CONSTRUCTION AND INSTALLATION

- A. General Requirements:
 1. Locate handholes at the approximate locations shown on the drawings with due consideration given to the location of other utilities, grades, and paving.
- B. Access for Handholes: Make the top of frames and covers flush with finished grade.

4.2. TRENCHING

- A. Work with extreme care near existing ducts, conduits, cables, and other utilities to avoid damaging them.
- B. Cut the trenches neatly and uniformly.
- C. For Concrete Encased Ducts:
 1. After excavation of the trench, stakes shall be driven in the bottom of the trench at
 2. 1200 mm (4 foot) intervals to establish the grade and route of the duct bank.
 3. Pitch the trenches uniformly towards manholes or both ways from high points between manholes for the required duct line drainage. Avoid pitching the ducts towards buildings wherever possible.
 4. The walls of the trench may be used to form the side walls of the duct bank provided that the soil is self-supporting and that concrete envelope can be poured without soil inclusions. Forms are required where the soil is not self-supporting.
 5. After the concrete encased duct has sufficiently cured, the trench shall be backfilled to grade with earth, with appropriate warning tape attached.
- D. Conduits to be installed under existing paved areas, roads, and railroad tracks that are not to be disturbed shall be jacked into place. Conduits shall be PVC-coated rigid metal.

4.3. DUCT INSTALLATION

A. General Requirements:

1. Ducts shall be in accordance with the NEC and IEEE C2, as shown on the drawings and as specified.
2. Slope ducts to drain towards handholes, and away from building and equipment entrances. Pitch not less than 100 mm (4 inches) in 30 M (100 feet).
3. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be PVC-coated galvanized rigid steel, and shall extend a minimum of 1500 mm (5 feet) outside of building foundation.
4. Stub-ups, sweeps, and risers to equipment mounted on outdoor concrete slabs shall be PVC-coated galvanized rigid steel, and shall extend a minimum of 1500 mm (5 feet) away from edge of slab.
5. Install insulated grounding bushings on the terminations.
6. PVC-coated rigid steel conduits shall be coupled to the ducts with suitable adapters, and the whole encased with 75 mm (3 inches) of concrete.
7. PVC coated rigid steel conduit turns of direction for all duct lines shall have minimum 1200 mm (4 feet) radius in the horizontal and vertical directions. PVC conduit sweeps for all duct lines shall have a minimum 12000 mm (40 feet) radius in the horizontal and 1200 mm (4 feet) in the vertical directions. Where a 12000 mm (40 feet) radius is not possible, horizontal turns of direction shall be rigid steel.
8. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly a minimum of 75 mm (3 inches) above bottom of trench during the concrete pour. Spacer spacing shall not exceed 1500 mm (5 feet).
9. Duct lines shall be installed no less than 300 mm (12 inches) from other utility systems, such as water, sewer, and chilled water.
10. Clearances between individual ducts:
 - a. For like services, not less than 75 mm (3 inches).
 - b. For power and signal services, not less than 150 mm (6 inches).
 - c. Provide plastic spacers to maintain clearances.
 - d. Provide nonferrous tie wires to prevent displacement of the ducts during pouring of concrete. Tie wires shall not act as substitute for spacers.

11. Duct lines shall terminate as shown on the drawings. All ducts shall be fitted with end bells.
 12. Couple the ducts with proper couplings. Stagger couplings in rows and layers to insure maximum strength and rigidity of the duct bank.
 13. Keep ducts clean of earth, sand, or gravel during construction, and seal with tapered plugs upon completion of each portion of the work.
 14. Duct Bank Markers:
 - a. Duct bank markers, where required, shall be located at the ends of duct banks except at handholes at approximately every 60 meter (200 feet) along the duct run and at each change in direction of the duct run. Markers shall be placed 600 mm (2 feet) to the right of the duct bank, facing the longitudinal axis of the run in the direction of the electrical load.
 - b. The letter "D" with two arrows shall be impressed or cast on top of the marker. One arrow shall be located below the letter and shall point toward the ducts. Second arrow shall be located adjacent to the letter and shall point in a direction parallel to the ducts. The letter and arrow adjacent to it shall each be approximately 75 mm (2 inches) long. The letter and arrows shall be V-shaped, and shall have a width of stroke at least 6 mm (1/4 inch) at the top and a depth of 6 mm (1/4 inch).
 - c. In paved areas, the top of the duct markers shall be flush with the finished surface of the paving.
 - d. Where the duct bank changes direction, the arrow located adjacent to the letter shall be cast or impressed with an angle in the arrow the same as the angular change of the duct bank.
- B. Direct Burial Duct and Conduits:
1. Install direct burial ducts and conduits only where shown on the drawings. Provide direct burial ducts only for low voltage systems.
 2. Join and terminate ducts and conduits with fittings recommended by conduit manufacturer.
 3. Direct burial ducts and conduits are prohibited under railroad tracks.
 4. Tops of ducts and conduits shall be:
 - a. Not less than 600 mm (24 inches) and not less than shown on the drawings, below finished grade.

- b. Not less than 750 mm (30 inches) and not less than shown on the drawings, below roads and other paved surfaces.
- 5. Do not kink the ducts or conduits.
- C. Concrete-Encased and Direct Burial Duct and Conduit Identification: Place continuous strip of warning tape approximately 300 mm (12 inches) above ducts or conduits before backfilling trenches. Warning tape shall be preprinted with proper identification.
- D. Spare Ducts and Conduits: Where spare ducts are shown, they shall have a nylon pull rope installed. They shall be capped at each end and labeled as to location of the other end.
- E. Duct and Conduit Cleaning:
 - 1. Upon completion of the duct bank installation or installation of direct buried ducts, a standard flexible mandrel shall be pulled through each duct to loosen particles of earth, sand, or foreign material left in the line. The mandrel shall be not less than 3600 mm (12 inches) long, and shall have a diameter not less than 13 mm (1/2 inch) less than the inside diameter of the duct. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than the diameter of the duct.
 - 2. Mandrel pulls shall be witnessed by the Resident Project Engineer.
- F. Duct and Conduit Sealing: Seal the ducts and conduits at building entrances, and at outdoor terminations for equipment, with a suitable non-hardening compound to prevent the entrance of moisture and gases.
- G. Connections to Existing Manholes: For duct bank connections to existing structures, break the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.
- H. Connections to Existing Ducts: Where connections to existing duct banks are indicated, excavate around the duct banks as necessary. Cut off the duct banks and remove loose concrete from the conduits before installing new concrete-encased ducts. Provide a reinforced concrete collar, poured monolithically with the new duct bank, to take the shear at the joint of the duct banks.
- I. Partially Completed Duct Banks: During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud and dirt from entering ducts by

providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of 600 mm (2 feet) back into the envelope and a minimum of 600 mm (2 feet) beyond the end of the envelope. Provide one No. 4 bar in each corner, 75 mm (3 inches) from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately 300 mm (1 foot) apart. Restrain reinforcing assembly from moving during pouring of concrete.

END OF SECTION 26 05 47

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of panelboards.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS:

Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND

CABLES: Low-voltage conductors.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS:

Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

E. Section 26 09 23, LIGHTING CONTROLS: Lighting controls integral to panelboards.

F. Section 26 43 13, SURGE PROTECTIVE DEVICES: Surge protective devices integral to panelboards.

1.3 QUALITY ASSURANCE

A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1. Shop Drawings:

a. Submit sufficient information to demonstrate compliance with drawings and specifications.

b. Include electrical ratings, dimensions, mounting details, materials, required

clearances, terminations, weight, circuit breakers, wiring and connection diagrams, accessories, and nameplate data.

2. Manuals:
 - a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering circuit breakers and replacement parts.
 - 1) Include schematic diagrams, with all terminals identified, matching terminal identification in the panelboards.
 - 2) Include information for testing, repair, troubleshooting, assembly, and disassembly.
 - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
3. Certifications: Two weeks prior to final inspection, submit the following.
 - a. Certification by the manufacturer that the panelboards conform to the requirements of the drawings and specifications.
 - b. Certification by the Contractor that the panelboards have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. International Code Council (ICC):
 - IBC-12..... International Building Code
- C. National Electrical Manufacturers Association (NEMA):
 - PB 1-11 Panelboards
 - 250-08..... Enclosures for Electrical Equipment (1,000V Maximum)
- D. National Fire Protection Association (NFPA):
 - 70-11 National Electrical Code (NEC)
 - 70E-12..... Standard for Electrical Safety in the Workplace
- E. Underwriters Laboratories, Inc. (UL):
 - 50-95..... Enclosures for Electrical Equipment

67-09.....	Panelboards
489-09.....	Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.
- B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.
- C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.
- D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.
- E. Bus bar connections to the branch circuit breakers shall be the “distributed phase” or “phase sequence” type.
- F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they will be connected.
- G. Neutral bus shall be 100% rated, mounted on insulated supports. Provide 200% neutral bus for computer panelboards as show on the plans
- H. Grounding bus bar shall be equipped with screws or lugs for the connection of equipment grounding conductors.
- I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.
- J. In two-section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type panelboards, and have field-installed cable connections to the second section as shown on the drawings. Panelboard sections with tapped bus or crossover bus are not acceptable.
- K. Series-rated panelboards are not permitted.

2.2 ENCLOSURES AND TRIMS

A. Enclosures:

1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
2. Enclosures shall not have ventilating openings.
3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.
5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:

1. Hinged "door-in-door" type.
2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
4. Inner and outer doors shall open left to right.
5. Trims shall be flush or surface type as shown on the drawings.

2.3 MOLDED CASE CIRCUIT BREAKERS

A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.

B. Circuit breakers shall be bolt-on type.

C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than:

1. 120/208 V Panelboard: 10,000 A symmetrical.
2. 120/240 V Panelboard: 10,000 A symmetrical.
3. 277/480 V Panelboard: 14,000 A symmetrical.

D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A frame. Circuit breakers with 400 A frames and above shall have magnetic trip, adjustable from 5x to 10x. Breaker magnetic trip setting shall be set to maximum, unless otherwise noted.

E. Circuit breaker features shall be as follows:

1. A rugged, integral housing of molded insulating material.

2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates closed, tripped, and open positions.
8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.
9. Ground fault current interrupting breakers, shunt trip breakers, lighting control breakers (including accessories to switch line currents), or other accessory devices or functions shall be provided where shown on the drawings.
10. For circuit breakers being added to existing panelboards, coordinate the breaker type with existing panelboards. Modify the panel directory accordingly.

2.4 SURGE PROTECTIVE DEVICES

- A. Where shown on the drawings, furnish panelboards with integral surge protective devices. Refer to Section 26 43 13, SURGE PROTECTIVE DEVICES.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.
- B. Locate panelboards so that the present and future conduits can be conveniently connected.
- C. Install a printed schedule of circuits in each panelboard after approval by the //Resident Engineer. Schedules shall reflect final load descriptions, room numbers, and room names connected to each circuit breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards
- D. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 1980 mm (78 inches).
- E. Provide blank cover for each unused circuit breaker mounting space.
- F. Panelboard enclosures shall not be used for conductors feeding through, spliced, or tapping off to other enclosures or devices.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests:
 - a. Compare equipment nameplate data with specifications and approved shop drawings.
 - b. Inspect physical, electrical, and mechanical condition.
 - c. Verify appropriate anchorage and required area clearances.
 - d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
 - e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method or perform thermographic survey after energization.
 - f. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3 FOLLOW-UP VERIFICATION

- A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

END OF SECTION 26 24 16

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation and connection of wiring devices.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements that are common to more than one section of Division 26.
- B. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits and outlets boxes.
- C. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Cables and wiring.
- D. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground fault currents.

1.3 QUALITY ASSURANCE

Refer to Paragraph, QUALIFICATIONS, in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. In accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, submit the following:
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, mounting details, construction materials, grade and termination information.
- C. Manuals: Two weeks prior to final inspection, deliver four copies of the following to the Engineer: Technical data sheets and information for ordering replacement units.

- D. Certifications: Two weeks prior to final inspection, submit four copies of the following to the Engineer: Certification by the Contractor that the devices comply with the drawings and specifications, and have been properly installed, aligned, and tested.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.

- B. National Fire Protection Association (NFPA):

70 National Electrical Code (NEC)

- C. National Electrical Manufacturers Association (NEMA):

WD 1 General Color Requirements for Wiring Devices
WD 6 Wiring Devices – Dimensional Requirements

- D. Underwriter’s Laboratories, Inc. (UL):

5 Surface Metal Raceways and Fittings
20 General-Use Snap Switches
231 Power Outlets
467 Grounding and Bonding Equipment
498 Attachment Plugs and Receptacles
943 Ground-Fault Circuit-Interrupters

PART 2 - PRODUCTS

2.1 RECEPTACLES

- A. General: All receptacles shall be listed by Underwriters Laboratories, Inc., and conform to NEMA WD 6.

- 1. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature. Terminal screws shall be brass, brass plated or a copper alloy metal.
- 2. Receptacles shall have provisions for back wiring with separate metal clamp type terminals (four min.) and side wiring from four captively held binding screws.

- B. Duplex Receptacles: Heavy Duty grade, single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 6. The duplex type shall have break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal.

- 1. Bodies shall be ivory in color.

2. Switched duplex receptacles shall be wired so that only the top receptacle is switched. The remaining receptacle shall be unswitched.
 3. Duplex Receptacles on Emergency Circuit:
 - a. In rooms without emergency powered general lighting, the emergency receptacles shall be of the self-illuminated type.
 4. Ground Fault Interrupter Duplex Receptacles: Shall be an integral unit, suitable for mounting in a standard outlet box.
 - a. Ground fault interrupter shall be consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. Device shall have nominal sensitivity to ground leakage current of five milliamperes and shall function to interrupt the current supply for any value of ground leakage current above five milliamperes (+ or – 1 milliamp) on the load side of the device. Device shall have a minimum nominal tripping time of 1/30th of a second.
 5. Safety Type Duplex Receptacles:
 - a. Bodies shall be gray in color.
 - 1) Shall permit current to flow only while a standard plug is in the proper position in the receptacle.
 - 2) Screws exposed while the wall plates are in place shall be the standard type.
 6. Duplex Receptacles: Shall be the same as follows.
 - a. Bodies shall be brown phenolic compound supported by a plated steel mounting strap having plaster ears.
- C. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete with appropriate cord grip plug. Devices shall meet UL 231.
- D. Weatherproof Receptacles: Shall consist of a duplex receptacle, mounted in box with a gasketed, weatherproof, cast metal cover plate and cap over each receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged in-use flap. The weatherproof integrity shall not be affected when heavy duty specification attachment plug caps are inserted. Cover plates on outlet boxes mounted flush in the wall shall be gasketed to the wall in a watertight manner.
- E. TVSS Receptacles. Shall comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 1449, with integral TVSS in line to ground, line to neutral, and neutral to ground.
1. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 volts and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
 2. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

2.2 TOGGLE SWITCHES

- A. Toggle Switches: Shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles shall be ivory in color unless otherwise specified. The rocker type switch is acceptable.

1. Switches installed in hazardous areas shall be explosion proof type in accordance with the NEC and as shown on the drawings.
2. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self grounding mounting strap with break-off plaster ears and provisions for back wiring with separate metal wiring clamps and side wiring with captively held binding screws.
3. Ratings:
 - a. 120 volt circuits: 20 amperes at 120-277 volts AC.
 - b. 277 volt circuits: 20 amperes at 120-277 volts AC.

2.3 MANUAL DIMMING CONTROL

- A. Slide dimmer with on/off control, single-pole or three-way as shown on plans. Faceplates shall be ivory in color unless otherwise specified.
- B. Manual dimming controls shall be fully compatible with electronic dimming ballasts and approved by the ballast manufacturer, shall operate over full specified dimming range, and shall not degrade the performance or rated life of the electronic dimming ballast and lamp.

2.4 WALL PLATES

- A. Wall plates for switches and receptacles shall be type 302 stainless steel. Oversize plates are not acceptable.
- B. Color shall be ivory unless otherwise specified. Coordinate color with Architect before ordering.
- C. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD 6.
- D. For receptacles or switches mounted adjacent to each other, wall plates shall be common for each group of receptacles or switches.
- E. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.
- F. Duplex Receptacles on Emergency Circuit:
 1. Bodies shall be red in color. Wall plates shall be red with the word "EMERGENCY" engraved in 1/4 inch white letters.

2.5 SURFACE MULTIPLE-OUTLET ASSEMBLIES

- A. Assemblies shall conform to the requirements of NFPA 70 and UL 5.

- B. Shall have the following features:
1. Enclosures:
 - a. Thickness of steel shall be not less than 0.040 inch steel for base and cover. Nominal dimension shall be 1-1/2 by 2-3/4 inches with inside cross sectional area not less than 3.5 square inches. The enclosures shall be thoroughly cleaned, phosphatized and painted at the factory with primer and the manufacturer's standard baked enamel or lacquer finish.
 2. Receptacles shall be duplex, general duty. See paragraph 'RECEPTACLES' in this section. Device cover plates shall be the manufacturer's standard corrosion resistant finish and shall not exceed the dimensions of the enclosure.
 3. Unless otherwise shown on drawings, spacing of the receptacles along the strip shall be 24 inches [600mm] on centers.
 4. Wires within the assemblies shall be not less than No. 12 AWG copper, with 600 volt ratings.
 5. Installation fittings shall be designed for the strips being installed including bends, offsets, device brackets, inside couplings, wire clips, and elbows.
 6. Bond the strips to the conduit systems for their branch supply circuits.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the NEC and as shown as on the drawings.
- B. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also connected to the green equipment grounding conductor.
- C. Outlet boxes for light and dimmer switches shall be mounted on the strike side of doors.
- D. Provide barriers in multi-gang outlet boxes to separate systems of different voltages, Normal Power and Emergency Power systems, and in compliance with the NEC.
- E. Coordinate with other work, including painting, electrical boxes and wiring installations, as necessary to interface installation of wiring devices with other work. Coordinate the electrical work with the work of other trades to ensure that wiring device flush outlets are positioned with box openings aligned with the face of the surrounding finish material. Pay special attention to installations in cabinet work, and in connection with laboratory equipment.
- F. Exact field locations of floors, walls, partitions, doors, windows, and equipment may vary from locations shown on the drawings. Prior to locating sleeves, boxes and chases for roughing-in of conduit and equipment, the Contractor shall coordinate exact field location of the above items with other trades. In addition, check for exact direction of door swings so that local switches are properly located on the strike side.

- G. Install wall switches 48 inches above floor, OFF position down.
- H. Install wall dimmers 48 inches above floor; derate ganged dimmers as instructed by manufacturer; do not use common neutral.
- I. Install convenience receptacles 18 inches above floor, and 6 inches above counter backsplash or workbenches. Install specific-use receptacles at heights shown on the drawings.
- J. Label device plates with a permanent adhesive label listing panel and circuit feeding the wiring device.
- K. Test wiring devices for damaged conductors, high circuit resistance, poor connections, inadequate fault current path, defective devices, or similar problems using a portable receptacle tester. Correct circuit conditions, remove malfunctioning units and replace with new, and retest as specified above.
- L. Test GFCI devices for tripping values specified in UL 1436 and UL 943.

END OF SECTION 26 27 26

**SECTION 26 43 13
SURGE PROTECTIVE DEVICES**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of Type 2 Surge Protective Devices, as defined in NFPA 70, and indicated as transient voltage surge suppression or TVSS in this section.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 23 00, LOW-VOLTAGE SWITCHGEAR: For factory-installed or external TVSS.
- C. Section 26 24 13, DISTRIBUTION SWITCHBOARDS: For factory-installed or external TVSS.
- D. Section 26 24 16, PANELBOARDS: For factory-installed or external TVSS.
- E. Section 26 26 00, POWER DISTRIBUTION UNITS FOR STATIC UNINTERRUPTIBLE POWER SYSTEMS: For factory-installed or external TVSS.

1.3 QUALITY ASSURANCE

- A. Refer to Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES), in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

- A. Submit six copies of the following in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
 - 1. Shop Drawings:
 - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
 - b. Include electrical ratings and device nameplate data.
 - 2. Manuals:
 - a. Submit, simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets, wiring diagrams, and information for ordering replacement parts.
 - b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.
 - a. Certification by the manufacturer that the TVSS conforms to the requirements of the drawings and specifications.
 - b. Certification by the Contractor that the TVSS has been properly installed.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplement and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Institute of Engineering and Electronic Engineers (IEEE):
 - IEEE C62.41.2-02 Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
 - IEEE C62.45-03 Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits
- C. National Fire Protection Association (NFPA):
 - 70-11 National Electrical Code (NEC)
- D. Underwriters Laboratories, Inc. (UL):
 - UL 1283-05 Electromagnetic Interference Filters
 - UL 1449-06 Surge Protective Devices

SPEC WRITER NOTE: Delete between // ---- // if not applicable to project. Also delete any other item or paragraph not applicable to the section and renumber the paragraphs.

PART 2 - PRODUCTS

2.1 SWITCHGEAR/SWITCHBOARD TVSS

- A. General Requirements:
 1. Comply with IEEE and UL.
 2. Modular design with field-replaceable modules, or non-modular design.
 3. Fuses, rated at 200 kA interrupting capacity.
 4. Bolted compression lugs for internal wiring.
 5. Integral disconnect switch.
 6. Redundant suppression circuits.
 7. LED indicator lights for power and protection status.
 8. Audible alarm, with silencing switch, to indicate when protection has failed.

9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
 10. Four-digit transient-event counter.
- B. Surge Current per Phase: Minimum 240kA per phase.

2.2 PANELBOARD TVSS

- A. General Requirements:
1. Comply with UL 1449 and IEEE C62.41.2.
 2. Modular design with field-replaceable modules, or non-modular design.
 3. Fuses, rated at 200 kA interrupting capacity.
 4. Bolted compression lugs for internal wiring.
 5. Integral disconnect switch.
 6. Redundant suppression circuits.
 7. LED indicator lights for power and protection status.
 8. Audible alarm, with silencing switch, to indicate when protection has failed.
 9. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device.
 10. Four-digit transient-event counter.
- B. Surge Current per Phase: Minimum 120kA per phase.

2.3 ENCLOSURES

- A. Enclosures: NEMA 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Factory-installed TVSS: Switchgear, switchboard, or panelboard manufacturer shall install TVSS at the factory.
- B. Field-installed TVSS: Contractor shall install TVSS with conductors or buses between TVSS and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
1. Provide a circuit breaker as a dedicated disconnecting means for TVSS as shown on drawings.

- C. Do not perform insulation resistance tests on switchgear, switchboards, panelboards, or feeders with the TVSS connected. Disconnect TVSS before conducting insulation resistance tests, and reconnect TVSS immediately after insulation resistance tests are complete.

3.2 ACCEPTANCE CHECKS AND TESTS

- A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
 - 1. Visual Inspection and Tests:
 - a. Compare equipment nameplate data with specifications and approved shop drawings.
 - b. Inspect physical, electrical, and mechanical condition.
 - c. Verify that disconnecting means and feeder size and maximum length to TVSS corresponds to approved shop drawings.
 - d. Verifying tightness of accessible bolted electrical connections by calibrated torque-wrench method.
 - e. Vacuum-clean enclosure interior. Clean enclosure exterior.
 - f. Verify the correct operation of all sensing devices, alarms, and indicating devices.

3.3 FOLLOW-UP VERIFICATION

- A. After completion of acceptance checks and tests, the Contractor shall show by demonstration in service that TVSS are in good operating condition and properly performing the intended function.

3.4 INSTRUCTION

- A. Provide the services of a factory-trained technician for one 2-hour training period for instructing personnel in the maintenance and operation of the TVSS, on the date requested by the Owner.

---END---

SHEET INDEX

SHEET No.	DESCRIPTION
G0.0	COVER SHEET
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G1.2	EXISTING FACILITIES AND PROJECT DESCRIPTION
G1.3-G1.4	SAFETY AND PHASING PLAN
G1.5	GENERAL NOTES
A100	FUEL SYSTEM EXISTING CONDITIONS
A101	FUEL SYSTEM EXISTING CONDITIONS - SERVICE ROOM
A102	FUEL SYSTEM PROPOSED WORK
A203	BOLLARDS PLACEMENT
A-401	SECURITY CAMERAS DETAILS
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FUEL CONTROLS	
P-105	DETAILS
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P-107	SYSTEM FLOW DIAGRAM
P-108	SEQUENCE OF OPERATIONS
P-109	CONTROLS/ MONITORING SITE PLAN
P-110	CONTROLS/ MONITORING ENLARGED PLANS
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E-201	MOGAS/ JET A ELECTRICAL CONTROLS- WIRE/CONDUIT SITE PLAN
E-202	MAINTENANCE BUILDING ELECTRICAL/ COMM PLAN
E-300	LIGHTNING PROTECTION PLAN
E-301	LIGHTNING PROTECTION DETAILS



VICINITY MAP



CONSTRUCTION PLANS FOR:

CONRAC FACILITIES REFURBISHMENT

AT THE
DESTIN - FORT WALTON BEACH AIRPORT

ITB AP 42-20
JUNE 2020
OKALOOSA COUNTY

PREPARED BY:



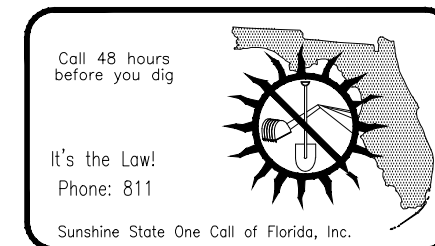
INFRASTRUCTURE
CONSULTING & ENGINEERING

5550 W. IDLEWILD AVENUE, SUITE 115

TAMPA, FL 33634

(813) 330-2704

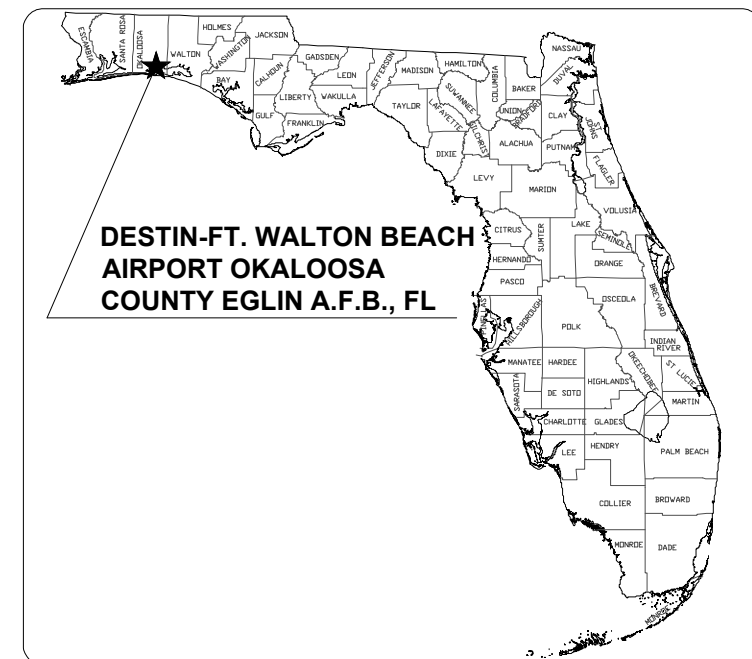
CERTIFICATE OF AUTHORIZATION NO.: 30862



BOARD OF COUNTY COMMISSIONERS

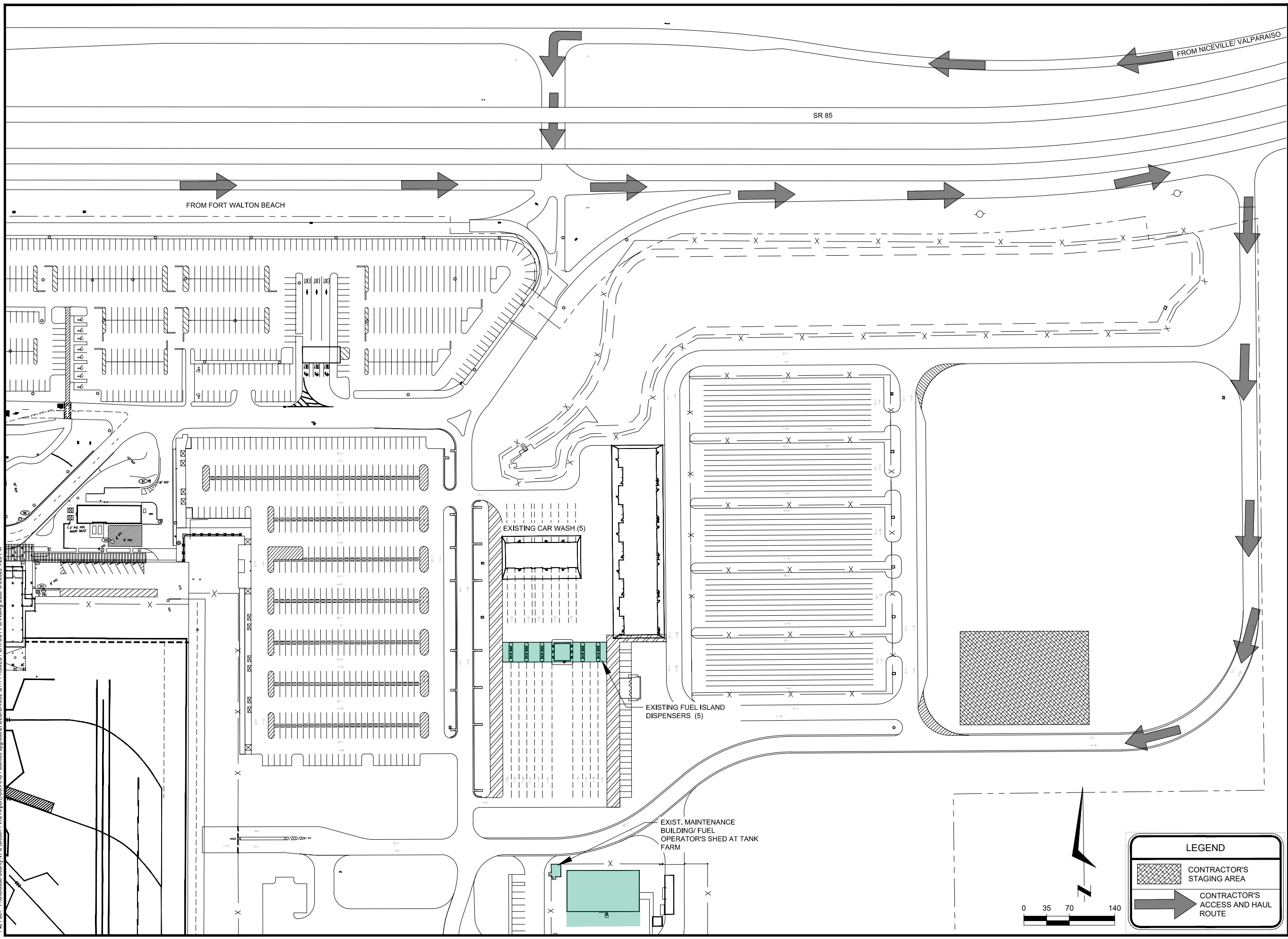
TREY GOODWIN - DISTRICT 4, CHAIRMAN
CAROLYN KETCHEL - DISTRICT 2, VICE CHAIR
GRAHAM FOUNTAIN - DISTRICT 1
NATHAN BOYLES - DISTRICT 3
KELLY WINDES - DISTRICT 5

REVISIONS			
No.	Description	Date	By



LOCATION MAP

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DESTIN - FORT WALTON BEACH AIRPORT



INFRASTRUCTURE CONSULTING & ENGINEERING
 5550 WEST IDLEWILD AVE. SUITE 115
 TAMPA, FLORIDA 33634 (813) 330-2701
 CERTIFICATE OF AUTHORIZATION NO.: 30862

Project Name:
CONRAC FACILITIES REFURBISHMENTS

Designer: HJ Checked by: DJH

Technician: MA ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS

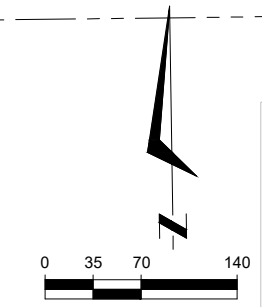
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PROJECT LAYOUT PLAN

FAA A.I.P. Project No.:
 N/A

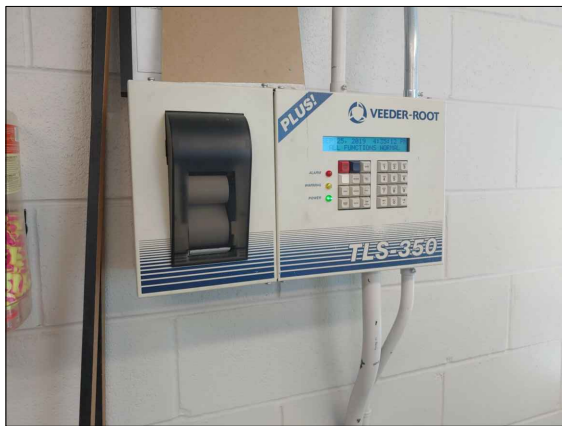
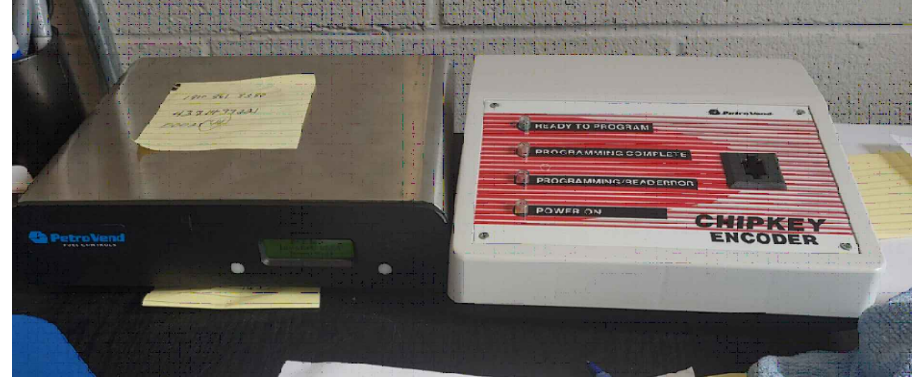
FDOT Project No.:

Date: **JUNE 2020** Sheet Number: **G1.1**



LEGEND

- CONTRACTOR'S STAGING AREA
- CONTRACTOR'S ACCESS AND HAUL ROUTE



PROJECT DESCRIPTION

- 1) **MOGAS ISLAND** - REPLACE EXISTING *RELIANCE SERIES PUMPS AND PEDESTALS*. CURRENTLY, THE 5 PUMPS ARE ANALOG READOUT WITH *PETROVEND* CHIP-KEY CONTROLS. THE DISPENSERS WILL BE REPLACED WITH DIGITAL READOUTS. CHIP-KEYS WILL BE REPLACED WITH PROXIMITY CARDS.

REPLACE FUEL INVENTORY CONTROLS SYSTEM. PROVIDE COMPLETE OPERATING SYSTEM.

PROVIDE NEW SITE SOFTWARE.
- 2) **FUEL TANK MONITORING SYSTEM AT TANK FARM** - THE EXISTING VEEDER-ROOT SYSTEM SHALL BE REPLACED. PROVIDE NEW *AUTOMATIC TANK MONITORING SYSTEM*. PROVIDE FIBER OPTIC CONNECTION TO THE TERMINAL BUILDING.
- 3) **BOLLARDS**- PROVIDE REMOVABLE/ LOCKABLE BOLLARDS AT CONRAC ADMIN BUILDING



DESTIN - FORT WALTON BEACH AIRPORT



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5550 WEST IDLEWILD AVE. SUITE 115
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CERTIFICATE OF AUTHORIZATION NO.: 30862

Project Name:
CONRAC FACILITIES REFURBISHMENTS

Designer: HJ	Checked by: DJH
Technician: MA	ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS			
No.	Description	Date	By

Drawing Name:
EXISTING FACILITIES AND PROJECT DESCRIPTION

FAA A.I.P. Project No.:
N/A

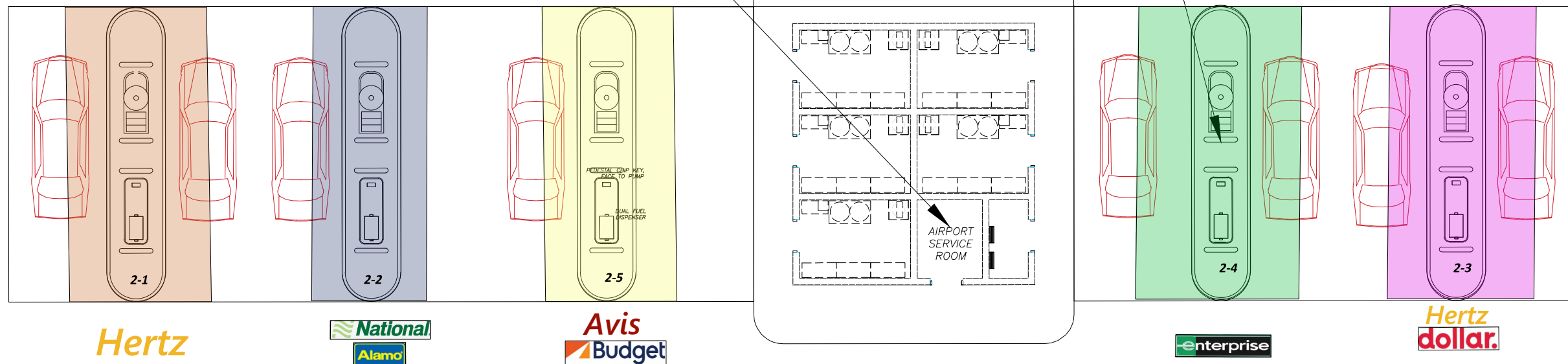
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FUEL MANAGEMENT SYSTEM REPLACEMENT (PHASE 1)

FUEL PUMP AND INVENTORY CONTROLLER PEDESTAL REPLACEMENTS, TYP.(PHASE 2)



PHASING

PHASE 1 - MOGAS FUEL MANAGEMENT SYSTEM REPLACEMENT. INSTALLED TO CONTROL / MONITOR ALL FUEL TANKS, THEN MODIFIED TO INCORPORATE THE DETAILED INVENTORY AND CONTROLS FOR MOGAS. INSTALLED PARALLEL TO CURRENT SYSTEM, CUT OVER AS NEW EQUIPMENT IS REPLACED. PRECURSOR IS NTP. WORK INCLUDED THE RELATED LIGHTNING PROTECTION, GROUNDING, AND FIBER RUNS TO CONNECT BACK TO ADMINISTRATION AREA AS WELL AS FUEL FARM SHED.

PHASE 2 - FUEL PUMP REPLACEMENT, INVENTORY CONTROL PEDESTALS FOR MOGAS MONITORING. PRECURSOR WOULD BE COMPLETION OF PHASES 1. SEQUENCE IS SHOWN IN DIAGRAM BELOW.

PHASE 3 - AUTOMATIC TANK MONITORING SYSTEM AT TANK FARM. PRECURSOR- NTP

GENERAL NOTES:

- NOTE 1:** NO MORE THAN ONE FUEL ISLAND SHALL BE OUT OF SERVICE AT ANY TIME.
- NOTE 2:** CONTRACT TIME 150 DAYS FROM NTP TO FINAL COMPLETION. INCLUDES MATERIAL PROCUREMENT.



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CERTIFICATE OF AUTHORIZATION NO.: 30862

Project Name:
CONRAC FACILITIES REFURBISHMENTS

Designer: HJ	Checked by: DJH
Technician: MA	ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS			
No.	Description	Date	By

Drawing Name:
SAFETY AND PHASING

FAA A.I.P. Project No.:
N/A

FDOT Project No.:

Date: **JUNE 2020** Sheet Number: **G1.3**

GENERAL NOTES

1. CONSTRUCTION STAKE-OUT SHALL BE PERFORMED BY CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL MEASUREMENTS THAT MAY BE REQUIRED TO LAY OUT THE CONSTRUCTION. THE COST OF STAKING WILL NOT BE PAID FOR DIRECTLY AND SHALL BE INCLUDED IN THE UNIT PRICES FOR THE VARIOUS ITEMS OF WORK.
2. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE CLEANUP AND DISPOSAL OF ALL TRASH AND DEBRIS CREATED BY HIS WORK OR PERSONNEL. ALL TRASH AND DEBRIS MUST BE DISPOSED OF OFFSITE.
3. THE CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR ASPHALT AND OR CONCRETE BATCH PLANT LOCATIONS WHICH MUST BE LOCATED OFF AIRPORT PROPERTY.
4. THE CONTRACTOR SHALL VISIT SITE TO DETERMINE EXISTING CONDITIONS PRIOR TO SUBMITTING BID. THE CONTRACTOR SHALL REPORT TO THE ENGINEER ANY VARIATIONS FROM THE INFORMATION SHOWN ON THE CONSTRUCTION PLANS.
5. APPROVED CUTS IN PAVEMENT OR CONCRETE SHALL BE MADE USING A PAVEMENT SAW, AND SHALL BE PATCHED TO MATCH THE EXISTING SURFACE IN A MANNER APPROVED BY THE ENGINEER.
6. EXISTING EASEMENTS TO OTHER PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
7. ALL NON-PAVED AREAS OUTSIDE THE LIMITS OF CONSTRUCTION WHICH ARE DISTURBED BY THE CONTRACTOR'S OPERATIONS, SUCH AS THE CONTRACTOR'S ACCESS ROAD, STAGING AREA, HAUL ROUTES, ETC., SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND GRASSED PER FDOT SPECIFICATION SECTION 570 UPON COMPLETION OF THE PROJECT.
8. ANY DAMAGES DONE TO AIRPORT PROPERTY OR UTILITIES (SUCH AS ROADS FENCING, EXISTING CABLES) WILL BE REPAIRED BY THE CONTRACTOR TO THE APPROVAL OF THE OWNER OF THE FACILITY IN A SATISFACTORY MANNER. THE CONTRACTOR WILL BEAR ALL COSTS FOR REPAIRS.
9. THE CONTRACTOR SHALL OBTAIN ALL PERMITS NECESSARY FOR THE COMPLETION OF THIS PROJECT.
10. THE CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL ENVIRONMENTAL RULES AND REGULATIONS OF THE CITY, COUNTY, STATE, ARMY CORPS OF ENGINEERS, AND ANY OTHER JURISDICTIONAL AGENCIES, AND ALL CONDITIONS SET FORTH IN ENVIRONMENTAL PERMITS.
11. ALL DISPUTES ARISING FROM THE CONTRACTOR SHALL BE DECIDED BY THE ENGINEER, WHOSE DECISION SHALL BE FINAL.
12. ALL DEMOLISHED MATERIALS BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE SHOWN IN THE CONTRACT DOCUMENTS. CONSTRUCTION AND DEMOLITION DEBRIS SHALL BE LEGALLY DISPOSED OF OFF AIRPORT PROPERTY.

HAUL ROUTE / STAGING

13. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE STORAGE AND SECURITY OF HIS MATERIAL AND EQUIPMENT AND SHALL ERECT STORAGE FACILITIES AND FENCING AS NECESSARY. THE CONTRACTOR'S STORAGE AND STAGING AREA SHALL BE IN THE LOCATION SHOWN ON DRAWING G1.1.
14. THE CONTRACTOR'S STAGING AREA(S) AND HAUL ROUTES SHOWN ON THE PLANS ARE GENERAL AND FOR INFORMATIONAL PURPOSES ONLY. THE ACTUAL SIZE AND LOCATION OF STAGING AREAS AND HAUL ROUTES WILL BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION.
15. ALL CONSTRUCTION TRAFFIC SHALL ENTER AND EXIT THE PROJECT AREA THROUGH THE PROJECT ACCESS ROUTES APPROVED BY THE ENGINEER ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SECURITY OF ALL GATES HE USES FOR ACCESS ONTO AIRPORT PROPERTY.
16. THE EXISTING AIRPORT PAVEMENTS ACCESS ROADS AND HAUL ROUTES MAY NOT BE CAPABLE OF SUPPORTING CERTAIN TYPES OF CONSTRUCTION EQUIPMENT. PRIOR TO BIDDING, THE CONTRACTOR SHALL FULLY SATISFY HIMSELF AS TO THE ABILITY OF THE EXISTING AIRPORT PAVEMENTS TO SATISFACTORILY SUSTAIN THE TYPE OF EQUIPMENT HE PLANS TO USE. CONTRACTOR SHALL SIZE THE EQUIPMENT USED FOR CONSTRUCTION ACCORDINGLY. ANY DAMAGE CAUSED BY HAULING OR ANY OTHER CONSTRUCTION ACTIVITY TO EXISTING PAVEMENT SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
17. THE OWNER'S REPRESENTATIVE SHALL DESIGNATE AREAS TO BE USED BY THE CONTRACTOR FOR THE PARKING OF CONSTRUCTION EQUIPMENT AND VEHICLES WHEN NOT ENGAGED IN THE CONSTRUCTION DURING NON-WORKING DAYS AND NIGHTS AS WELL AS AREAS FOR CONTRACTOR'S EMPLOYEES AUTO PARKING.
18. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING AND PROVIDING ALL PERMANENT AND TEMPORARY UTILITY CONNECTIONS TO THE STAGING AREA.

BURIED UTILITIES

19. PRIOR TO DIGGING ANY TRENCHES, THE CONTRACTOR SHALL NOTIFY ALL UTILITIES (ELECTRIC, GAS, TELEPHONE, WATER, SEWER) AND OBTAIN LOCATIONS OF UNDERGROUND UTILITIES.

SECURITY NOTES

20. GENERAL INTENT: IT IS INTENDED THAT THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE AIRPORT SECURITY PLAN AND WITH THE SECURITY REQUIREMENTS SPECIFIED HEREIN BY AIRPORT OPERATIONS. THE CONTRACTOR SHALL DESIGNATE TO THE ENGINEER AND AIRPORT OPERATIONS, IN WRITING, THE NAME OF HIS "CONTRACTOR SECURITY OFFICER (CSO)." THE CSO SHALL REPRESENT THE CONTRACTOR ON THE SECURITY REQUIREMENTS FOR THE CONTRACT.
21. CONTRACTOR PERSONNEL SECURITY ORIENTATION: THE CSO SHALL BE RESPONSIBLE FOR BRIEFING ALL CONTRACTOR AND SUBCONTRACTOR PERSONNEL ON SECURITY REQUIREMENTS. ALL NEW CONTRACTOR EMPLOYEES SHALL BE BRIEFED ON SECURITY REQUIREMENTS PRIOR TO WORKING IN THE CONSTRUCTION AREA.
22. MATERIALS DELIVERY TO THE SITE: ALL CONTRACTOR'S MATERIAL ORDERS FOR DELIVERY TO THE WORK SITE WILL USE AS A DELIVERY ADDRESS, THE STREET NAME ASSIGNED TO THE ACCESS POINT AT THE CONTRACTOR'S STAGING SITE AT THE AIRPORT. THE NAME "DESTIN-FT.WALTON BEACH AIRPORT" SHALL NOT BE USED IN THE DELIVERY ADDRESS AT ANY TIME. THIS WILL PRECLUDE DELIVERY TRUCKS

FROM ENTERING INTO THE TERMINAL COMPLEX, OR TAKING SHORT CUTS THROUGH THE PERIMETER GATES AND ENTERING INTO AIRCRAFT OPERATIONS AREA INAPPROPRIATELY.

23. CONSTRUCTION AREA LIMITS: THE LIMITS OF CONSTRUCTION, MATERIAL STORAGE AREAS, PLANT SITE, EQUIPMENT STORAGE AREA, PARKING AREA AND OTHER AREAS DEFINED AS REQUIRED FOR THE CONTRACTOR'S EXCLUSIVE USE DURING CONSTRUCTION SHALL BE MARKED BY THE CONTRACTOR. THE CONTRACTOR SHALL ERECT AND MAINTAIN AROUND THE PERIMETER OF THESE AREAS SUITABLE FENCING, MARKING AND/OR WARNING DEVICES VISIBLE FOR DAY/NIGHT USE.
24. IDENTIFICATION-VEHICLES: THE CONTRACTOR, THROUGH THE CSO, SHALL ESTABLISH AND MAINTAIN A LIST OF CONTRACTOR AND SUBCONTRACTOR VEHICLES AUTHORIZED TO OPERATE ON THE SITE AND SHALL ISSUE A PERMIT TO EACH VEHICLE TO BE MADE AVAILABLE UPON REQUEST BY AIRPORT OPERATIONS THE RESIDENT PROJECT REPRESENTATIVE OR ANY AUTHORIZED AIRPORT REPRESENTATIVES. A BLOCK OF VEHICLE PERMITS SHALL BE ISSUED BY AIRPORT OPERATIONS TO THE CONTRACTOR AND AT THE COMPLETION OF THE CONTRACT ALL PERMITS WILL BE RETURNED TO AIRPORT OPERATIONS. IN LIEU OF ISSUING INDIVIDUAL VEHICLE PERMITS, THE CSO CAN REQUIRE EACH VEHICLE TO DISPLAY A LARGE COMPANY SIGN ON BOTH SIDES OF THE VEHICLE AND ADVISE AIRPORT OPERATIONS AND SECURITY OF A CURRENT LIST OF COMPANIES AUTHORIZED TO ENTER AND CONDUCT WORK ON THE AIRPORT. CONTRACTOR EMPLOYEE VEHICLES SHALL BE RESTRICTED TO THE CONTRACTOR'S EMPLOYEE PARKING AREA AND ARE NOT ALLOWED ON THE AOA AT ANY TIME.

QUALITY CONTROL PLAN

25. QUALITY CONTROL PLAN: WITHIN 10 DAYS OF NOTIFICATION OF INTENT TO AWARD, THE CONTRACTOR SHALL SUBMIT SEVEN (7) COPIES OF A WRITTEN QUALITY CONTROL PLAN. THE CONTRACTOR SHALL DESIGNATE A QUALITY CONTROL OFFICER RESPONSIBLE FOR THE QUALITY OF CONSTRUCTION AND SHALL INCLUDE AN ORGANIZATIONAL CHART DESIGNATING QUALITY CONTROL RESPONSIBILITIES. THE PLAN SHALL ENCOMPASS A PROGRAM OF QUALITY CONTROL ACTIVITIES FOR THE PROJECT AS A WHOLE, AS WELL AS SPECIFIED PROCEDURES FOR EACH ELEMENT OF WORK. FOR EACH MAJOR ELEMENT OF WORK, THE CONTRACTOR SHALL DESCRIBE IN THE QUALITY CONTROL PLAN PRELIMINARY INSPECTION PROCEDURES TO BE ACCOMPLISHED PRIOR TO START UP, PROGRESS INSPECTION PROCEDURES TO MONITOR THE WORK IN PROGRESS, AS WELL AS FINAL INSPECTIONS TO VERIFY ALL TESTS HAVE BEEN PERFORMED AND ARE PASSING, AND ALL CONDITIONS OF THE SPECIFICATIONS HAVE BEEN MET.

UTILITY CONTACT INFORMATION:

ORGANIZATION	NAME	PHONE
GULF POWER	CHAD FOUNTAIN	(850) 224-4780
COX COMMUNICATIONS	ROGER DIXON	(850) 664-3763
OKALOOSA WATER AND SEWER	GABBY ARCEO	(850) 651-7504
EGLIN WATER AND SEWER (ASUS)	JASON DRAYER	(850) 324-2595
OKALOOSA GAS DISTRICT	ESSA RHEBI	(850) 729-4864

UTILITY LOCATES

1. CONTRACTOR SHALL EMPLOY THE SERVICES OF A "UTILITY LOCATE SERVICE" TO DETERMINE THE PRESENCE OF ANY BURIED TELEPHONE, POWER, FIBER, WATER OR SEWER LINES IN AREAS OF EXCAVATION. PAYMENT WILL BE MADE FOR "UTILITY LOCATE SERVICES" AS A LUMP SUM.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND IDENTIFICATION OF ALL EXISTING UTILITIES AND UNDERGROUND PIPELINES IN CONSTRUCTION AREA. ANY DAMAGES TO EXISTING UTILITIES OR UNDERGROUND PIPELINES ON OR OFF AIRPORT PROPERTY SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. ALL REPAIR WORK SHALL MEET THE APPROVAL OF THE OWNER OF THE DAMAGED UTILITY. NO REIMBURSEMENT WILL BE ALLOWED FOR UTILITY/PIPE REPAIR OR REPLACEMENT.
3. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES, AIRFIELD LIGHTING AND NAVAIDS NOT CALLED OUT TO BE REMOVED OR ABANDONED. ANY DAMAGES DONE TO AIRPORT PROPERTY OR UTILITIES (INCLUDING, BUT NOT LIMITED TO RUNWAYS, TAXIWAYS, APRONS, FENCING, EXISTING CABLES, LIGHTING, SIGNS, NAVAIDS) WILL BE REPAIRED BY THE CONTRACTOR TO THE APPROVAL OF THE OWNER OF THE FACILITY IN A SATISFACTORY MANNER. THE CONTRACTOR WILL BEAR ALL COSTS FOR REPAIRS.
4. ANY UNPLANNED, UNAPPROVED, OR ACCIDENTAL SHUTDOWN OR INTERRUPTION OF SERVICE TO ANY LIGHTING CIRCUIT OR NAVIGATIONAL AID REQUIRES IMMEDIATE NOTIFICATION OF AIRPORT OPERATIONS AND THE OWNER'S REPRESENTATIVE BY THE CONTRACTOR. THE COST OF MATERIALS AND LABOR REQUIRED TO REPAIR THE LIGHTING CIRCUIT SHALL BE BORNE BY THE CONTRACTOR.



DESTIN - FORT WALTON BEACH AIRPORT



Project Name:
CONRAC FACILITIES REFURBISHMENTS

Designer: HJ	Checked by: DJH
Technician: MA	ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS

No.	Description	Date	By

GENERAL NOTES

FAA A.I.P. Project No.:
N/A

FDOT Project No.:

Date: **JUNE 2020** Sheet Number: **G1.5**



DESTIN - FORT
WALTON BEACH
AIRPORT



INFRASTRUCTURE
CONSULTING & ENGINEERING
5550 WEST IDLEWILD AVE. SUITE 115
TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

Project Name:
**CONRAF FACILITIES
REFURBISHMENTS**

Designer: HJ Checked by: DJH

Technician: MA ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS

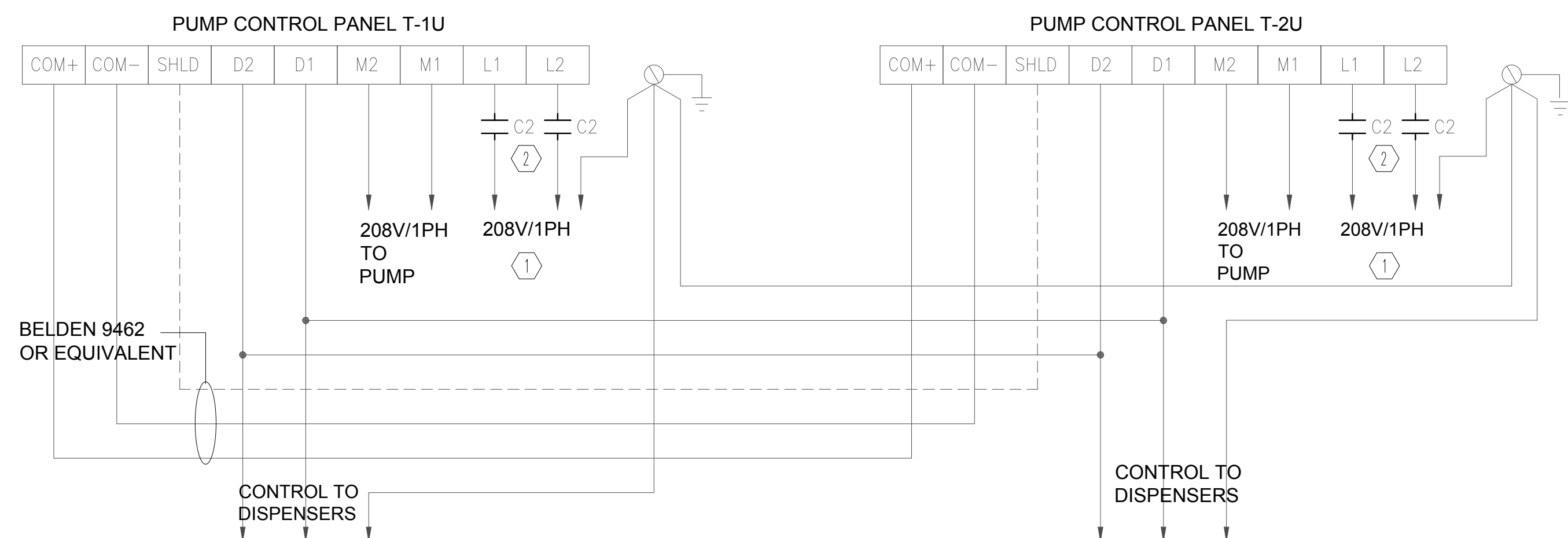
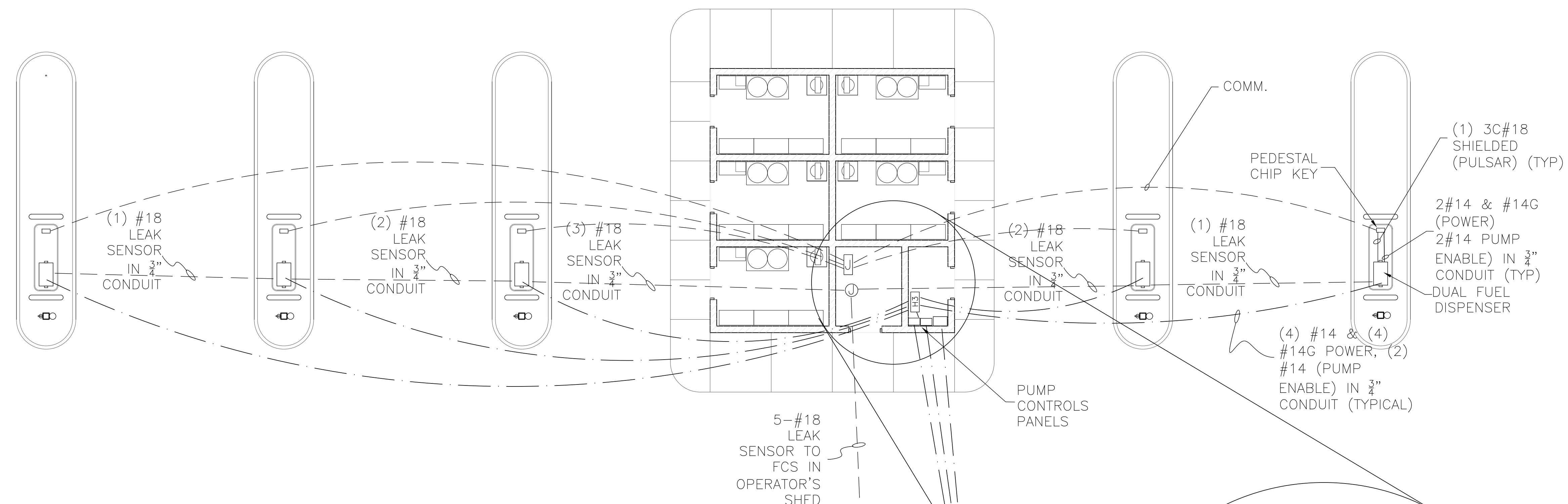
No.	Description	Date	By

**FUEL SYSTEM EXISTING
CONDITIONS**

FAA A.I.P. Project No.:
N/A

FDOT Project No.:

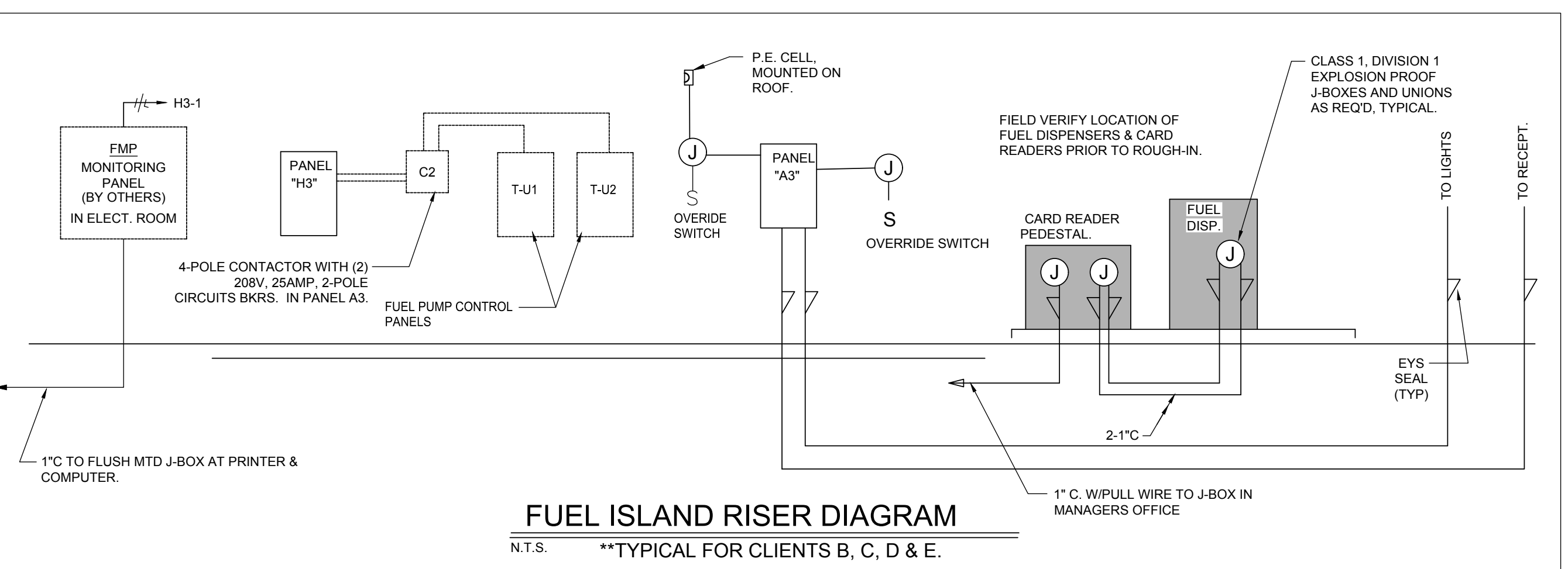
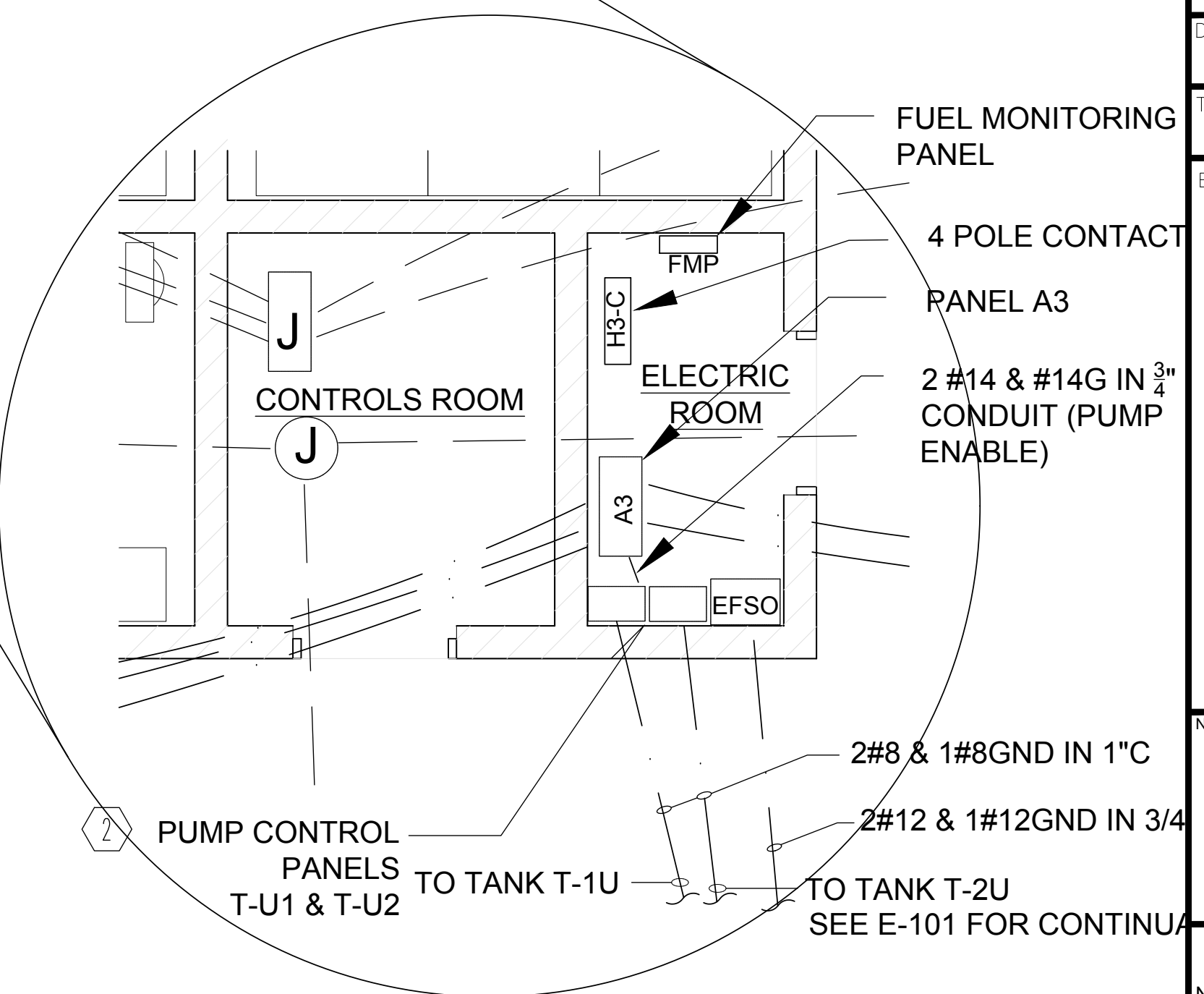
Date: JUNE 2020 Sheet Number: A100



MOGAS PUMP CONTROL WIRING DIAGRAM

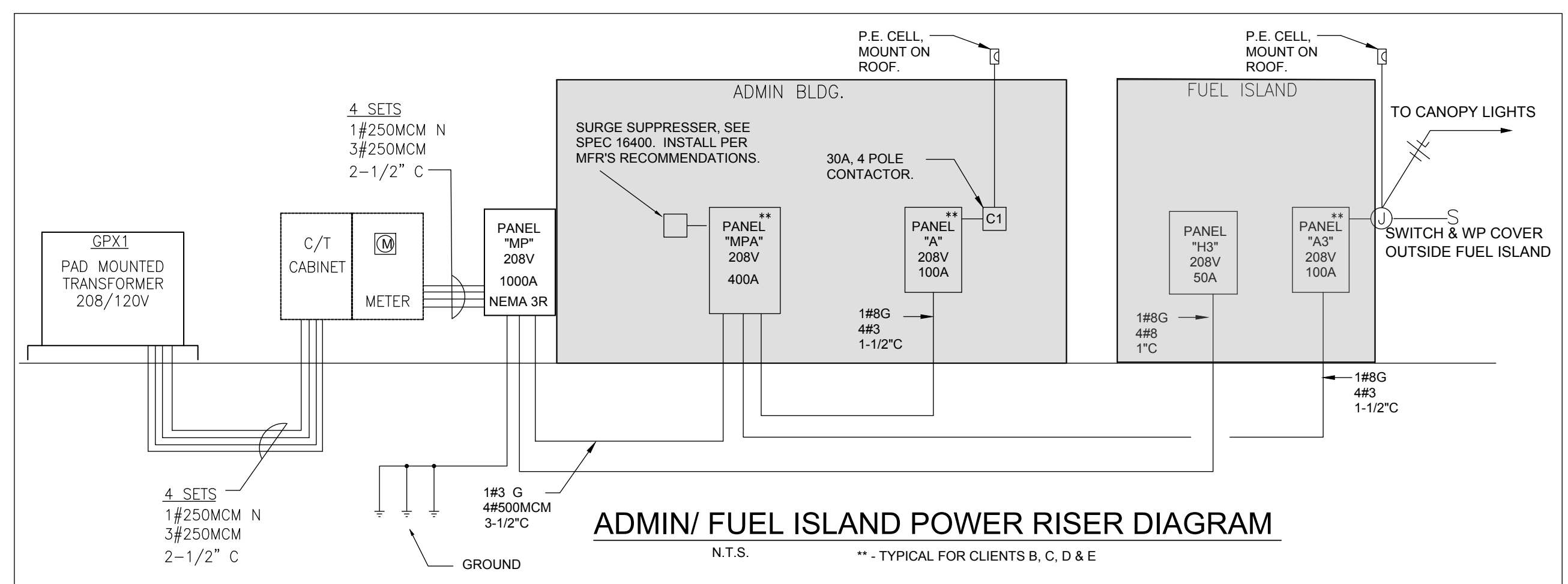
N.T.S.

- ① SERVED FROM PANELBOARD A3. 15A/2P CIRCUIT BREAKER FOR EACH CONTROL PANEL.
- ② POWER TO PUMP CONTROL PANELS IS CONTROLLED THROUGH A MULTI-POLE, MECHANICALLY HELD CONTACTOR AS PART OF THE EMERGENCY FUEL SHUTOFF SYSTEM (EFSO).



FUEL ISLAND RISER DIAGRAM

N.T.S. **TYPICAL FOR CLIENTS B, C, D & E.



ADMIN/ FUEL ISLAND POWER RISER DIAGRAM

N.T.S. ** - TYPICAL FOR CLIENTS B, C, D & E

File Path: Y:\Okaloosa County\WPS (Destin-FWB Airport)\ConRAF Facilities Upgrade\2. DESIGN\006-A100 Fuel\dwg Date: 6/9/2020 9:21 AM



DESTIN - FORT WALTON BEACH AIRPORT



INFRASTRUCTURE CONSULTING & ENGINEERING
5550 WEST IDLEWILD AVE. SUITE 115
TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

Project Name:
CONRAC FACILITIES REFURBISHMENTS

Designer: HJ Checked by: DJH

Technician: MA ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS

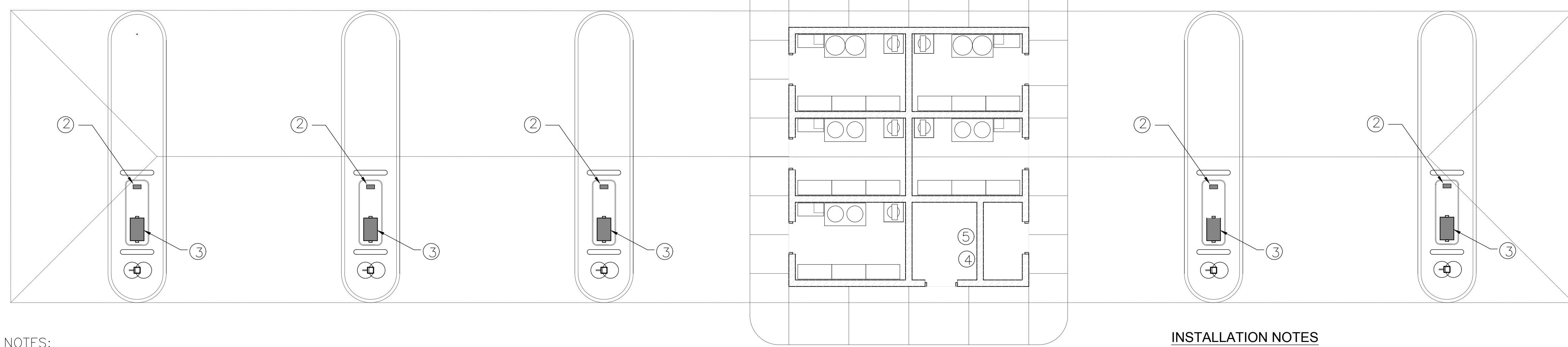
No.	Description	Date	By

Drawing Name:
FUEL SYSTEM PROPOSED WORK

FAA A.I.P. Project No.:
N/A

FDOT Project No.:

Date: JUNE 2020 Sheet Number: A102



INSTALLATION NOTES

1. FOLLOW THE ORDER OF REMOVAL AND REPLACEMENT INDICATED ON SAFETY AND PHASING SHEET NO MORE THAN ONE DISPENSER AND RELATED CONTROL PEDESTAL SHALL BE OUT OF SERVICE DURING OPERATING HOURS (0500 TO 2200, DAILY)
2. CUT POWER TO THE INDIVIDUAL DISPENSER CIRCUIT. SHUT OFF AT NEAREST SUPPLY VALVE. REMOVE ANY FUEL LEFT FROM HOSES OR LINES.
3. UNWIRE AND REMOVE THE EXISTING DISPENSER. COORDINATE WITH REMOVAL OF INVENTORY CONTROL PEDESTAL. DISCONNECT COMMUNICATION CONNECTIONS TO AGENCY MANAGERS OFFICE.
4. REWIRE AND PLACE THE NEW DISPENSER AND RECONNECT TO EXISTING SUMP AND VALVES. COORDINATE WITH INSTALLATION OF NEW INVENTORY CONTROL PEDESTAL. RESTORE COMMUNICATION CONNECTIONS TO AGENCY MANAGERS OFFICE
5. PURGE ALL LINES TO REMOVE AIR.
6. RECALIBRATE DISPENSERS
7. TEST PUMP OPERATION AND INVENTORY CONTROL FUNCTIONS
8. RETURN PUMP TO AGENCY USE, AFTER TRAINING AGENCY / OPERATORS.
9. BEGIN WORK ON NEXT PUMP.
10. FOR OPW SALES AND TECHNICAL SUPPORT, CONTACT GENE POPE @ 813.969.1900

NOTES:



- ① CLASS 1, DIVISION 1 EXPLOSION PROOF J-BOXES AND UNIONS ARE REQUIRED.
- ② NEW INVENTORY CONTROL PEDESTAL WITH PROXIMITY CARD READER AND PIN ENTRY. PETROVEND OPW 200 OR APPROVED EQUAL. FACE TO PUMP.



- ③ NEW DUAL FUEL DISPENSER. GASBOY ATLAS 9800K SERIES, MODEL 9853KXTW1 CONSISTS OF A TWIN, ONE PRODUCT SIDE LOADED REMOTE DISPENSER WITH UP TO 22GPM. DISPENSER HAS ELECTRONIC TOTALIZERS, BACKLIT LCD DISPLAY. OR APPROVED EQUAL.



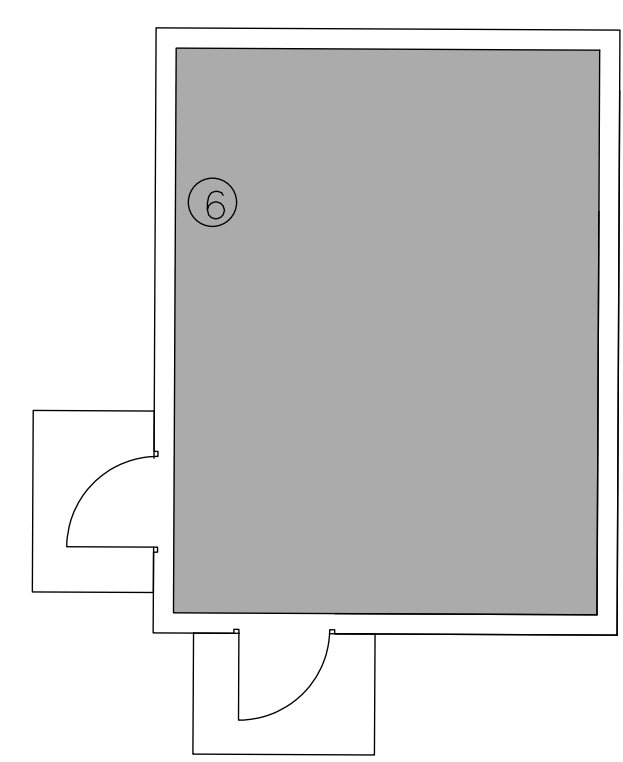
- ④ MOGAS FUEL MANAGEMENT SYSTEM/ FUEL SITE CONTROLLER- PETROVEND OPW FSC 3000 INVENTORY CONTROLS COMPLETE SYSTEM



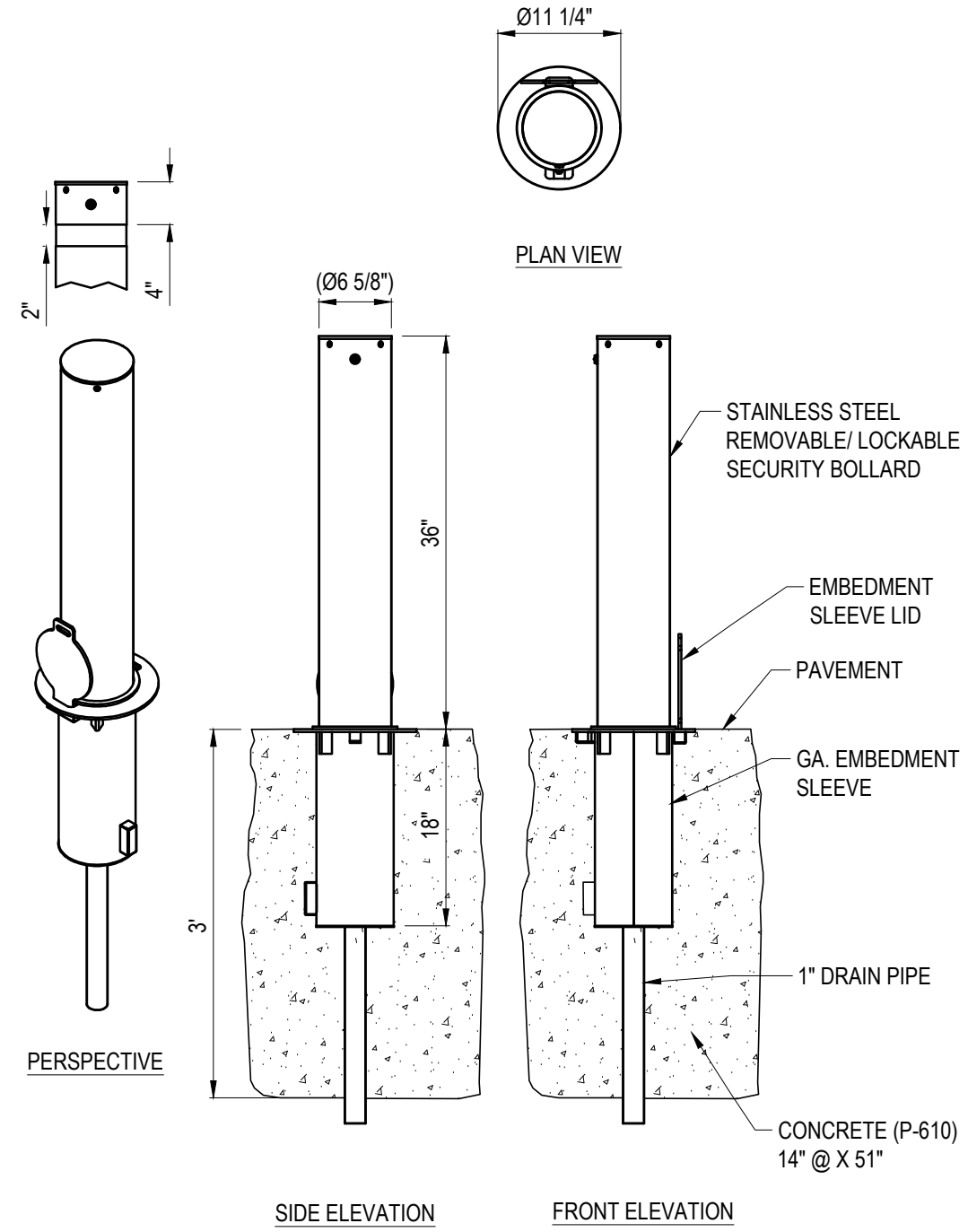
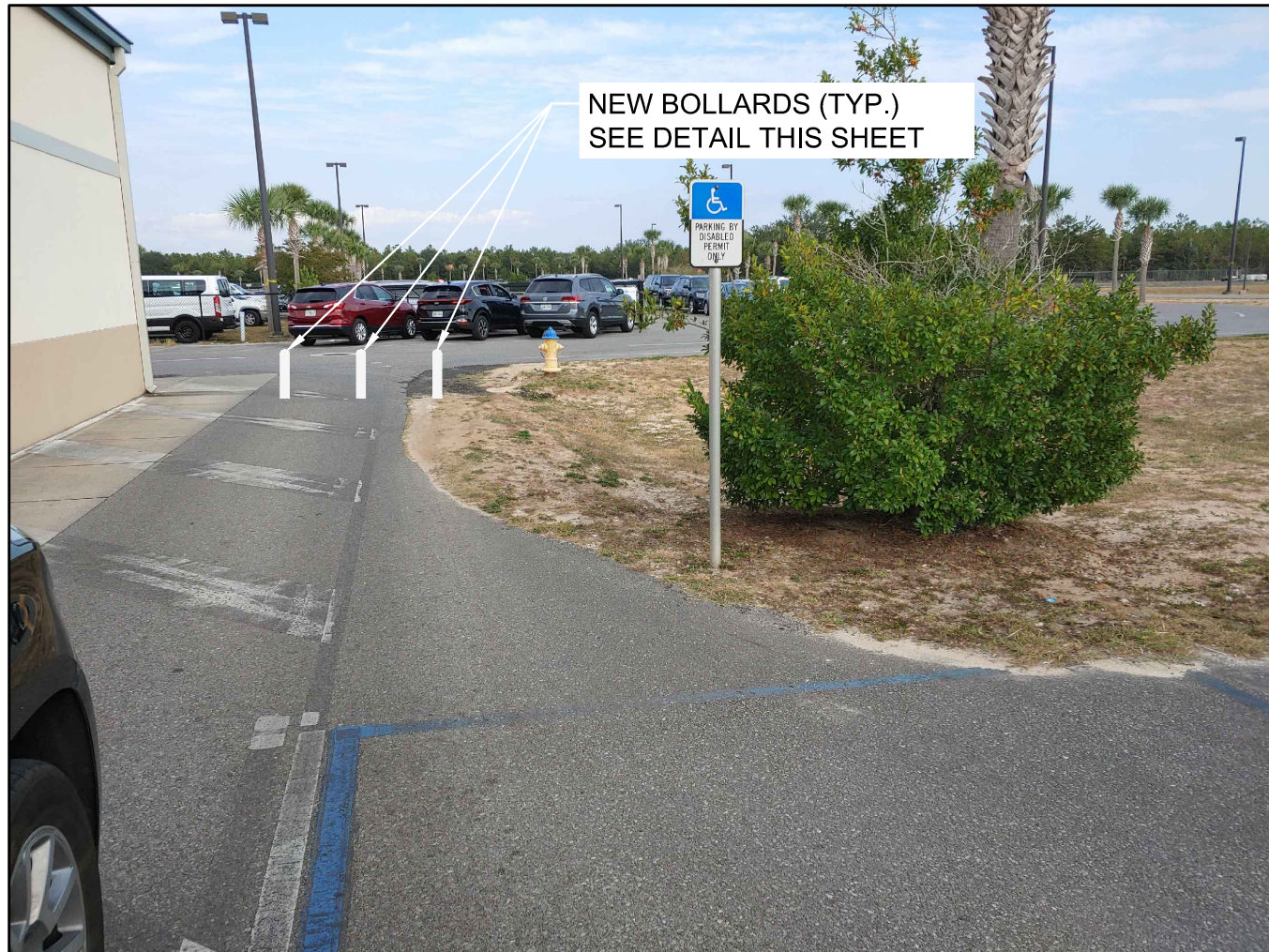
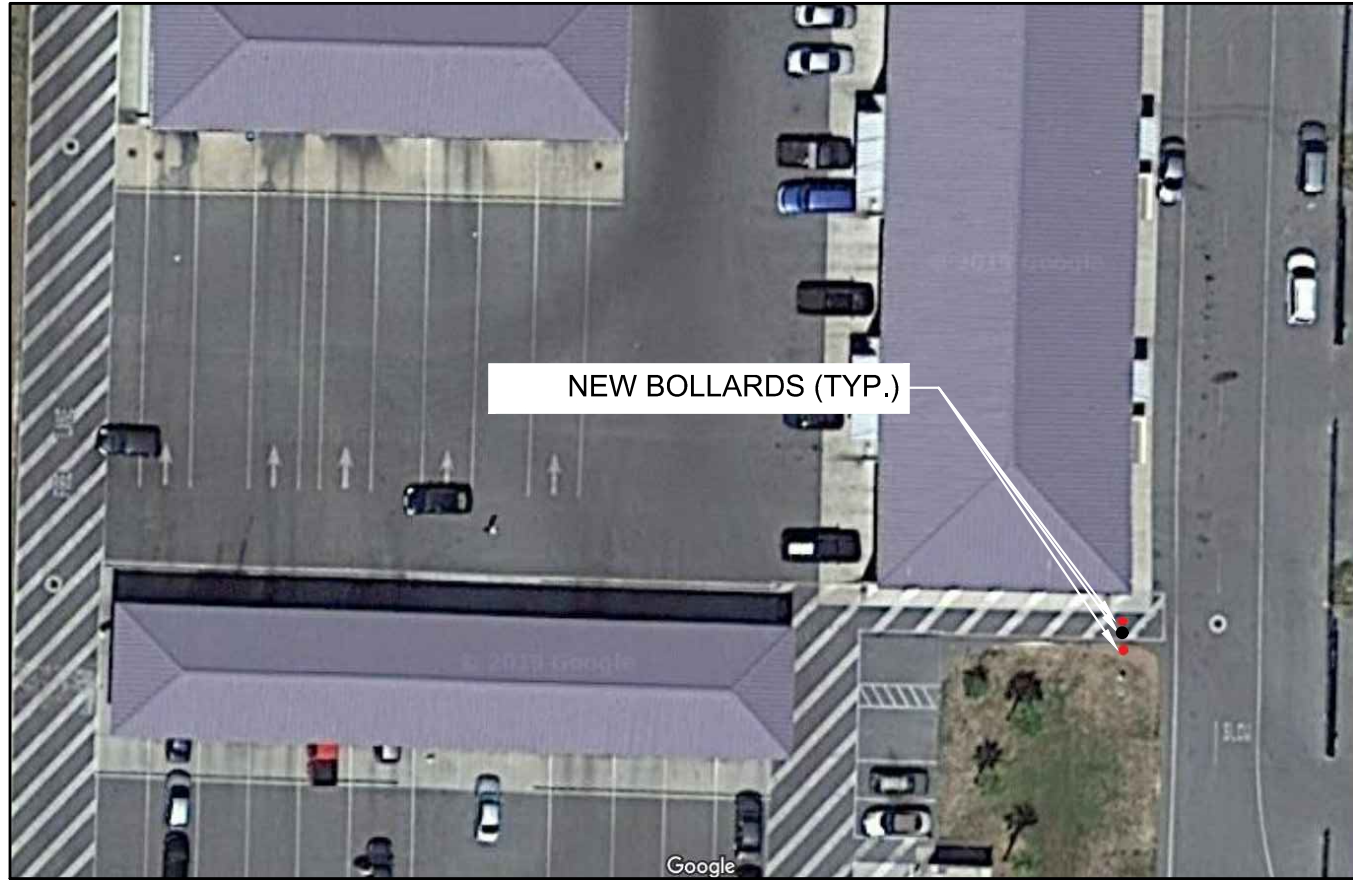
- ⑤ SITE SOFTWARE- OPW PHOENIX SQL. WITH PROGRAMMABLE PROXIMITY CARD CODING CAPABILITIES. LOADED ON OKALOOSA COUNTY SERVER.



- ⑥ AUTOMATIC TANK MONITORING SYSTEM- OPW SITE SENTINEL INTEGRA 100



MAINTENANCE BUILDING/ FUEL OPERATOR'S SHED AT TANK FARM (REFER TO DRAWINGS P-105 THRU P-110, E-200 THRU E301)



SPECIFICATIONS:
 BOLLARD SHALL BE CRASH RATED PER ASTM STD.

NOTES:
 1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
 2. CALPIPE (ATKORE) SECURITY BOLLARD (INTERNAL LOCKING REMOVABLE BOLLARD) OR APPROVED EQUAL.

A INTERNAL LOCKING SECURITY BOLLARDS
 6" REMOVABLE BOLLARD, 36" ABOVE GRADE/18" BELOW GRADE



DESTIN - FORT
 WALTON BEACH
 AIRPORT



Project Name:
**CONRAC FACILITIES
 REFURBISHMENTS**

Designer: HJ	Checked by: DJH
Technician: MA	ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS			
No.	Description	Date	By

Drawing Name:
BOLLARDS PLACEMENT

FAA A.I.P. Project No.:
 N/A

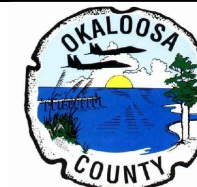
FDOT Project No.:

Date:
 FEB 2020

Sheet Number:
 A203



DESTIN - FORT
WALTON BEACH
AIRPORT



INFRASTRUCTURE
CONSULTING & ENGINEERING
5550 WEST IDLEWILD AVE. SUITE 115
TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

Project Name:
**CONRAC FACILITIES
REFURBISHMENTS**

Designer: HJ	Checked by: DJH
Technician: MA	ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS

No.	Description	Date	By

Drawing Name:
**SECURITY CAMERAS
DETAILS**

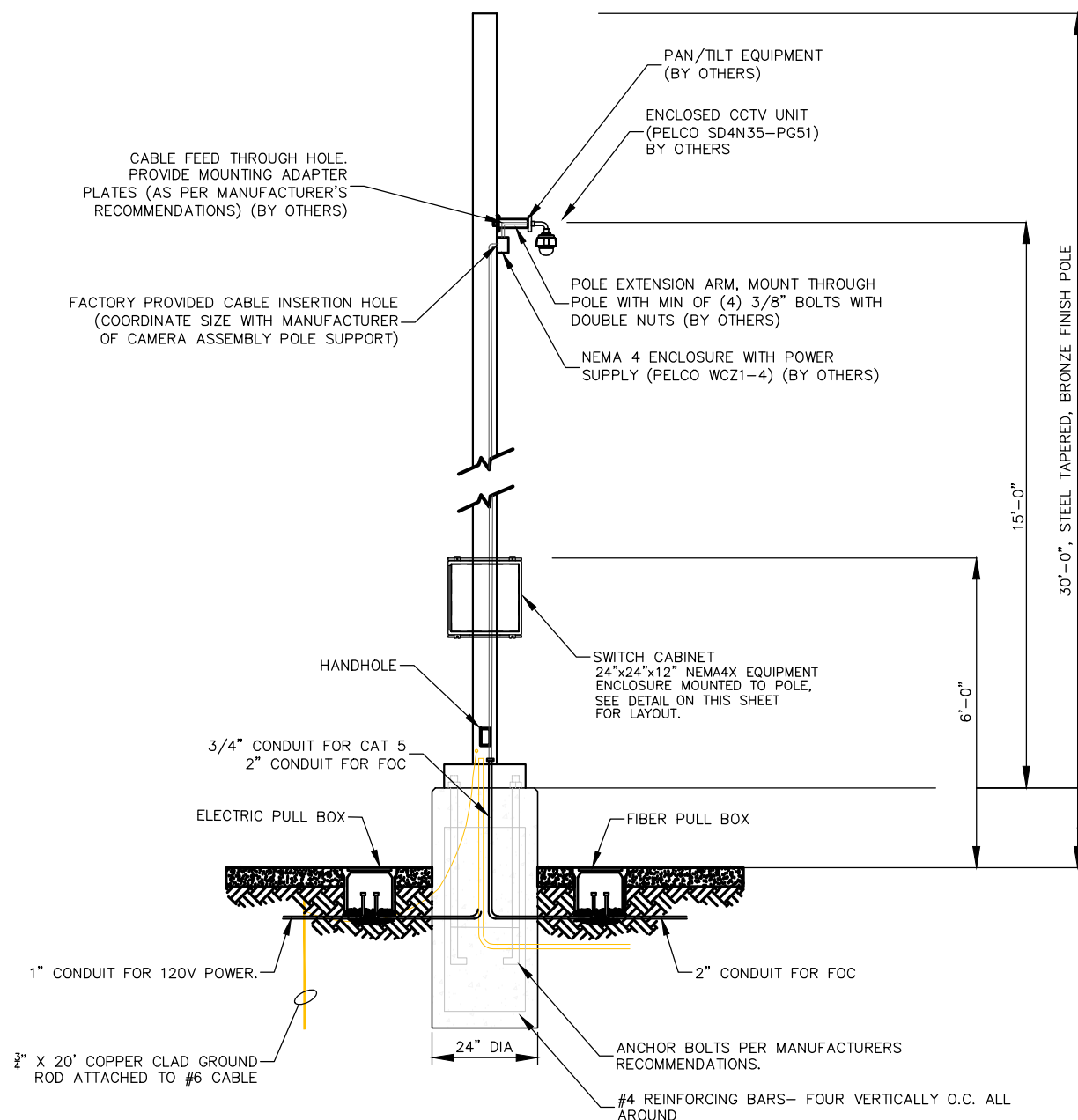
FAA A.I.P. Project No.:
N/A

FDOT Project No.:

Date: FEB 2020	Sheet Number: A401
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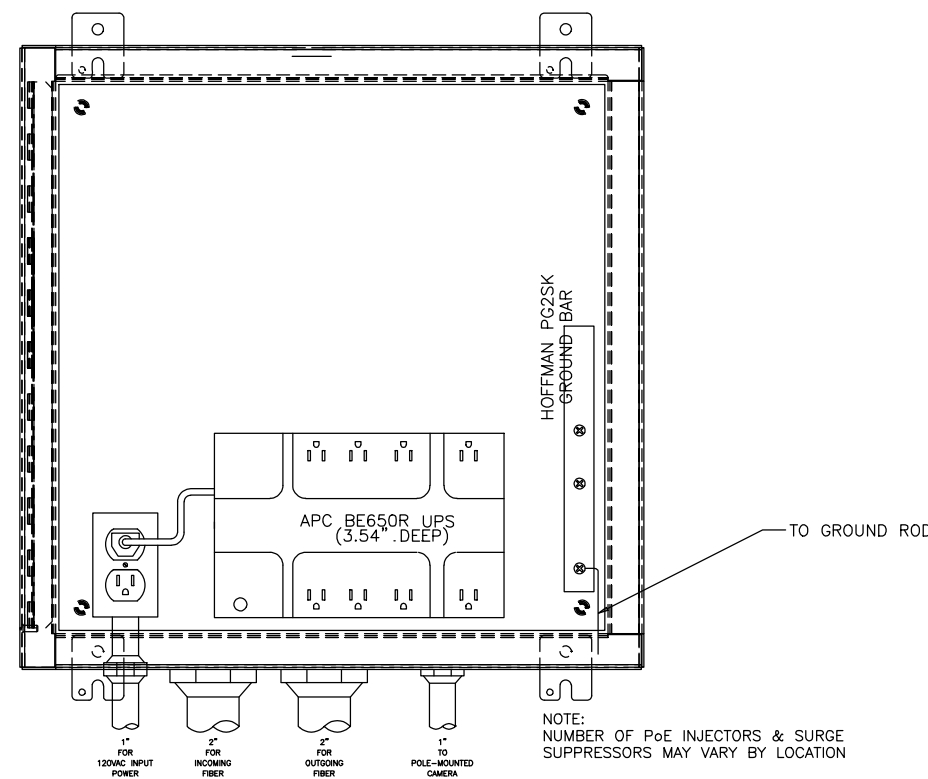
GENERAL NOTES:

1. CONTRACTOR SHALL INSTALL 2 QUAZITE BOXES, ALL CONDUIT, ALUMINUM ENCLOSURE CABINET, LIGHT POLE AND FOUNDATION.
2. CONTRACTOR SHALL PROVIDE 120V POWER SUPPLY AND FIBER OPTIC CABLES TO POLE.
3. INSTALLATION OF CAMERA, PATCH PANEL, AND CAT5 WIRING SHALL BE BY OTHERS.
4. CONTRACTOR SHALL TERMINATE ALL STRANDS OF 6 STRANDS MMFO CABLE ENTERING SWITCH CABINET WITH SPIDER AND ST FO CONNECTOR PIG TAILS.
5. ELECTRICAL REQUIREMENTS PER CAMERA POLE 120 Vac 60 HZ 250 WATTS.
6. CONCRETE FOR THE FOUNDATION SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI. A CIRCULAR TUBE OR PRE CAST BASE SHALL FOR THE BE USED FOR THE FOUNDATION.
7. REINFORCING OF BARS SHALL BE ASTM A615, GRADE 60.
8. MANUFACTURER OF LIGHT POLES SHALL SUPPLY THE ANCHOR BOLTS. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, USING SUPPLIED TEMPLATE.
9. LEVEL BASE USING LEVELING NUTS AND GROUT.
10. AT LIGHT POLES, LEAVE ENOUGH SLACK TO PULL WIRE CONNECTIONS AND FUSE HOLDER OUT OF HAND HOLE.



TYPICAL POLE MOUNTED CCTV INSTALLATION

N.T.S.

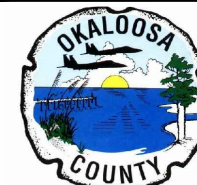


TYPICAL CABINET DETAIL

24"x24"x12" NEMA4X EQUIPMENT ENCLOSURE
NOT TO SCALE



DESTIN - FORT
WALTON BEACH
AIRPORT



IE
INFRASTRUCTURE
CONSULTING & ENGINEERING
5550 WEST IDLEWILD AVE. SUITE 115
TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

Project Name:
**CONRAC FACILITIES
REFURBISHMENTS**

Designer: HJ	Checked by: DJH
Technician: MA	ICE Proj. No.: 19-59

Engineer of Record:

Notes:

REVISIONS			
No.	Description	Date	By

Drawing Name:
**SECURITY CAMERAS
DETAILS**

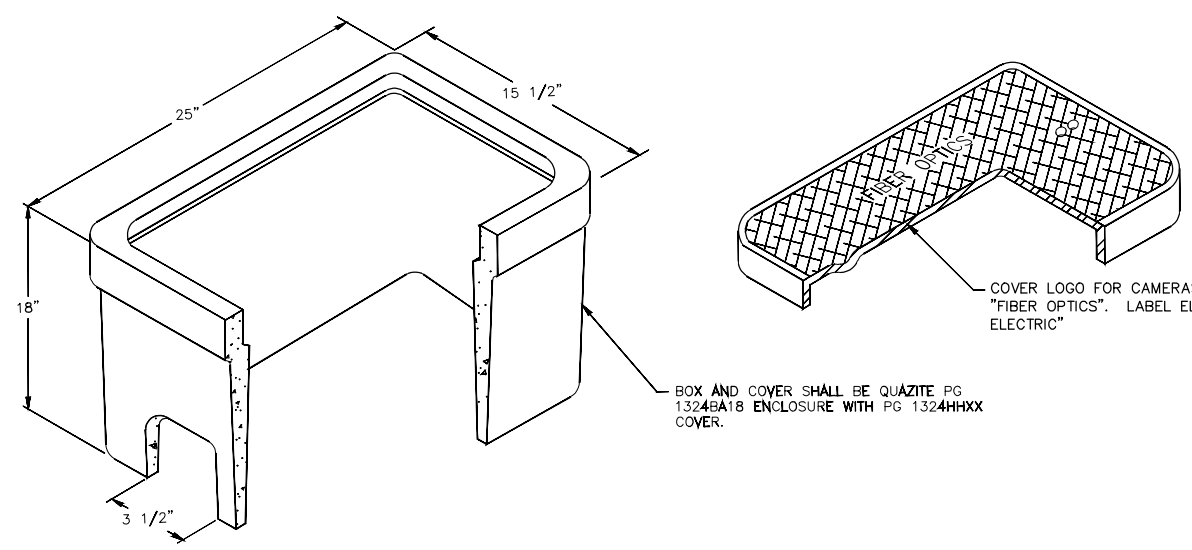
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N/A

FDOT Project No.:

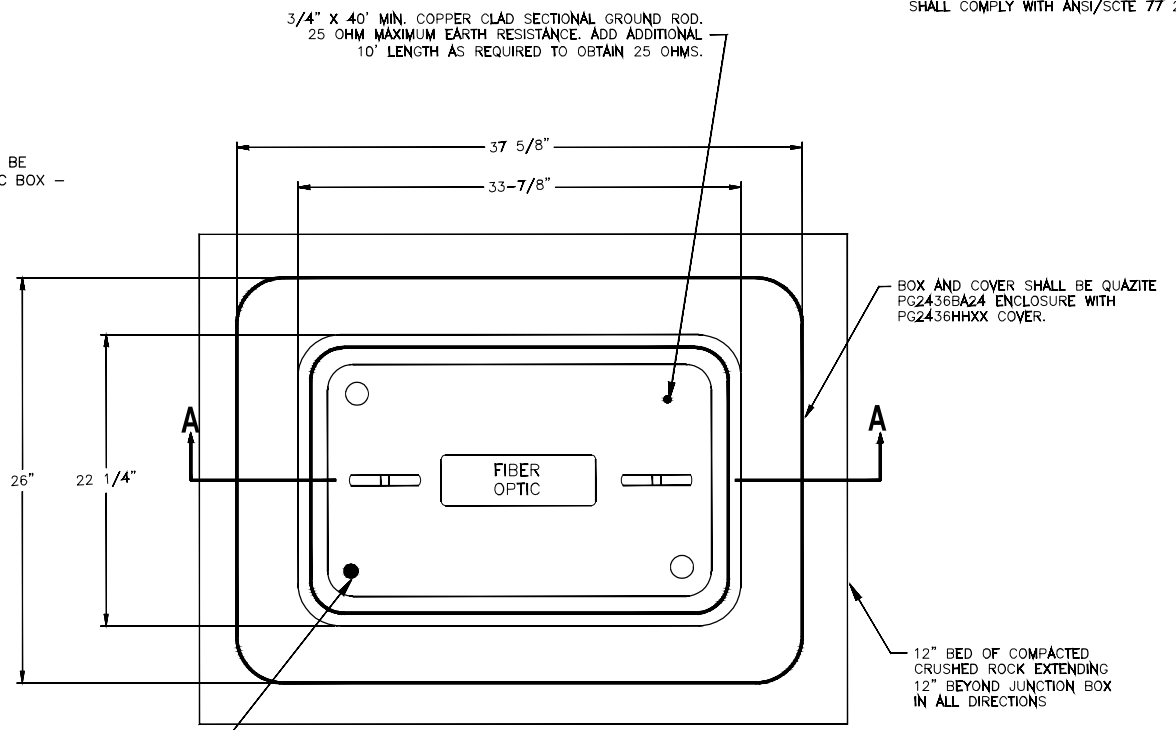
Date: FEB 2020	Sheet Number: A402
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NOTES

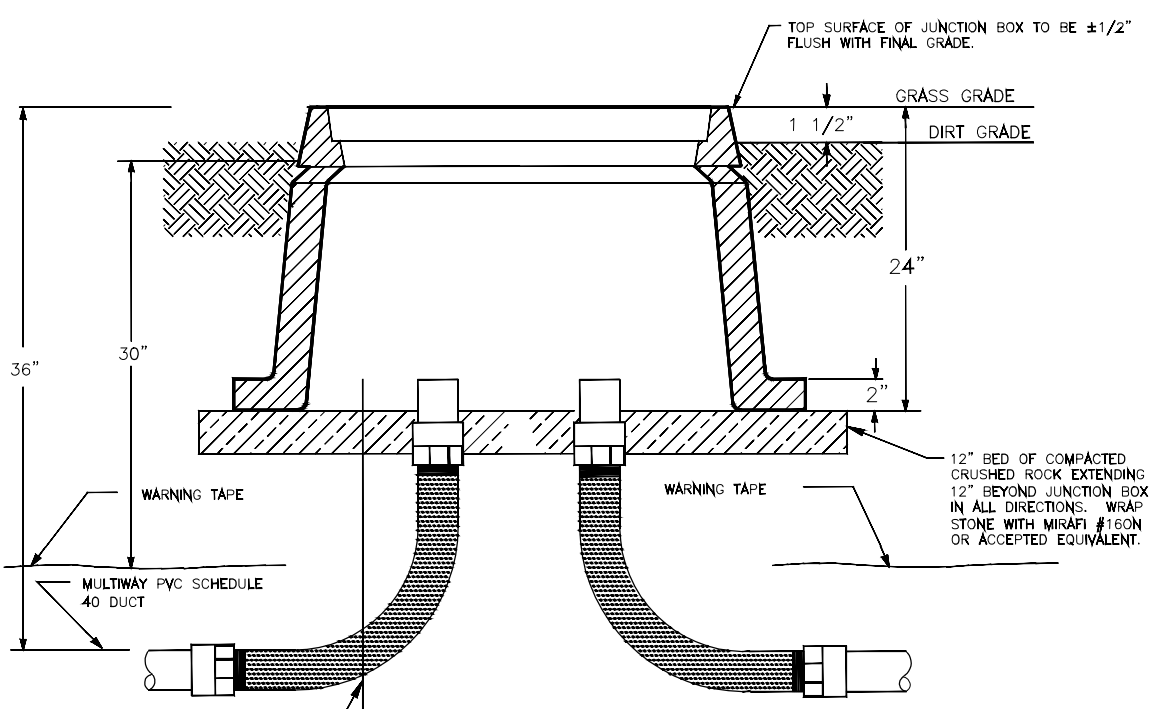
- BOXES SHALL BE UL LISTED TIER 22 AND SHALL COMPLY WITH ANSI/SCTE 77 2007.



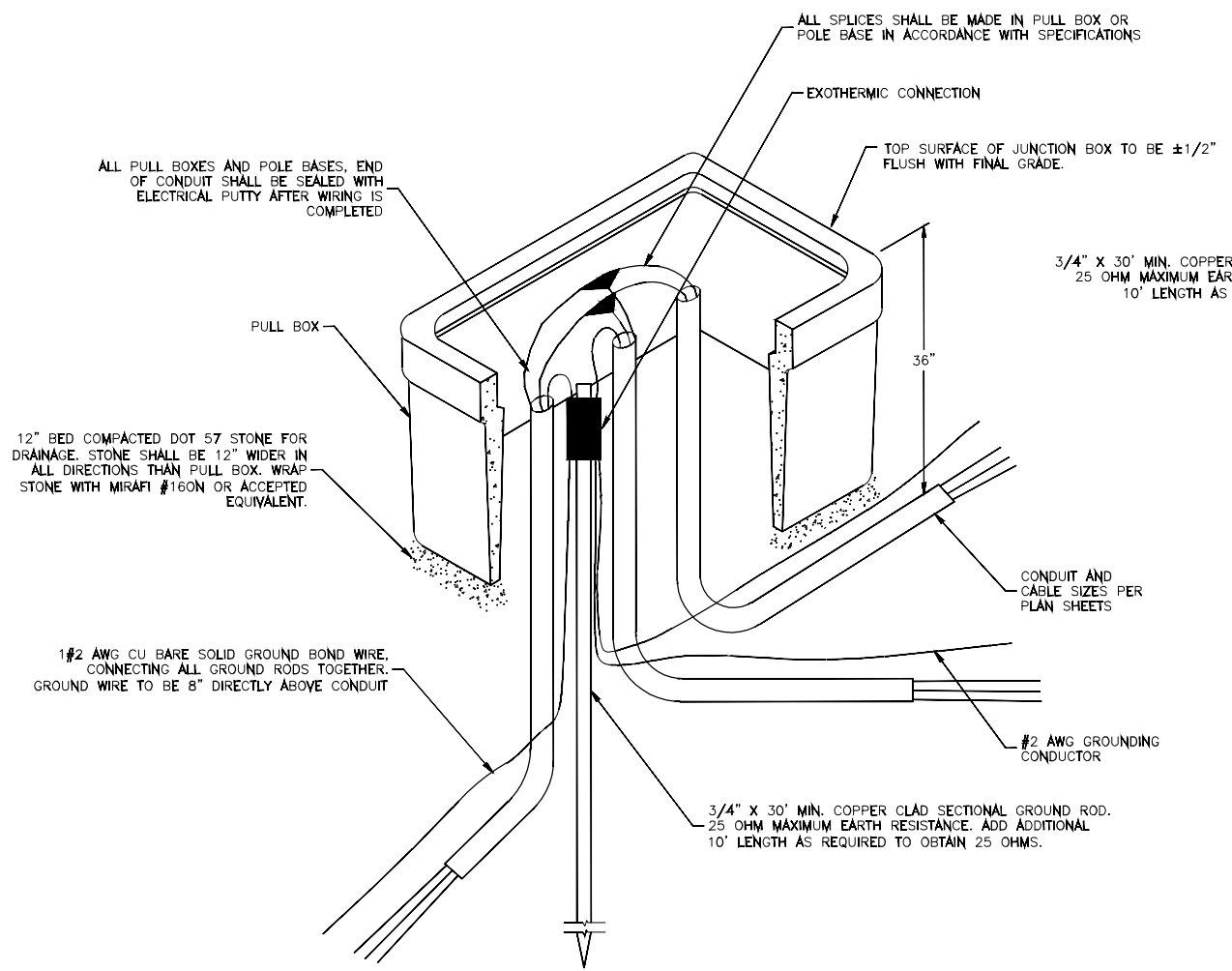
PBA 13X24 JUNCTION / PULL BOX
.T.S.



PLAN
PBA 24X36 JUNCTION / PULL BOX



SECTION A-A
PBB 24X36 JUNCTION / PULL BOX
N.T.S.



PBA 13X24 JUNCTION / PULL BOX
N.T.S.

File Path: Y:\Okaloosa County\VPS (Destin-FWB Airport)\ConRAC Facilities Upgrade2.DESIGN\11-401-SECURITY CAMERAS DETAILS.dwg Date: 6/3/2020 10:50 AM

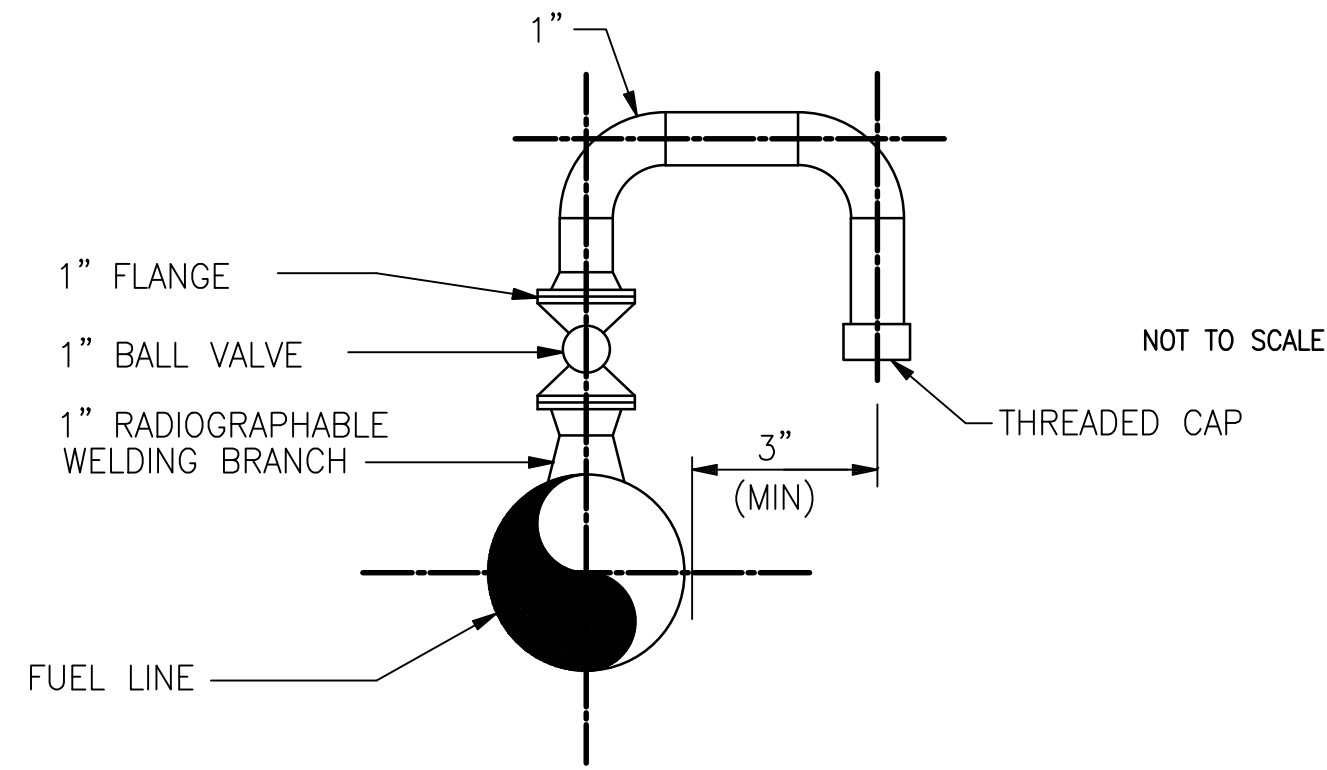
GENERAL NOTES

- BEFORE SUBMITTING PROPOSALS, EACH BIDDER SHALL VISIT THE SITE, EXAMINE ALL DRAWINGS AND SPECIFICATIONS, FULLY FAMILIARIZE HIMSELF WITH ALL JOB CONDITIONS AND SHALL BE FULLY INFORMED AS TO THE EXTENT OF VERY LIMITED DOWN TIME AND OF HIS WORK. ALL OUTAGES SHALL BE WITHIN A 6 HOUR WINDOW AT NIGHT. ACTUAL HOURS OF OUTAGE SHALL BE COORDINATED WITH THE AIRPORT PRIOR TO INITIATING OUTAGE. NO CONSIDERATION SHALL BE GIVEN TO MISUNDERSTANDING OF THE REQUIREMENTS OF WORK INVOLVED.
- THE CONTRACTOR SHALL VERIFY THE EXACT DIMENSIONS IN THE FIELD. FLANGES OF VALVES, PIPING AND EQUIPMENT (NEW AND EXISTING) SHALL MATCH BEFORE ANY EXISTING SERVICES ARE DISCONNECTED. ALL EXISTING PIPING AND EQUIPMENT TO BE REMOVED SHALL REMAIN ON SITE UNDAMAGED UNTIL NEW IS INSTALLED AND ONLINE.
- IF FOR ANY REASON IT LOOKS LIKE THE NEW SYSTEM CANNOT BE PUT IN SERVICE IN THE ALLOTTED TIME, THE EXISTING SYSTEM SHALL REMAIN IN SERVICE.
- THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE. NOT ALL COMPONENTS ARE SHOWN IN ALL VIEWS. THE CONTRACTOR SHALL MAKE USE OF THE ENTIRE SET OF DRAWINGS AND SPECIFICATIONS AND INCLUDE ALL COMPONENTS TO CONSTRUCT A FULLY OPERATIONAL FUELING SYSTEM.
- THE CONTRACTOR SHALL DEVELOP TO SCALE PIPE FABRICATION SHOP DRAWINGS FOR APPROVAL PRIOR TO ANY INSTALLATION.
- WRITTEN DIMENSIONS ON DRAWINGS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACT SHALL FIELD VERIFY DIMENSIONS PRIOR TO FABRICATION.
- THE CONTRACTOR SHALL COORDINATE ALL HIS WORK WITH ALL OTHER TRADES BEFORE ANY INSTALLATION IS MADE.
- AT START OF CONSTRUCTION, THE CONTRACTOR AND EACH OF HIS SUBCONTRACTORS SHALL PREPARE TYPED LISTS OF ALL EQUIPMENT THAT THEY ARE SUPPLYING WHICH REQUIRE ELECTRICAL WORK, AND SEND LISTS TO THE ELECTRICAL CONTRACTOR FOR HIS REVIEW AND COORDINATION.
- ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S APPROVED PUBLISHED LITERATURE.
- INSTALLATION OF EQUIPMENT SHALL PERMIT ACCESSIBILITY FOR SERVICE AND/OR REPLACEMENT.
- AFTER COMPLETION OF WORK, THE FUEL SYSTEM SHALL BE CYCLED TO CAPTURE ANY DEBRIS IN THE PIPING SYSTEM BEFORE REMOVAL OF THE EXISTING FILTER MEDIA AND REPLACE FILTER MEDIA WITH NEW.
- THE CONTRACTOR SHALL COORDINATE AND OBTAIN HOT WORK PERMITS WITH EGLIN AFB AND OKALOOSA COUNTY FIRE INSPECTOR BEFORE BEGINNING ANY WELDING ON SITE.

SCOPE:

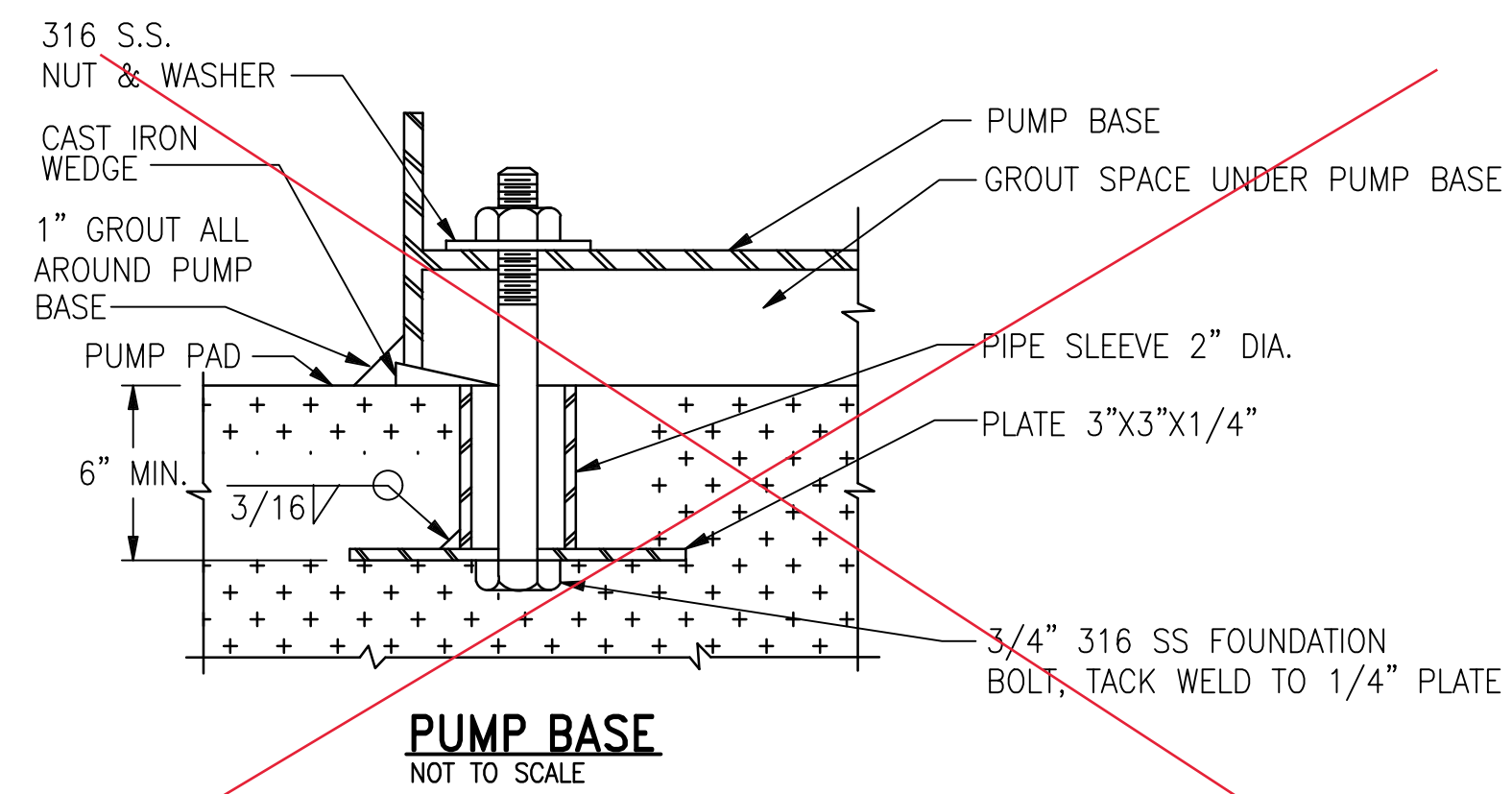
THE MECHANICAL SCOPE INCLUDES BUT IS NOT LIMITED TO: INSTALLATION OF (2) NEW 25,000 GALLON JET-A TANKS AND PUMPS.

PUMP SCHEDULE							NOTE
DESIGNATION	SERVES	TYPE	SERVICE	FLOW GPM	FT. HEAD	MOTOR HP	
P-1	OFF-LOADING	SELF PRIMING CENTRIFUGAL	MOGAS	300	60	7.5	EXISTING
P-2	OFF-LOADING	SELF PRIMING CENTRIFUGAL	JET-A	300	101	15	EXISTING
P-3	LOADING	SELF PRIMING CENTRIFUGAL	JET-A	300	192	30	EXISTING
P-4	DISPENSER	SUBMERSIBLE TURBINE PUMP	MOGAS	25	46	3/4	EXISTING
P-5	DISPENSER	SUBMERSIBLE TURBINE PUMP	MOGAS	25	46	3/4	EXISTING
P-6	DIESEL TANK	SUBMERSIBLE TURBINE PUMP	DIESEL	18	10	1/3	EXISTING
P-7	LOADING	SELF PRIMING CENTRIFUGAL	JET-A	300	192	30	-NEW

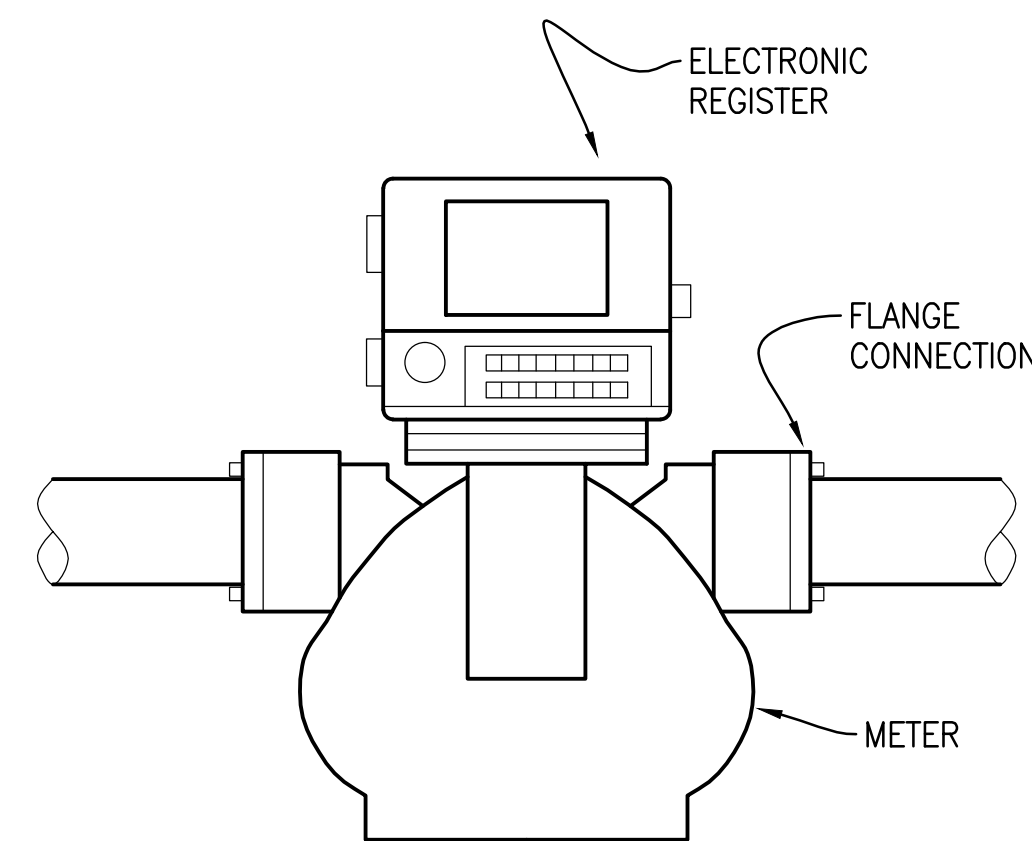


NOTES:
1. BALL VALVE MAY BE LOCATED IN HORIZONTAL RUN OF VENT PIPE.

MANUAL AIR VENT
NOT TO SCALE

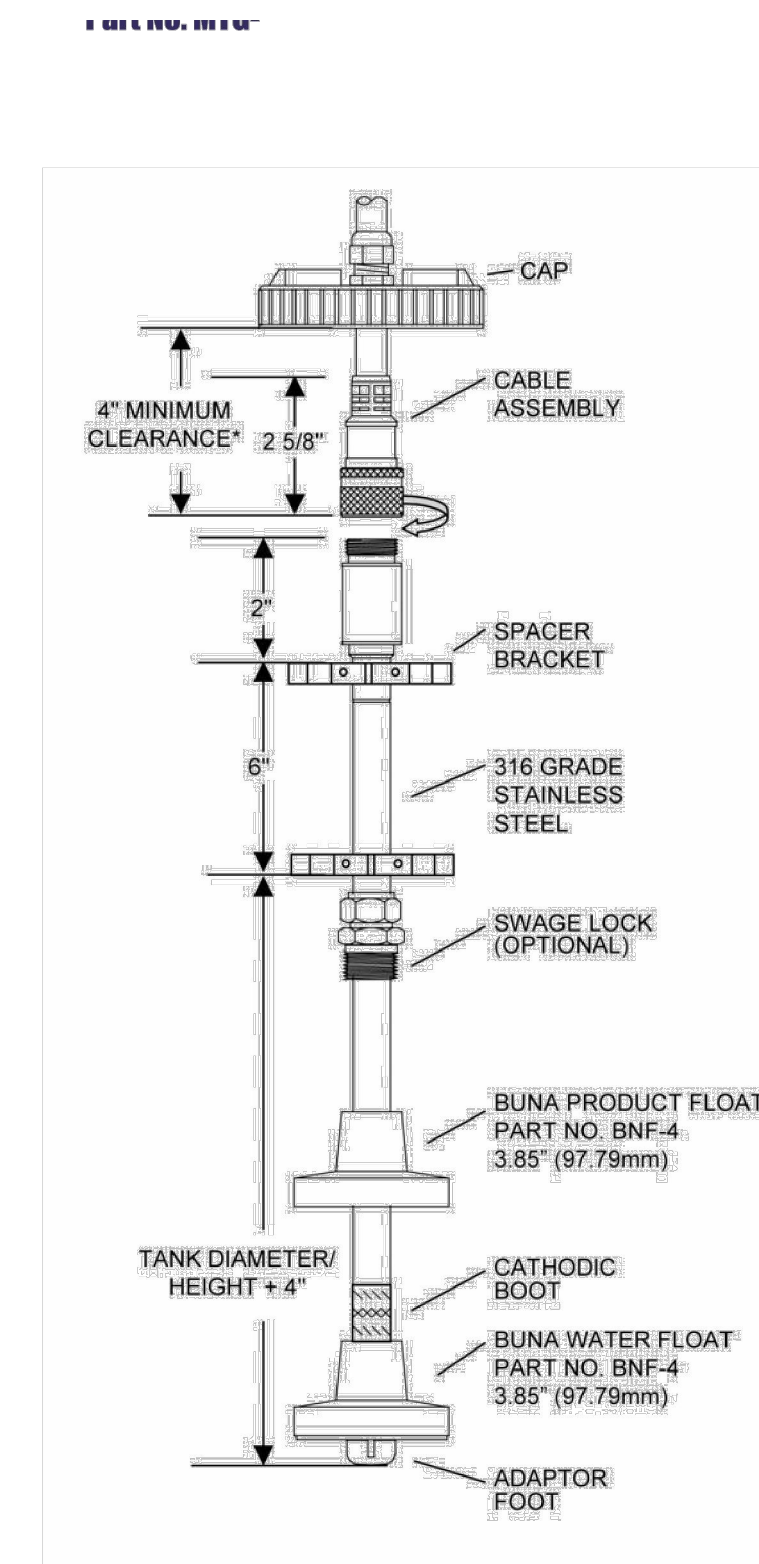


PUMP BASE
NOT TO SCALE



METER CONNECTION DETAIL
NOT TO SCALE

Existing



TANK GAUGING PROBE
NOT TO SCALE

NOTE:
SEE SHEET P-108
FOR LEGEND.

OKALOOSA COUNTY AIRPORTS



AVCON, INC.
ENGINEERS & PLANNERS
320 BAYSHORE DRIVE, SUITE A - NICEVILLE, FL 32578-2425
OFFICE: (850) 678-0050 - FAX: (850) 678-0040
CORPORATE CERTIFICATE OF AUTHORIZATION NUMBER: 5057
www.avconinc.com

PETERSON ENGINEERING INC.
(PROF. ENG. #: 3600)
75 SOUTH "F" STREET
PENSACOLA, FLORIDA 32502
(850) 434-0513
P.E.I. JOB# 17060

DESTIN-FORT WALTON BEACH AIRPORT

FUEL FARM EXPANSION

DETAILS

ATTENTION:
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SCALE: AS NOTED

REVISIONS:

NO.	DATE	BY	DESCRIPTION

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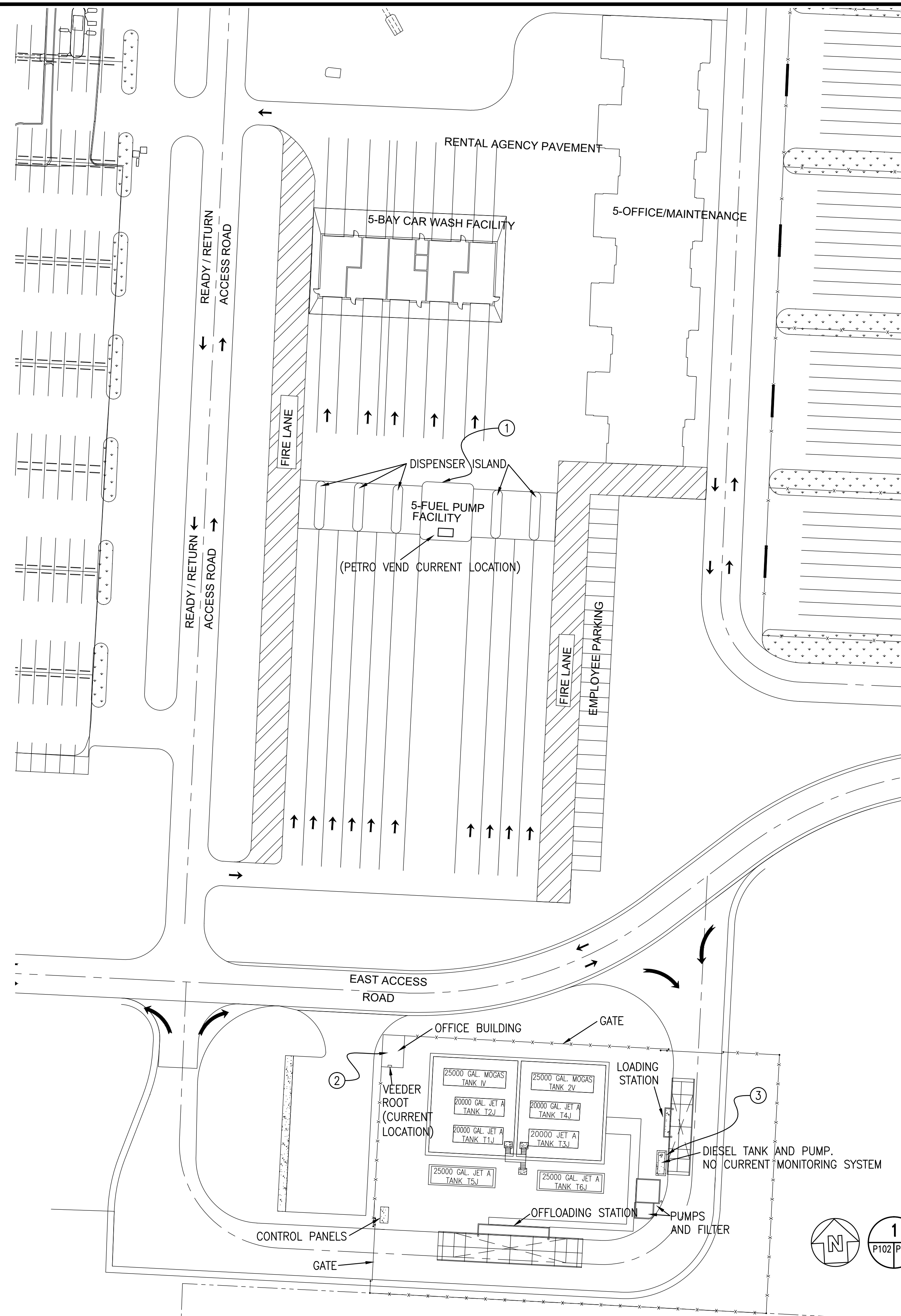
DESIGNED BY: J. CHAVERS
DRAWN BY: C. JOINER
CHECKED BY: J. CHAVERS
APPROVED BY: G. PETERSON
DATE: JUNE 2017

AVCON PROJECT NO. 2017.050.02

P-105

D:\PROJECT\2017\17060 VPS Fuel Management\DWG\Plumbing\COMBINED\17060P-106.dwg, 10/19/2017 7:10:27 PM, DWG To PDF.pc3

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NOTE:
SEE SHEET P-108
FOR LEGEND.

1 SITE PLAN
SCALE: 1" = 40'-0"

NOTES:

- ① THE EXISTING PETRO VEND SYSTEM WILL BE UPGRADED OR CHANGED OUT TO A NEW SYSTEM AS NEEDED SO ALL THE FUEL MANAGEMENT SYSTEM IS FROM ONE MANUFACTURER AND MEETS ALL PROJECT REQUIREMENTS.
- ② THE EXISTING VEEDER ROOT SYSTEM 350 WILL BE UPGRADED OR CHANGED OUT TO A NEW SYSTEM AS NEEDED SO ALL THE FUEL MANAGEMENT SYSTEM IS FROM ONE MANUFACTURER AND MEETS THE PROJECT REQUIREMENTS.
- ③ THE EXISTING DIESEL SYSTEM DOES NOT HAVE ANY REMOTE FUEL MANAGEMENT SYSTEM. A COMPLETE NEW SYSTEM WILL BE ADDED WHICH MEETS ALL THE PROJECT REQUIREMENTS.

OKALOOSA COUNTY AIRPORTS

DESTIN FORT WALTON BEACH

FLY VPS

AIRPORT

AVCON

AVCON, INC.
ENGINEERS & PLANNERS
320 BAYSHORE DRIVE, SUITE A - NICEVILLE, FL 32578-2425
OFFICE: (850) 678-0050 - FAX: (850) 678-0040
CORPORATE CERTIFICATE OF AUTHORIZATION NUMBER: 5057
www.avconinc.com

PETERSON ENGINEERING INC.
(PROF. ENG. #: 3800)
75 SOUTH "F" STREET
PENSACOLA, FLORIDA 32502
(850) 434-0513
P.E.I. JOB# 17060

DESTIN-FORT WALTON BEACH AIRPORT

VPS FUEL MANAGEMENT

CONTROLS SITE PLAN

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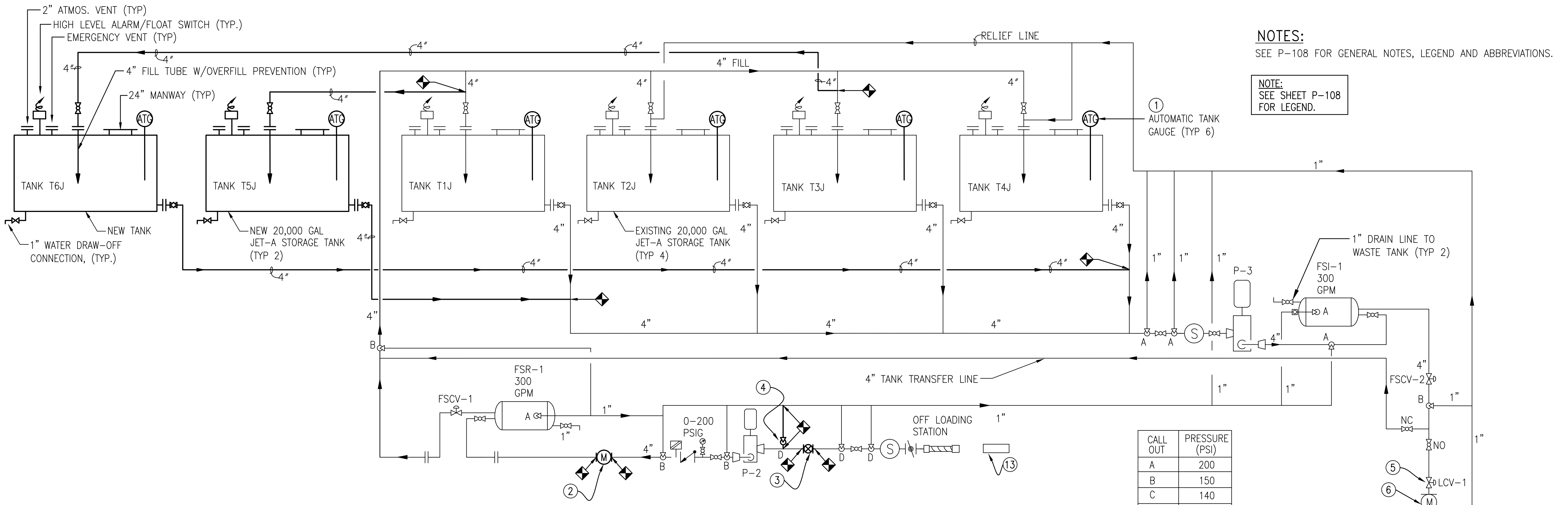
SCALE: AS NOTED

REVISIONS:

NO.	DATE	BY	DESCRIPTION

DESIGNED BY: J. CHAVERS
DRAWN BY: C. JOINER
CHECKED BY: J. CHAVERS
APPROVED BY: G. PETERSON
DATE: JUNE 2017

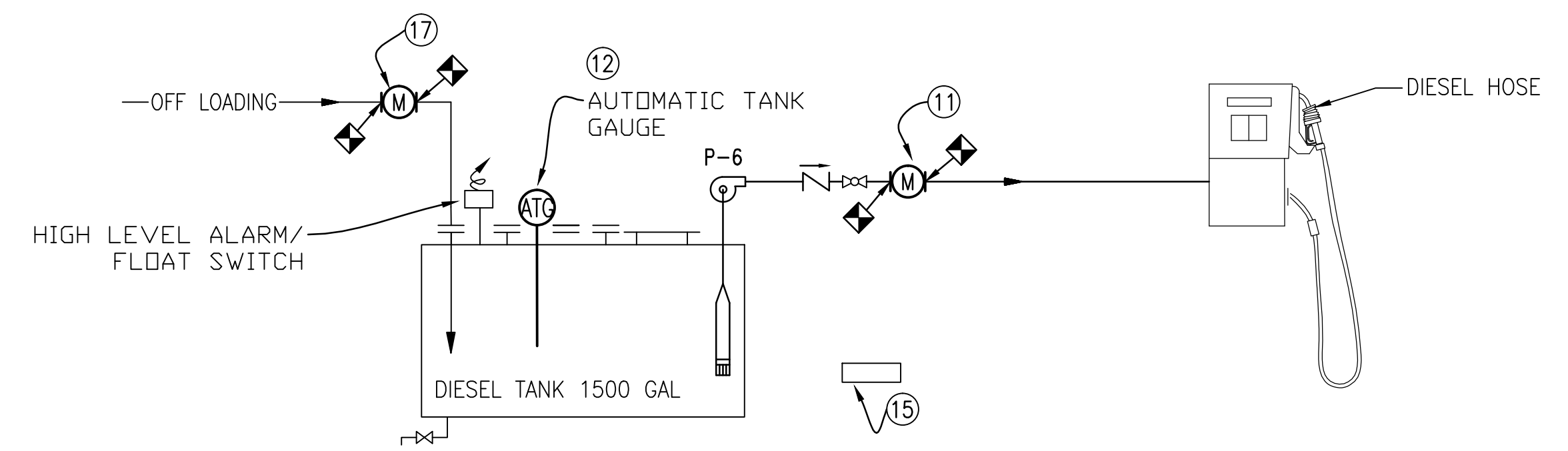
AVCON PROJECT NO. 2017.050.02



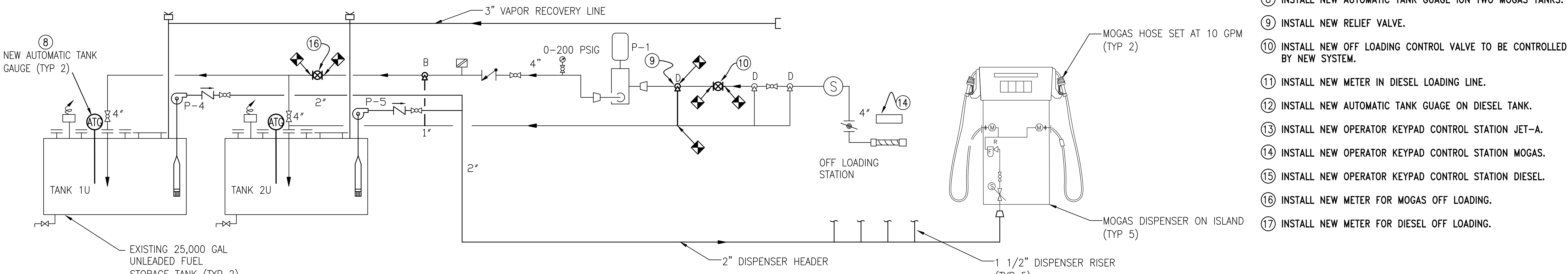
JET-A FUEL SYSTEM FLOW DIAGRAM

TRV PRESSURE SCHEDULE

CALL OUT	PRESSURE (PSI)
A	200
B	150
C	140
D	100

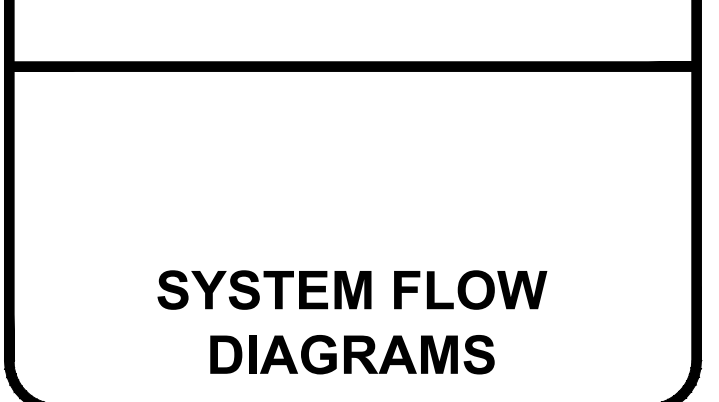
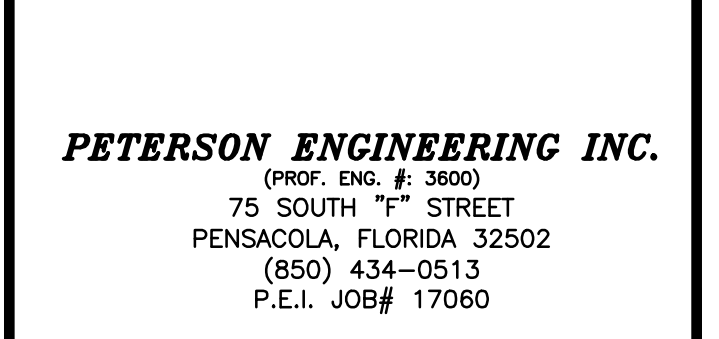
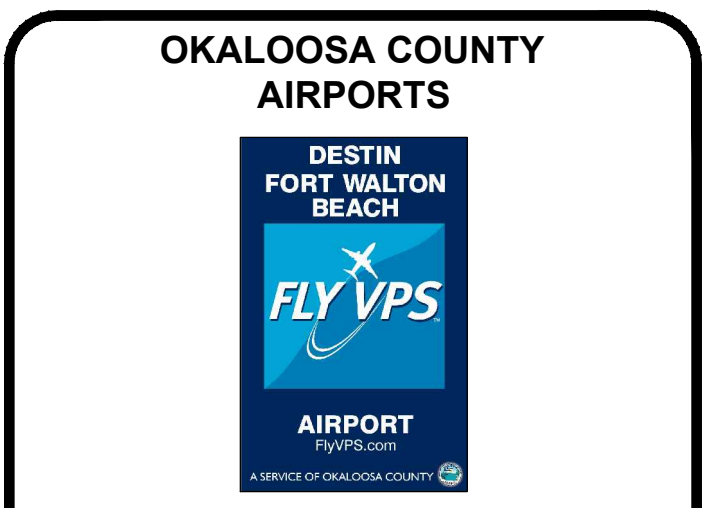


DIESEL FUEL SYSTEM FLOW DIAGRAM



UNLEADED FUEL (MOGAS) SYSTEM FLOW DIAGRAM

- NOTES:**
- INSTALL NEW AUTOMATIC TANK GAUGE ON ALL SIX JET-A TANKS.
 - INSTALL NEW OFF LOADING JET-A METER.
 - INSTALL NEW OFF LOADING JET-A OFF LOADING CONTROL VALVE.
 - INSTALL NEW RELIEF VALVE.
 - THE LOADING CONTROL VALVE TO BE CONTROLLED BY NEW SYSTEM.
 - THE EXISTING METER TO BE REPLACED WITH NEW METER.
 - NEW OPERATOR KEYPAD CONTROL STATION JET-A.
 - INSTALL NEW AUTOMATIC TANK GAUGE ON TWO MOGAS TANKS.
 - INSTALL NEW RELIEF VALVE.
 - INSTALL NEW OFF LOADING CONTROL VALVE TO BE CONTROLLED BY NEW SYSTEM.
 - INSTALL NEW METER IN DIESEL LOADING LINE.
 - INSTALL NEW AUTOMATIC TANK GAUGE ON DIESEL TANK.
 - INSTALL NEW OPERATOR KEYPAD CONTROL STATION JET-A.
 - INSTALL NEW OPERATOR KEYPAD CONTROL STATION MOGAS.
 - INSTALL NEW OPERATOR KEYPAD CONTROL STATION DIESEL.
 - INSTALL NEW METER FOR MOGAS OFF LOADING.
 - INSTALL NEW METER FOR DIESEL OFF LOADING.



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SCALE: AS NOTED

REVISIONS:

NO.	DATE	BY	DESCRIPTION

DESIGNED BY: J. CHAVERS
DRAWN BY: C. JOINER
CHECKED BY: J. CHAVERS
APPROVED BY: G. PETERSON
DATE: JUNE 2017

AVCON PROJECT NO. 2017.050.02

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SEQUENCE OF OPERATION

JET A

THE SYSTEM HAS 6 ABOVEGROUND TANKS (4-EXISTING, 2-NEW). THE LEVEL WITH TEMPERATURE COMPENSATION SHALL BE PROVIDED TO GIVE GALLONS IN STORAGE IN EACH TANK CONTINUOUSLY WITH REPORTING.

THE TRUCK OFF-LOADING STATION IS TO HAVE A KEYPAD SO EACH VENDOR WILL HAVE A CODE. THE SYSTEM WILL REPORT WHICH VENDOR IT IS AND GIVE THE TIME AND AMOUNT OF FUEL THAT THEY DELIVERED. THERE WILL BE A MINIMUM OF 10 CODES POSSIBLE FOR DIFFERENT VENDORS. THE SYSTEM WILL PROVIDE THE INFORMATION CONTINUOUSLY BACK TO THE COUNTY SERVER. THE SYSTEM WILL CONTROL THE PUMPING AT THE TRUCK OFF-LOADING STATION. THE SYSTEM WILL CLEAR THE VENDOR'S CODE AFTER 20 MINUTES OF NO DELIVERY FLOW, OR A NEW VENDOR CODE IS ENTERED.

THE TRUCK LOADING STATION SHALL HAVE A DISPENSING STATION CONTROL STATION WHICH REQUIRES YOU TO HAVE A KEY INSERTED AND THEN A 4 DIGIT CODE ENTERED BEFORE THE TRUCK LOADING PUMP WILL TURN ON. THE SYSTEM WILL CONTINUOUSLY REPORT BACK TO THE CENTRAL COUNTY COMPUTER THE PERSON RECEIVING THE FUEL, THE AMOUNT, AND TIME IN WHICH THE TRUCK WAS LOADED.

MOGAS

THE SYSTEM HAS 2 EXISTING ABOVEGROUND TANKS. THE LEVEL WITH TEMPERATURE COMPENSATION SHALL BE PROVIDED TO GIVE GALLONS STORAGE IN EACH TANK CONTINUOUSLY REPORTING.

THE TRUCK OFF-LOADING STATION IS TO HAVE A KEYPAD SO EACH VENDOR WILL HAVE A CODE. THE SYSTEM WILL REPORT WHICH VENDOR IT IS AND GIVE THE TIME AND AMOUNT OF FUEL THAT THEY DELIVERED. THERE WILL BE A MINIMUM OF 10 CODES POSSIBLE FOR DIFFERENT VENDORS. THE SYSTEM WILL PROVIDE THE INFORMATION CONTINUOUSLY BACK TO THE COUNTY SERVER. THE SYSTEM WILL CONTROL THE PUMPS AT THE TRUCK OFF-LOADING STATION. THE SYSTEM WILL CLEAR THE VENDOR'S CODE AFTER 20 MINUTES OF NO DELIVERY FLOW, OR A NEW VENDOR CODE IS ENTERED.

THE 5 STATION VEHICLE FILLING STATION (GAS PUMPS) ARE TO HAVE A DISPENSING STATION CONTROL WHICH REQUIRES YOU TO HAVE A KEY INSERTED AND THEN A 4 DIGIT CODE ENTERED BEFORE THE GAS PUMP WILL TURN ON. THE SYSTEM WILL CONTINUOUSLY REPORT BACK TO THE CENTRAL COUNTY COMPUTER THE KEY/CODE RECEIVING THE FUEL, THE AMOUNT, AND THE TIME WHICH THE VEHICLE WAS FUELED. THE EXISTING SYSTEM IS A PETRO VEND WHICH HAS THE KEY AND CODE SYSTEM TO GET FUEL. THE NEW SYSTEM WILL BE A SYSTEM WHICH WILL CONTINUOUSLY REPORTS BACK TO THE COUNTY COMPUTER. THE MOGAS GAS PUMPS SYSTEM AND ALL THE TANK FARM MONITORING AND CONTROL WILL BE FROM THE SAME MANUFACTURER.

DIESEL

THE SYSTEM HAS 1 EXISTING ABOVEGROUND TANK. LEVEL WITH TEMPERATURE COMPENSATION SHALL BE PROVIDED TO GIVE GALLONS STORAGE IN THE TANK CONTINUOUSLY REPORTING.

THE OFF-LOADING STATION SHALL HAVE A KEYPAD SO EACH VENDOR WILL HAVE A CODE. THE SYSTEM WILL REPORT WHICH VENDOR IT IS AND GIVE THE TIME AND AMOUNT OF DIESEL THAT THEY DELIVERED. THERE WILL BE 10 CODES POSSIBLE FOR DIFFERENT VENDORS. THE SYSTEM WILL PROVIDE THE INFORMATION CONTINUOUSLY BACK TO THE COUNTY SERVER. THE SYSTEM WILL NOT CONTROL FLOW AT THE OFF-LOADING STATION. THE SYSTEM WILL CLEAR THE VENDOR'S CODE AFTER 20 MINUTES OF NO DELIVERY FLOW, OR A NEW VENDOR CODE IS ENTERED.

THE TRUCK LOADING STATION IS TO HAVE A DISPENSING STATION CONTROL STATION WHICH REQUIRES YOU TO HAVE A KEY INSERTED AND THEN A 4 DIGIT CODE ENTERED BEFORE THE LOADING PUMP WILL TURN ON. THE SYSTEM WILL CONTINUOUSLY REPORT BACK TO THE CENTRAL COUNTY COMPUTER THE PERSON RECEIVING THE DIESEL, THE AMOUNT, AND TIME IN WHICH THE TRUCK WAS LOADED.

USER INTERFACE

THE CONTRACTOR SHALL PROVIDE 6 CUSTOM GRAPHIC SCREENS WITH THE DATA FROM MONITORING SYSTEM CONTINUOUSLY UPDATING THE SCREENS. THE SYSTEM SHALL ALSO BE ABLE TO HAVE THE DATA FROM THE MONITORING SYSTEM DIRECTLY INPUT INTO A DATABASE SOFTWARE. ARITHMETIC FUNCTIONS SUCH AS ADDING, AVERAGING, ETC., CAN BE PERFORMED ON THE DATA. THE CONTRACTOR SHALL PROGRAM AND DEMONSTRATE TOTAL FUNCTIONALITY OF 6 CUSTOM DATABASE DISPLAYS WITH ACTUAL DATA FROM THIS PROJECT. THE SYSTEM SHALL BE ABLE TO GRAPH ALL INPUTS OVER TIME AND BE ABLE TO HAVE MULTIPLE VALUES (A MINIMUM OF 4) DISPLAYED/PRINTED ON ONE GRAPH. THE CONTRACTOR SHALL PROGRAM 6 GRAPHS AS DIRECTED BY THE OWNER.

FULLY FUNCTIONAL/TRAINING/NO LOCKED PROGRAMS

THE CONTRACTOR IS RESPONSIBLE FOR SETTING UP THE SYSTEM SO THAT EVERY VALUE CAN BE SHOWN TABULAR OR GRAPHICALLY. THE OWNERS SHOULD BE ABLE TO PROGRAM THE SYSTEM TO CREATE OR DELETE ANY OF THE DISPLAYS AND REPORTS AND ASSIGN VALUE INPUTS AS THEY DESIRE. THE CONTRACTOR SHALL PROVIDE THE COMPLETE SYSTEM MANUALS WITH ALL PROGRAMMING INFORMATION. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 16 HOURS OF ONSITE TRAINING IN TWO 8 HOUR SESSIONS. THE SECOND SESSION WILL BE MINIMUM OF 2 WEEKS AND MAXIMUM OF 6 WEEKS AFTER THE FIRST SESSION.

THE CONTRACTOR SHALL SET UP HALF OF THE REQUIRED GRAPHICS, DATABASE DISPLAYS, AND GRAPHIS AS DIRECTED BY THE OWNER WHEN THE SYSTEM IS INITIALLY SET UP AND TURNED OVER TO THE OWNER. AFTER THE SYSTEM HAS BEEN TOTALLY FUNCTIONAL FOR 6 WEEKS THE CONTRACTOR SHALL RETURN AND COMPLETE THE SECOND HALF OF THE REQUIRED DISPLAYS, DATABASE DISPLAYS, AND GRAPHICS, AS DIRECTED BY THE OWNER TO MEET THE OWNERS NEEDS AND DESIRES.

ITEM	AFTER SIX WEEKS	TOTAL
GRAPHICS	3	6
DATA BASE	3	6
GRAPHS	3	6

ABBREVIATIONS

ATG	AUTOMATIC TANK GAUGING	LCV	LOADING CONTROL VALVE
CV	CONTROL VALVE	LI	LEVEL INDICATOR (ATG)
E.	EASTING	N.	NEW
EX	EXISTING	NC	NORMALLY CLOSED
F/S	FILTER SEPARATOR	NO	NORMALLY OPEN
FS	FLOW SWITCH	PSI	POUNDS PER SQUARE INCH
FSCV	FILTER SEPARATOR CONTROL VALVE	TRV	THERMAL RELIEF VALVE
FCV	FLOW CONTROL VALVE	TYP	TYPICAL
FSCV	FILTER SEPARATOR CONTROL VALVE		
HP	HORSE POWER		
FSR-1	FILTER SEPARATOR		
FSI-1	FILTER SEPARATOR		

LEGEND

	BALL VALVE
	BALL VALVE, FULL PORT
	BASKET STRAINER
	CHECK VALVE
	CONTROL VALVE
	PLUG VALVE, DOUBLE BLOCK AND BLEED
	BUTTERFLY VALVE
	FLOW SWITCH
	BLIND FLANGE
	CAP
	FLEXIBLE CONNECTION
	SAMPLE CONNECTION
	INSULATING FLANGE
	RELIEF VALVE
	BALL CHECK RELIEF
	LINE SIZE REDUCER
	BASKET STRAINER
	PRESSURE GAUGE
	MANUAL AIR VENT
	LOW POINT DRAIN
	FUELING HOSE
	90 DEG ELBOW DOWN
	AUTOMATIC TANK GAUGE
	METER
	CONNECT TO EXISTING
	INDICATES DIRECTION OF FLOW
	UNION

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DESTIN-FORT WALTON BEACH AIRPORT

VPS FUEL MANAGEMENT

SEQUENCE OF OPERATIONS

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REVISIONS:

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DRAWN BY: C. JOINER
CHECKED BY: J. CHAVERS
APPROVED BY: G. PETERSON
DATE: JUNE 2017

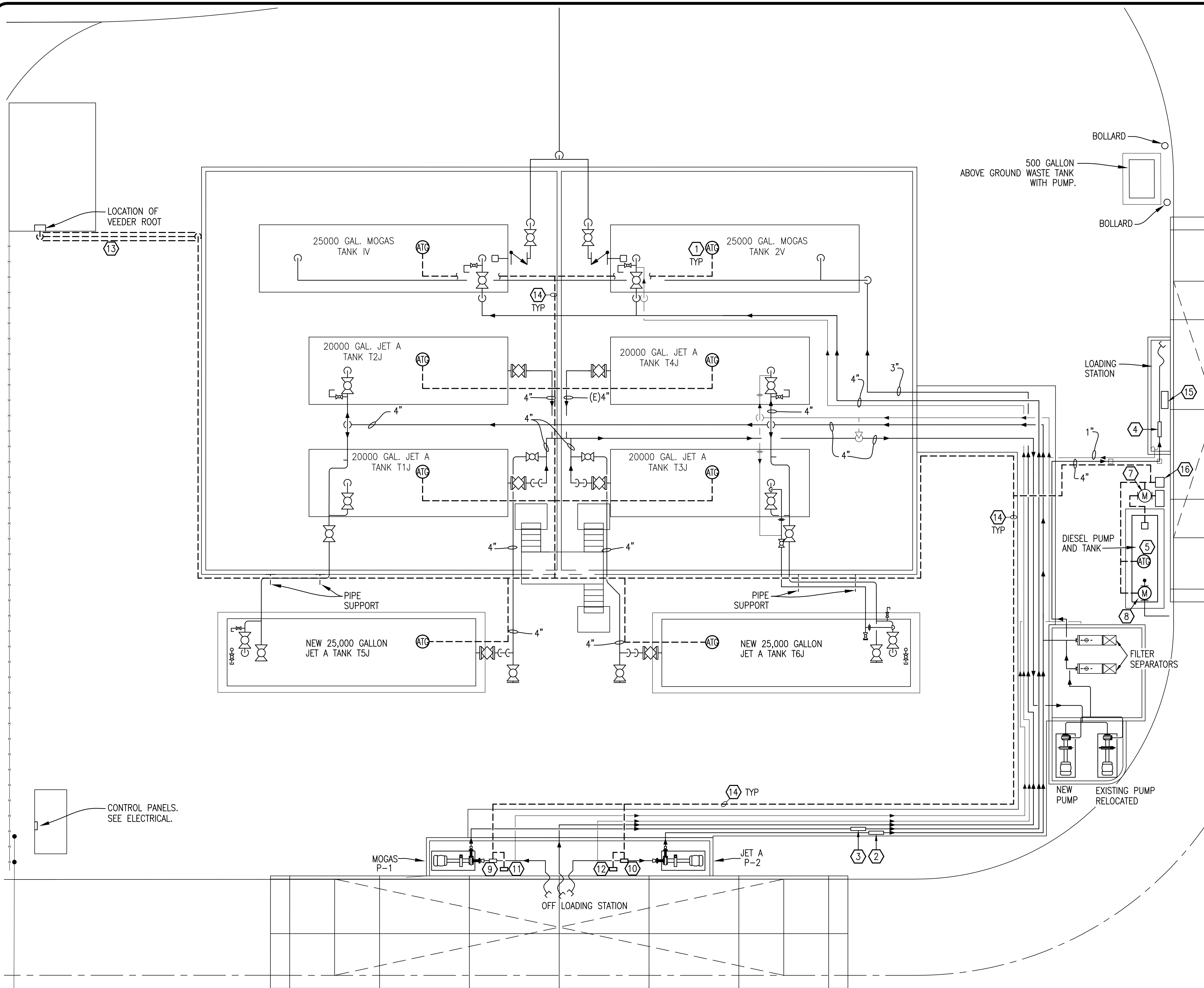
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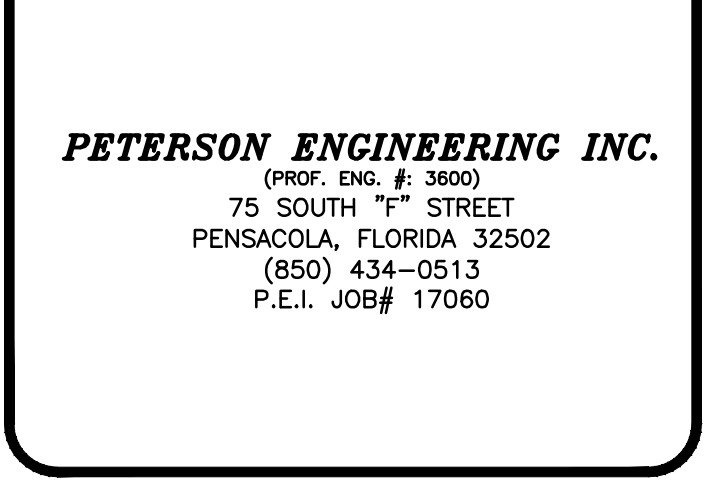
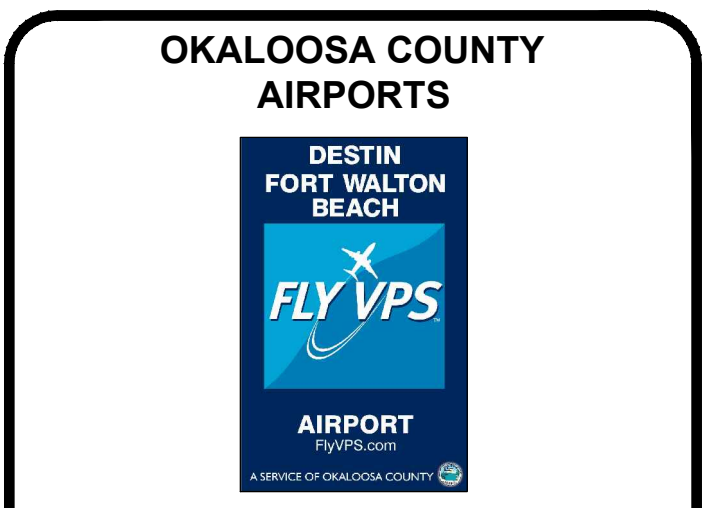
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SHEET NOTES

- 1) INSTALL NEW LEVEL GAUGE WITH TEMPERATURE COMPENSATION IN EACH TANK (TYP.-6 JET-A, 2-MOGAS).
- 2) INSTALL NEW FLOW METER IN JET-A OFF LOADING LINE. SEE DETAIL.
- 3) INSTALL NEW FLOW METER IN MOGAS OFF LOADING LINE. SEE DETAIL.
- 4) INSTALL NEW FLOW METER IN JET A DISPENSING LINE. SEE DETAIL.
- 5) INSTALL NEW LEVEL GAUGE WITH TEMPERATURE COMPENSATION IN DIESEL TANK.
- 6) INSTALL NEW FLOW METER IN THE DIESEL DISPENSING LINE.
- 7) THE DIESEL PUMP HAS AN EXISTING MANUAL DISPENSING PUMP CONTROL. INSTALL NEW OPERATOR CONTROL STATION WITH KEY AND CODE AUTHORIZATION CONTROL FOR DISPENSING DIESEL.
- 8) INSTALL NEW FLOW METER IN THE DIESEL OFF LOADING LINE TO THE TANK. THE NEW OPERATOR CONTROL STATION WILL ALSO BE USED TO THE VENDOR SUPPLYING THE DIESEL.
- 9) INSTALL NEW FLOW CONTROL VALVE IN THE MOGAS OFF LOADING LINE. SEE ENLARGED PLAN.
- 10) INSTALL NEW FLOW CONTROL VALVE IN THE JET A OFF LOADING LINE. SEE ENLARGED LINE.
- 11) INSTALL NEW OPERATOR CONTROL STATION WITH CODE AUTHORIZATION CONTROL TO MONITOR THE VENDOR SUPPLYING THE MOGAS
- 12) INSTALL NEW OPERATOR CONTROL STATION WITH CODE AUTHORIZATION CONTROL TO MONITOR THE VENDOR SUPPLYING THE JET A
- 13) MONITORING AND CONTROL WIRING CONDUIT SHALL BE RUN UNDERGROUND, THIS LOCATION.
- 14) THE NEW MONITORING AND CONTROL WIRING CONDUIT SHALL BE FIELD ROUTED OUT OF THE WAY TO PRESENT ANY TRIP HAZARD OR CREATING ANY ACCESS BARRIER. THE ROUTE WILL REQUIRE ACCEPTANCE BY THE OWNER BEFORE INSTALLING.
- 15) INSTALL NEW OPERATOR CONTROL STATION WITH KEY AND DIGITAL CODE INPUTS FOR JET-A.
- 16) INSTALL NEW OPERATOR CONTROL STATION WITH KEY AND DIGITAL CODE INPUTS FOR DIESEL.

NOTE:
SEE SHEET P-108
FOR LEGEND.



DESTIN-FORT WALTON BEACH AIRPORT
VPS FUEL MANAGEMENT
CONTROLS/MONITORING SITE PLAN

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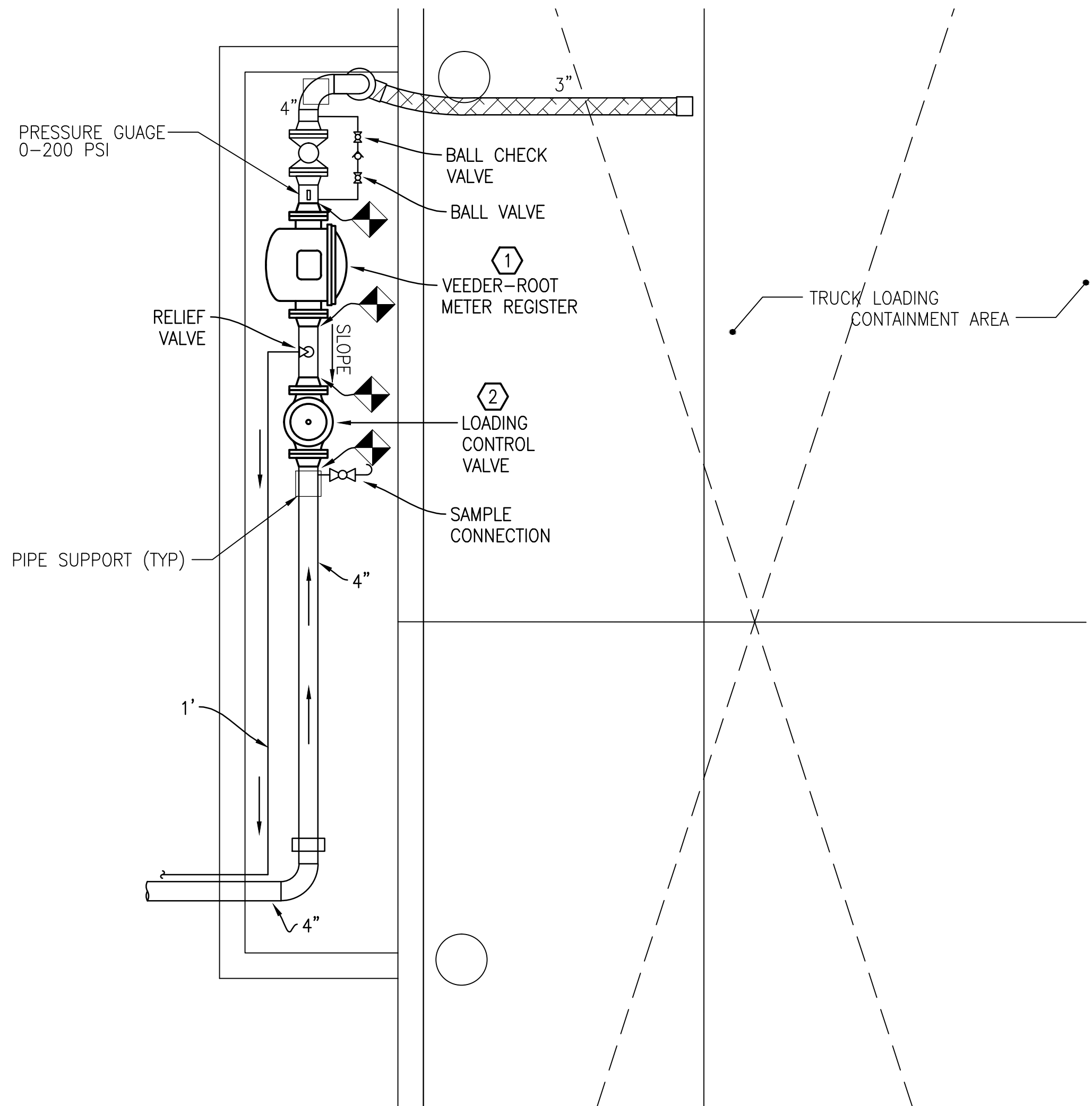
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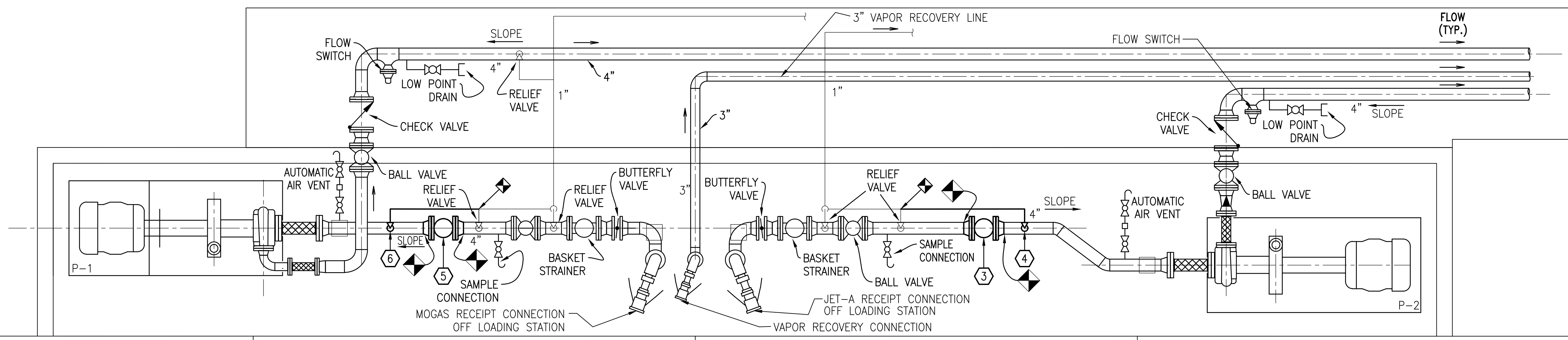
CONTROL/MONITORING SITE PLAN
SCALE: 1/8"=1'-0"



2 **LOADING STATION ENLARGED VIEW**
 SCALE: 1/2" = 1'-0"

- NEW WORK NOTES:**
- ① REMOVE EXISTING METER AND INSTALL NEW METER WITH WIRING BACK TO FUEL MANAGEMENT PANEL.
 - ② REMOVE EXISTING LOADING CONTROL VALVE AND REPLACE WITH NEW VALVE.
 - ③ INSTALL NEW OFF LOADING CONTROL VALVE.
 - ④ INSTALL NEW RELIEF VALVE AND TIE THE LINE INTO THE EXISTING RELIEF LINE.
 - ⑤ INSTALL NEW OFF LOADING CONTROL VALVE.
 - ⑥ INSTALL NEW RELIEF VALVE AND TIE THE LINE INTO THE EXISTING RELIEF LINE.

NOTE:
 SEE SHEET P-108
 FOR LEGEND.



1 **OFF LOADING STATION ENLARGED VIEW**
 SCALE: 1/2" = 1'-0"



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VPS FUEL MANAGEMENT

CONTROLS/MONITORING ENLARGED PLANS

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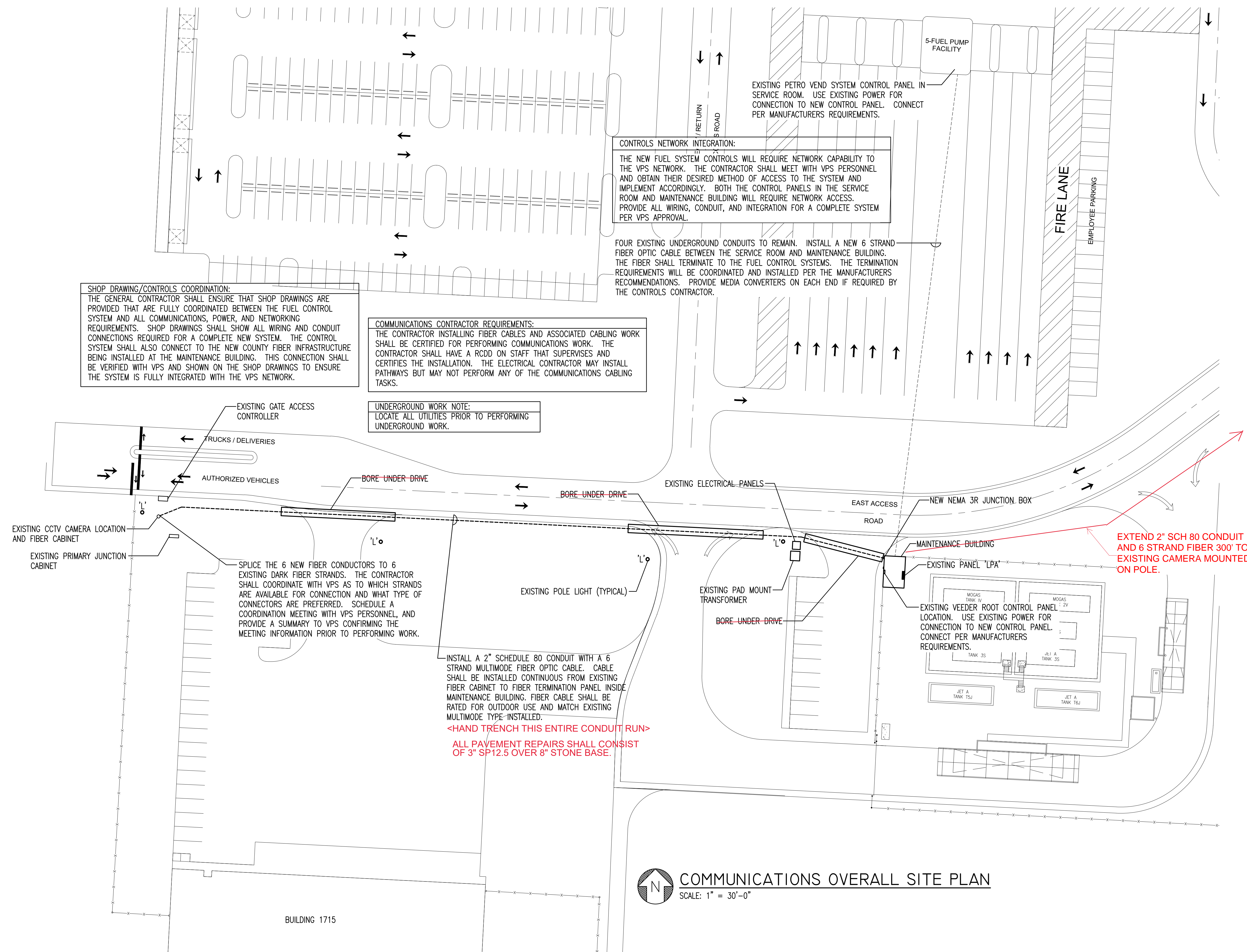
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J:\2017\1070-VPS CONTROLS\DRAWINGS\ELECTRICAL October 20, 2017



SHOP DRAWING/CONTROLS COORDINATION:
 THE GENERAL CONTRACTOR SHALL ENSURE THAT SHOP DRAWINGS ARE PROVIDED THAT ARE FULLY COORDINATED BETWEEN THE FUEL CONTROL SYSTEM AND ALL COMMUNICATIONS, POWER, AND NETWORKING REQUIREMENTS. SHOP DRAWINGS SHALL SHOW ALL WIRING AND CONDUIT CONNECTIONS REQUIRED FOR A COMPLETE NEW SYSTEM. THE CONTROL SYSTEM SHALL ALSO CONNECT TO THE NEW COUNTY FIBER INFRASTRUCTURE BEING INSTALLED AT THE MAINTENANCE BUILDING. THIS CONNECTION SHALL BE VERIFIED WITH VPS AND SHOWN ON THE SHOP DRAWINGS TO ENSURE THE SYSTEM IS FULLY INTEGRATED WITH THE VPS NETWORK.

COMMUNICATIONS CONTRACTOR REQUIREMENTS:
 THE CONTRACTOR INSTALLING FIBER CABLES AND ASSOCIATED CABLING WORK SHALL BE CERTIFIED FOR PERFORMING COMMUNICATIONS WORK. THE CONTRACTOR SHALL HAVE A RCDD ON STAFF THAT SUPERVISES AND CERTIFIES THE INSTALLATION. THE ELECTRICAL CONTRACTOR MAY INSTALL PATHWAYS BUT MAY NOT PERFORM ANY OF THE COMMUNICATIONS CABLING TASKS.

UNDERGROUND WORK NOTE:
 LOCATE ALL UTILITIES PRIOR TO PERFORMING UNDERGROUND WORK.

CONTROLS NETWORK INTEGRATION:
 THE NEW FUEL SYSTEM CONTROLS WILL REQUIRE NETWORK CAPABILITY TO THE VPS NETWORK. THE CONTRACTOR SHALL MEET WITH VPS PERSONNEL AND OBTAIN THEIR DESIRED METHOD OF ACCESS TO THE SYSTEM AND IMPLEMENT ACCORDINGLY. BOTH THE CONTROL PANELS IN THE SERVICE ROOM AND MAINTENANCE BUILDING WILL REQUIRE NETWORK ACCESS. PROVIDE ALL WIRING, CONDUIT, AND INTEGRATION FOR A COMPLETE SYSTEM PER VPS APPROVAL.

FOUR EXISTING UNDERGROUND CONDUITS TO REMAIN. INSTALL A NEW 6 STRAND FIBER OPTIC CABLE BETWEEN THE SERVICE ROOM AND MAINTENANCE BUILDING. THE FIBER SHALL TERMINATE TO THE FUEL CONTROL SYSTEMS. THE TERMINATION REQUIREMENTS WILL BE COORDINATED AND INSTALLED PER THE MANUFACTURERS RECOMMENDATIONS. PROVIDE MEDIA CONVERTERS ON EACH END IF REQUIRED BY THE CONTROLS CONTRACTOR.

SPLICE THE 6 NEW FIBER CONDUCTORS TO 6 EXISTING DARK FIBER STRANDS. THE CONTRACTOR SHALL COORDINATE WITH VPS AS TO WHICH STRANDS ARE AVAILABLE FOR CONNECTION AND WHAT TYPE OF CONNECTORS ARE PREFERRED. SCHEDULE A COORDINATION MEETING WITH VPS PERSONNEL, AND PROVIDE A SUMMARY TO VPS CONFIRMING THE MEETING INFORMATION PRIOR TO PERFORMING WORK.

INSTALL A 2" SCHEDULE 80 CONDUIT WITH A 6 STRAND MULTIMODE FIBER OPTIC CABLE. CABLE SHALL BE INSTALLED CONTINUOUS FROM EXISTING FIBER CABINET TO FIBER TERMINATION PANEL INSIDE MAINTENANCE BUILDING. FIBER CABLE SHALL BE RATED FOR OUTDOOR USE AND MATCH EXISTING MULTIMODE TYPE INSTALLED.
<HAND TRENCH THIS ENTIRE CONDUIT RUN>
ALL PAVEMENT REPAIRS SHALL CONSIST OF 3" SP12.5 OVER 8" STONE BASE.

EXTEND 2" SCH 80 CONDUIT AND 6 STRAND FIBER 300' TO EXISTING CAMERA MOUNTED ON POLE.



COMMUNICATIONS OVERALL SITE PLAN
 SCALE: 1" = 30'-0"

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DESTIN-FORT WALTON BEACH AIRPORT

FUEL FARM EXPANSION

COMMUNICATIONS OVERALL SITE PLAN

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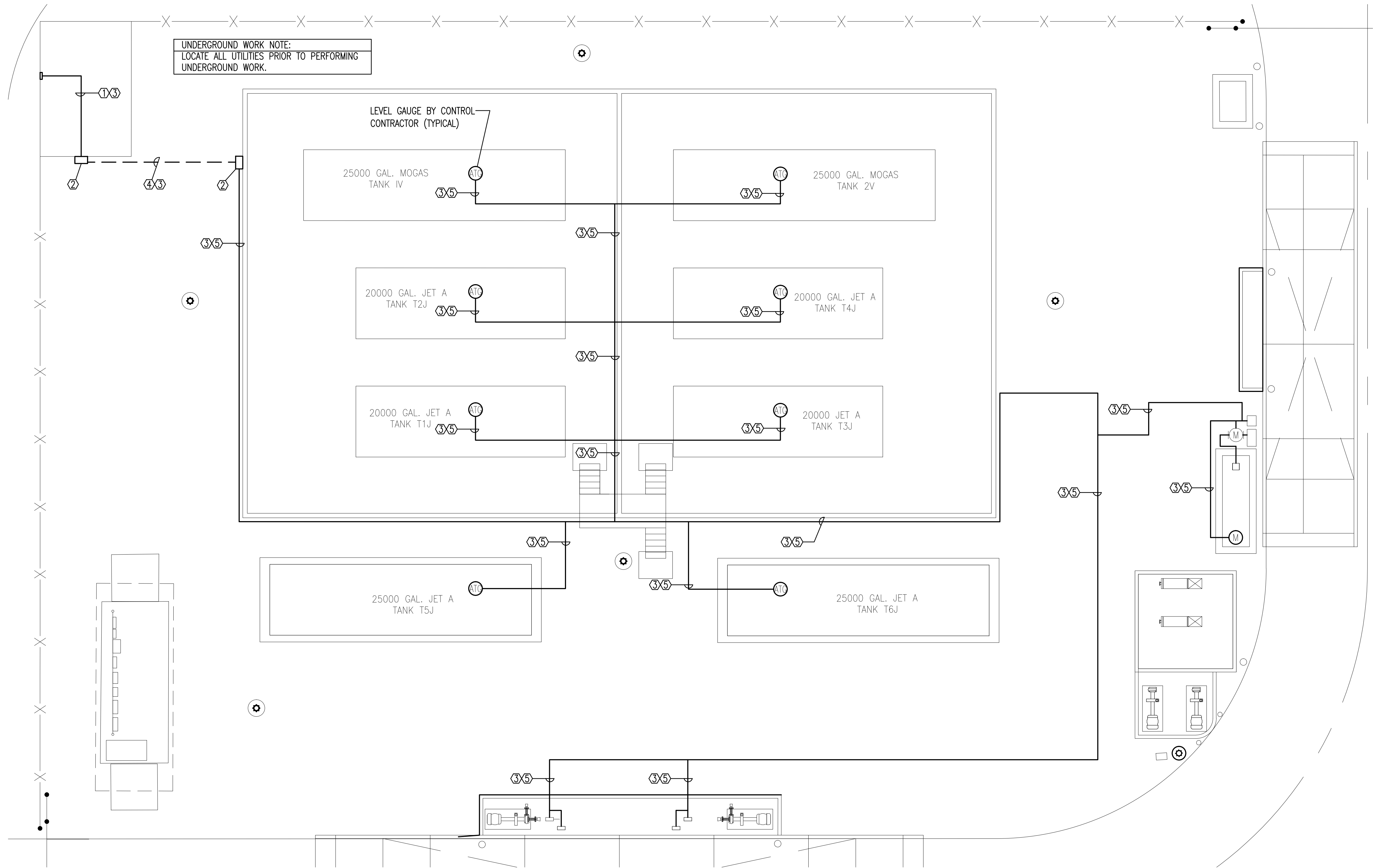
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UNDERGROUND WORK NOTE:
LOCATE ALL UTILITIES PRIOR TO PERFORMING UNDERGROUND WORK.

LEVEL GAUGE BY CONTROL CONTRACTOR (TYPICAL)

25000 GAL. MOGAS TANK IV

25000 GAL. MOGAS TANK 2V

20000 GAL. JET A TANK T2J

20000 GAL. JET A TANK T4J

20000 GAL. JET A TANK T1J

20000 GAL. JET A TANK T3J

25000 GAL. JET A TANK T5J

25000 GAL. JET A TANK T6J

KEY NOTES:

- ① INSTALL MONITORING AND CONTROL WIRING/CONDUIT ABOVE CEILING AND SURFACE MOUNT ON WALLS.
- ② ABOVE GROUND/UNDERGROUND TRANSITION LOCATION.
- ③ CONDUIT QUANTITY AND SIZES SHALL BE COORDINATED WITH THE FUELS CONTROL SYSTEM CONTRACTOR. CONDUIT SHALL BE A MINIMUM OF 1". EXPOSED CONDUITS IN HAZARDOUS AREAS SHALL HAVE SEAL OFFS AND BE RATED FOR USE IN A HAZARDOUS ENVIRONMENT.
- ④ INSTALL MONITORING AND CONTROL WIRING/CONDUIT UNDERGROUND.
- ⑤ INSTALL NEW MONITORING AND CONTROL WIRING/CONDUIT EXPOSED ABOVE GRADE. CONDUIT SHALL BE FIELD ROUTED OUT OF THE WAY TO PRESENT ANY TRIP HAZARD OR CREATING ANY ACCESS BARRIER. THE ROUTE WILL REQUIRE ACCEPTANCE BY THE OWNER BEFORE INSTALLING. COORDINATE WITH THE CONTROLS CONTRACTOR FOR ALL LOCATIONS OF CONTROL STATIONS, VALVES, GAUGES, ETC THAT REQUIRE NEW CONTROLS CONNECTIONS. INSTALL CONDUIT, BOXES, AND CONTROL WIRING TO ALL SYSTEM CONTROLS DEVICES PER THE DIRECTION OF THE SYSTEMS CONTROL CONTRACTOR.

'MOGAS'/'JET A' ELECTRICAL CONTROLS WIRE/CONDUIT SITE PLAN

SCALE: 1/8" = 1'-0"

INCLUDE THE FOLLOWING INFORMATION, AT A MINIMUM, IN ELECTRICAL SHOP DRAWINGS PRIOR TO CONSTRUCTION. THIS IS IN ADDITION TO REQUIRED FUEL SYSTEM SHOP DRAWINGS.

1. CONDUIT QUANTITIES
2. CONDUIT SIZES
3. WIRING TYPES, QUANTITIES, AND SIZES IN EACH CONDUIT
4. CONNECTION POINTS TO ALL CONTROL DEVICES
5. A LETTER STATING THAT THE ELECTRICAL, COMMUNICATIONS, AND SYSTEM CONTROLS CONTRACTORS HAVE COORDINATED ALL REQUIREMENTS NECESSARY FOR A COMPLETE SYSTEM.

REFER TO THE PLUMBING DRAWINGS FOR CONTROLS INFORMATION AND COORDINATION. THE FUEL SYSTEM CONTROLS CONTRACTOR SHALL PROVIDE ALL INFORMATION TO THE ELECTRICAL AND COMMUNICATIONS CONTRACTORS SO ALL SUPPORT INFRASTRUCTURE IS INSTALLED AS REQUIRED FOR A COMPLETE SYSTEM.

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FUEL FARM EXPANSION
MOGAS/ JET A ELECTRICAL CONTROLS WIRE/CONDUIT SITE PLAN

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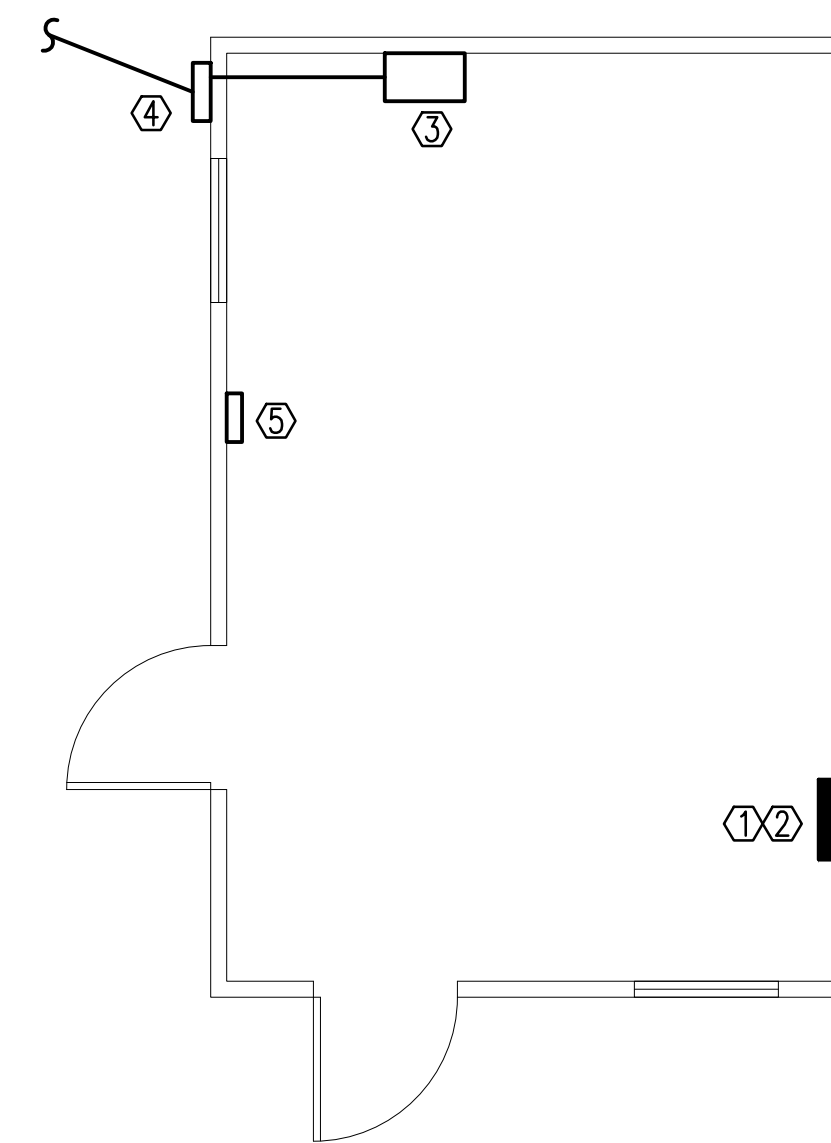
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SHEET NUMBER
E-201

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KEY NOTES:

- ① INSTALL A SURGE SUPPRESSOR TO EXISTING PANEL 'LPA'. SURGE SHALL HAVE INTERNAL FUSING AND BE RATED TO ATTACH DIRECTLY TO THE PANEL BUS. THE SURGE SHALL HAVE LED INDICATORS AND 5 YEAR MINIMUM WARRANTY. CONDUCTORS SHALL BE KEPT AT SHORT AS POSSIBLE BETWEEN THE BUS AND SURGE SUPPRESSOR DEVICE.
- ② EXISTING PANEL 'LPA'; 120/208V, 3Ø, 4W, 60 AMP MAIN BREAKER. SQUARE D 'E2' SERIES.
- ③ WALL MOUNT FIBER TERMINATION PANEL. TERMINATE FIBER TO PANEL, TEST, AND LABEL. PROVIDE 'LC' FIBER CONNECTORS. FIBER SHALL BE CONTINUOUS FROM THE EXISTING CCTV FIBER CABINET TO THE FIBER TERMINATION PANEL.
- ④ NEMA 3R JUNCTION BOX. TRANSITION 2" RIGID CONDUIT UP EXTERIOR WALL AND PENETRATE WALL HIGH. EXTEND 2" EMT CONDUIT TO WALL MOUNT FIBER TERMINATION PANEL.
- ⑤ EXISTING VEEDER ROOT SYSTEM CONTROL PANEL.



MAINTENANCE BUILDING ELECTRICAL/COMM PLAN

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

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216 E. Government St. FL Authorization No. 30167
Pensacola, FL 32502 FL PE No. 59251
Phone: (850) 462-8040 Job Number: 17-070

DESTIN-FORT WALTON BEACH AIRPORT

FUEL FARM EXPANSION

MAINTENANCE BUILDING ELECTRICAL/COMM PLAN

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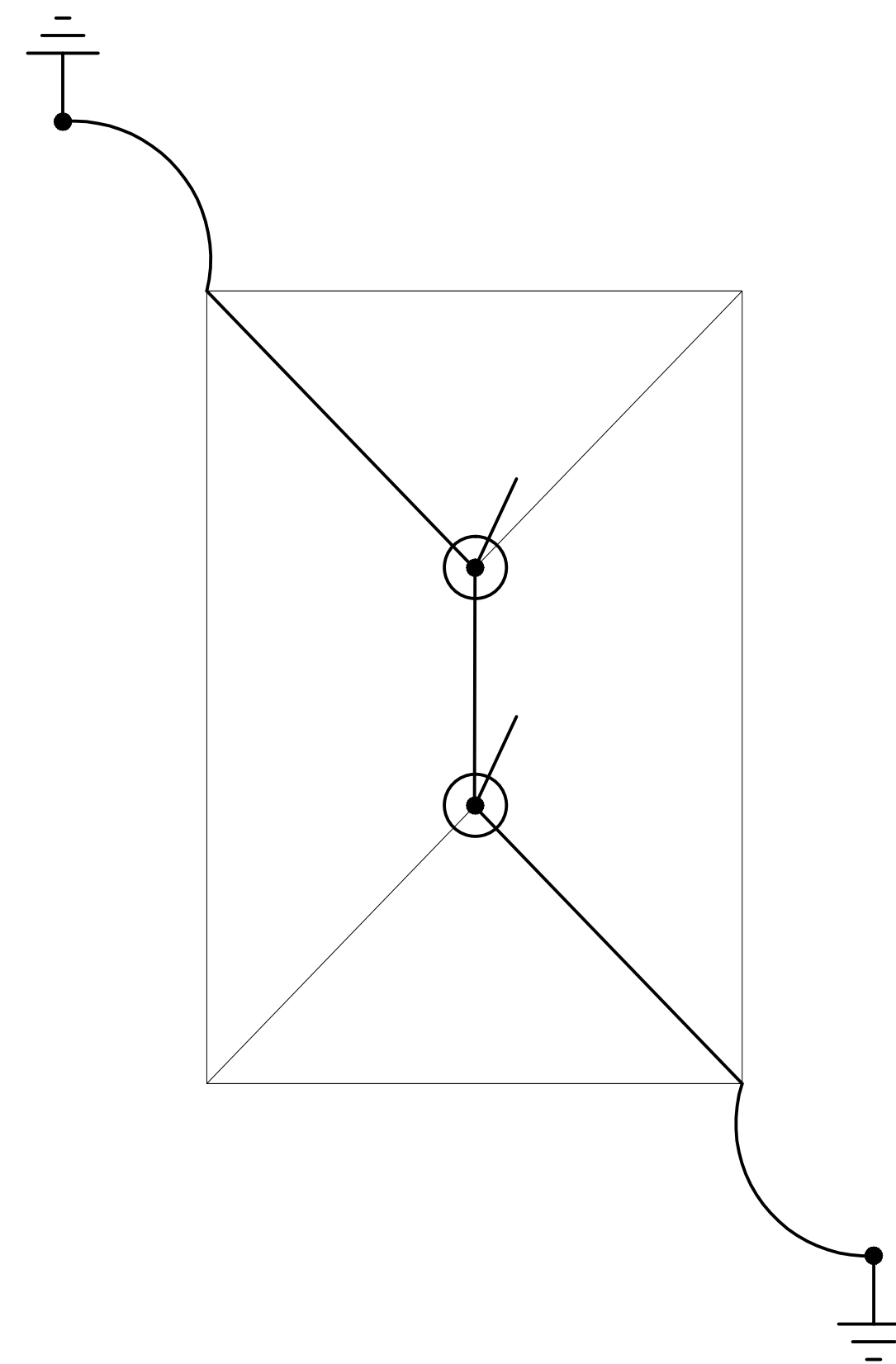
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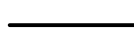
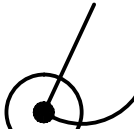
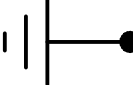
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LIGHTNING PROTECTION PLAN
SCALE: 1/4" = 1'-0"

NEW WORK LIGHTNING PROTECTION SYSTEM LEGEND

-  24" ROOF MOUNTED LIGHTNING PROTECTION SYSTEM AIR TERMINAL
-  LIGHTNING PROTECTION SYSTEM ROOF CONDUCTOR. NO. A24, CLASS I ALUMINUM CONSISTING OF 24 STRANDS OF #14 AWG ALUMINUM WIRE.
-  LIGHTNING PROTECTION SYSTEM DOWN CONDUCTOR. NO. C29, CLASS I COPPER CONSISTING OF 29 STRANDS OF #16 AWG COPPER WIRE.
-  GROUND ROD 3/4" X 10' WITH PLASTIC TEST WELL

GENERAL NOTES:

- LIGHTNING PROTECTION SYSTEM SHALL NOT DEGRADE THE ROOFING SYSTEM INTEGRITY
- THE CONTRACTOR SHALL NOT USE THE FACILITY STRUCTURE AS A DOWN CONDUCTOR OR USE ANY PORTION OF THE STRUCTURE AS A CONDUCTOR, EXCEPT AS NECESSARY TO PROTECT THE STRUCTURE ITSELF.
- LIGHTNING PROTECTION SYSTEM AND BUILDING GROUND SYSTEM TO BE INSPECTED AND A UL CERTIFICATION PROVIDED. PERFORM ALL WORK REQUIRED TO OBTAIN UL CERTIFICATION.
- BARE COPPER LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM ROOF OR SIDING OR OTHER ALUMINUM SURFACES AND VICE VERSA, ALUMINUM LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON COPPER ROOFING OR COPPER SIDING OR OTHER COPPER SURFACES.
- ALL GROUND RODS WITH TEST WELLS SHALL BE EXOTHERMICALLY WELDED, EXCEPT FOR ONE GROUND ROD INSIDE TEST WELL SHALL BE MECHANICALLY CONNECTED.
- INSTALLATION SHALL COMPLY WITH NFPA 780.

OKALOOSA COUNTY AIRPORTS



AVCON, INC.
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LIGHTNING PROTECTION PLAN

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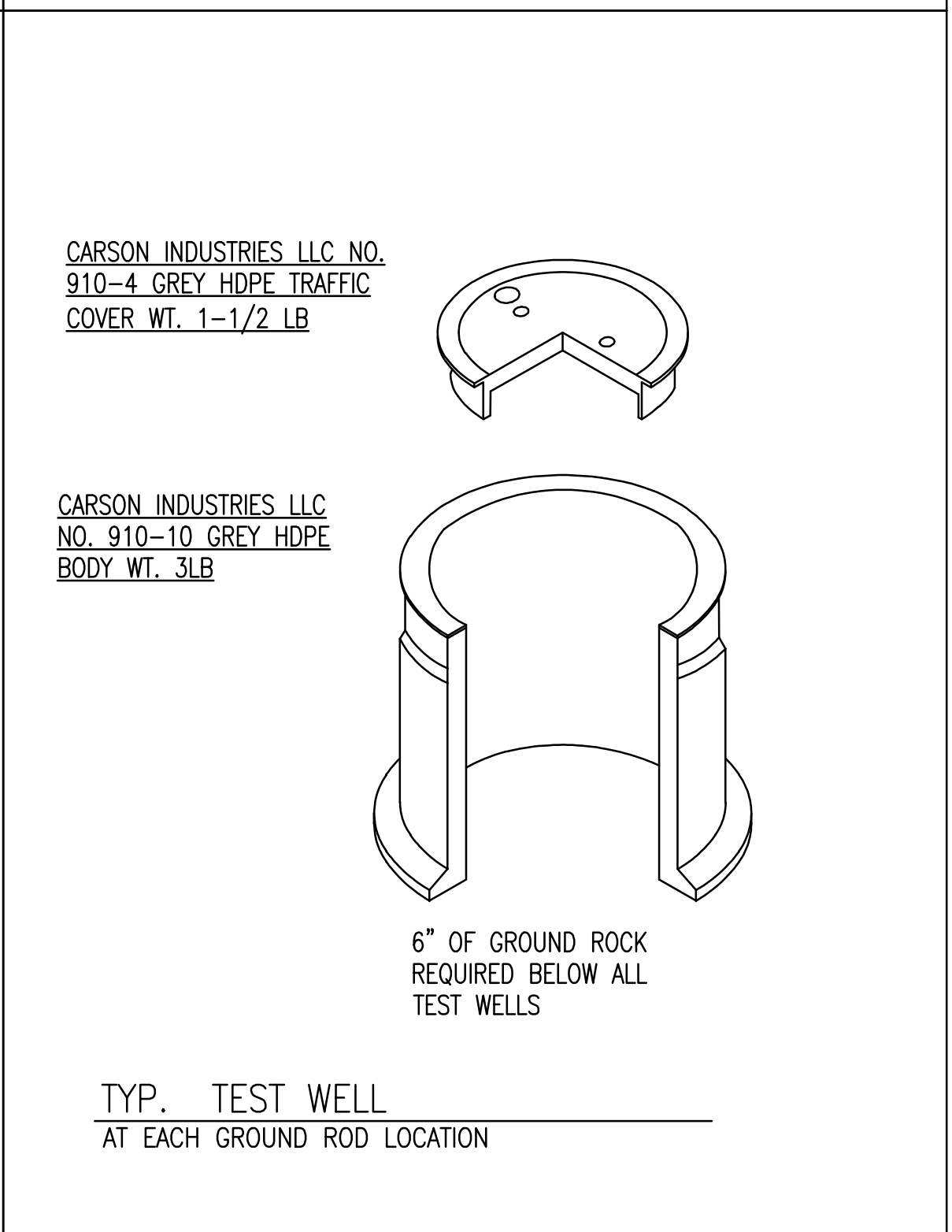
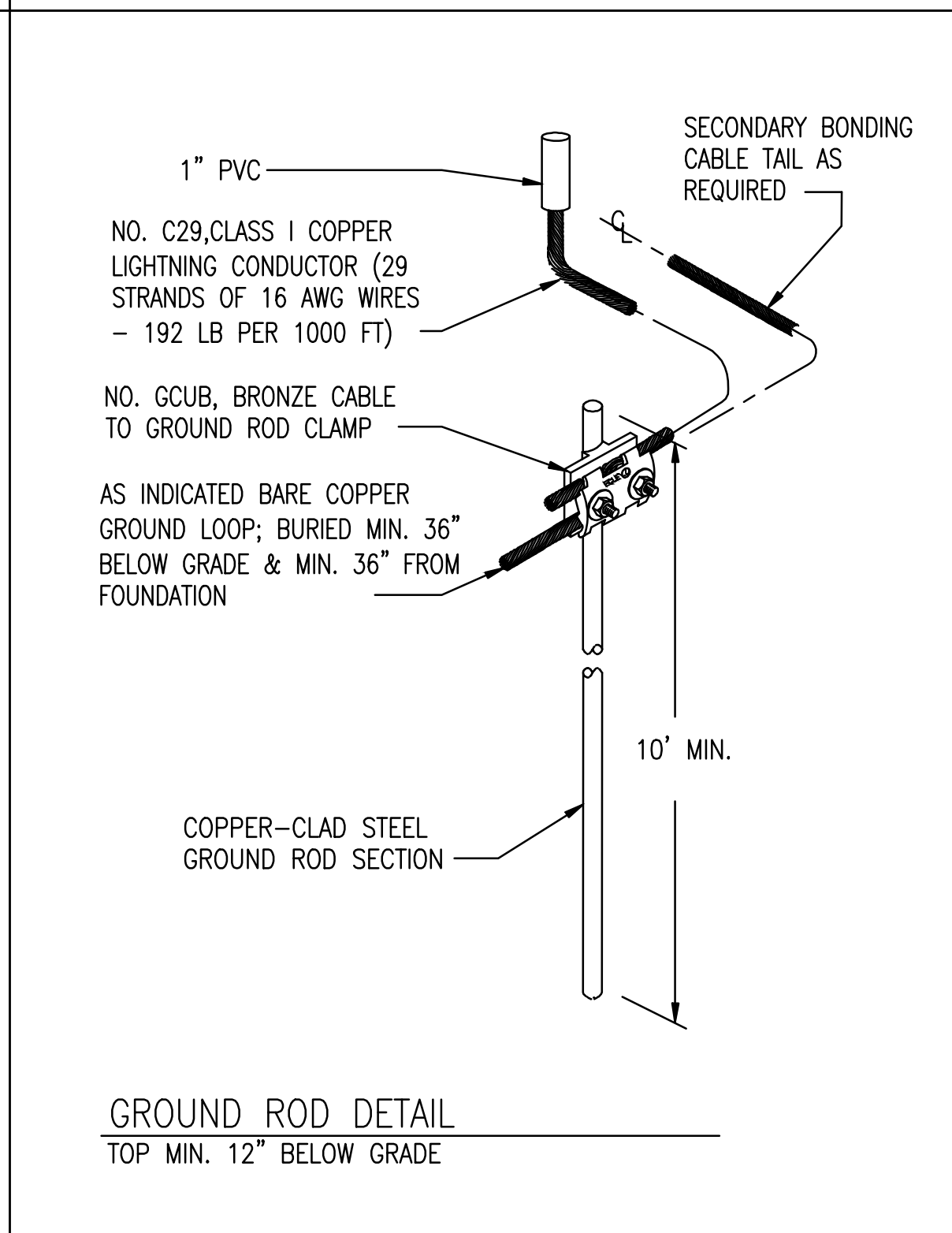
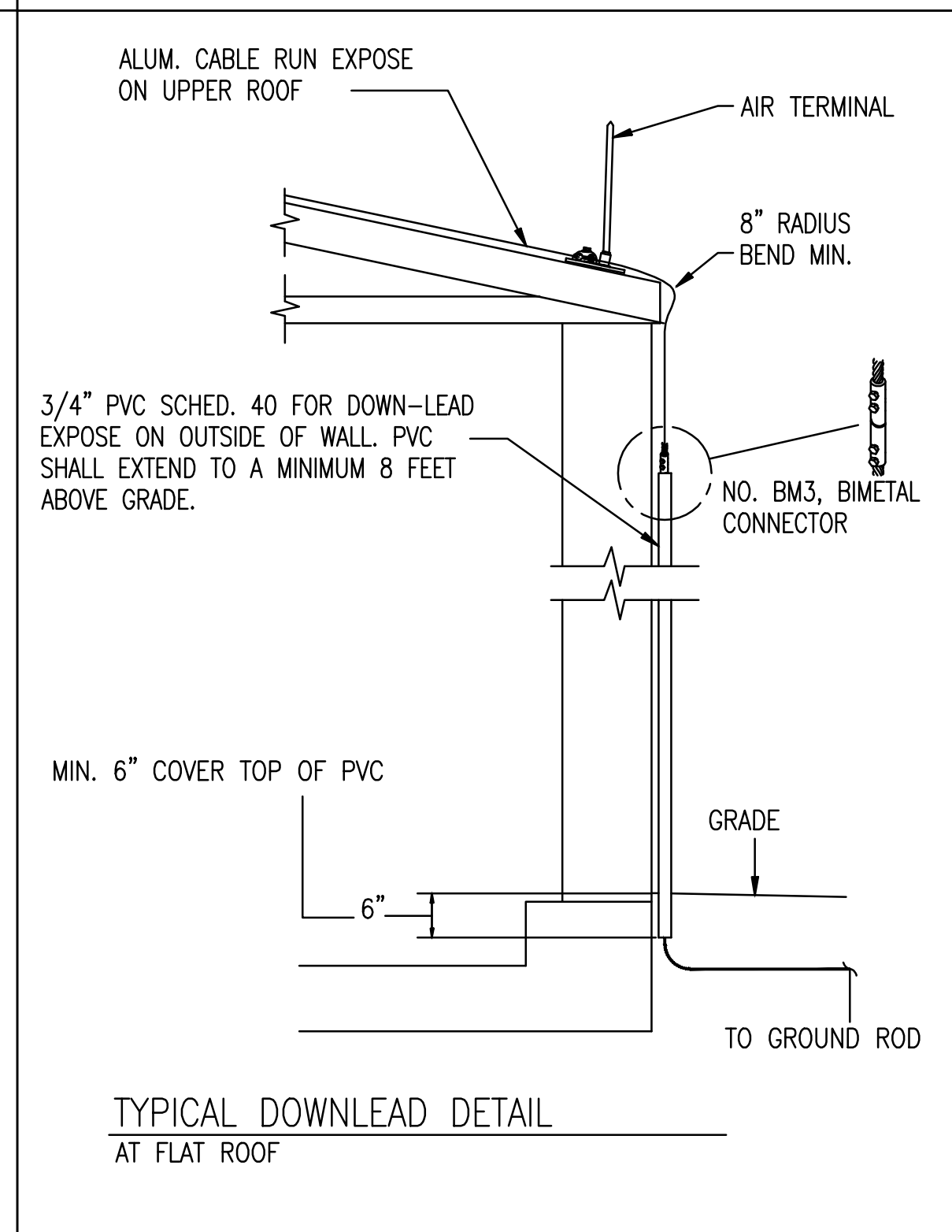
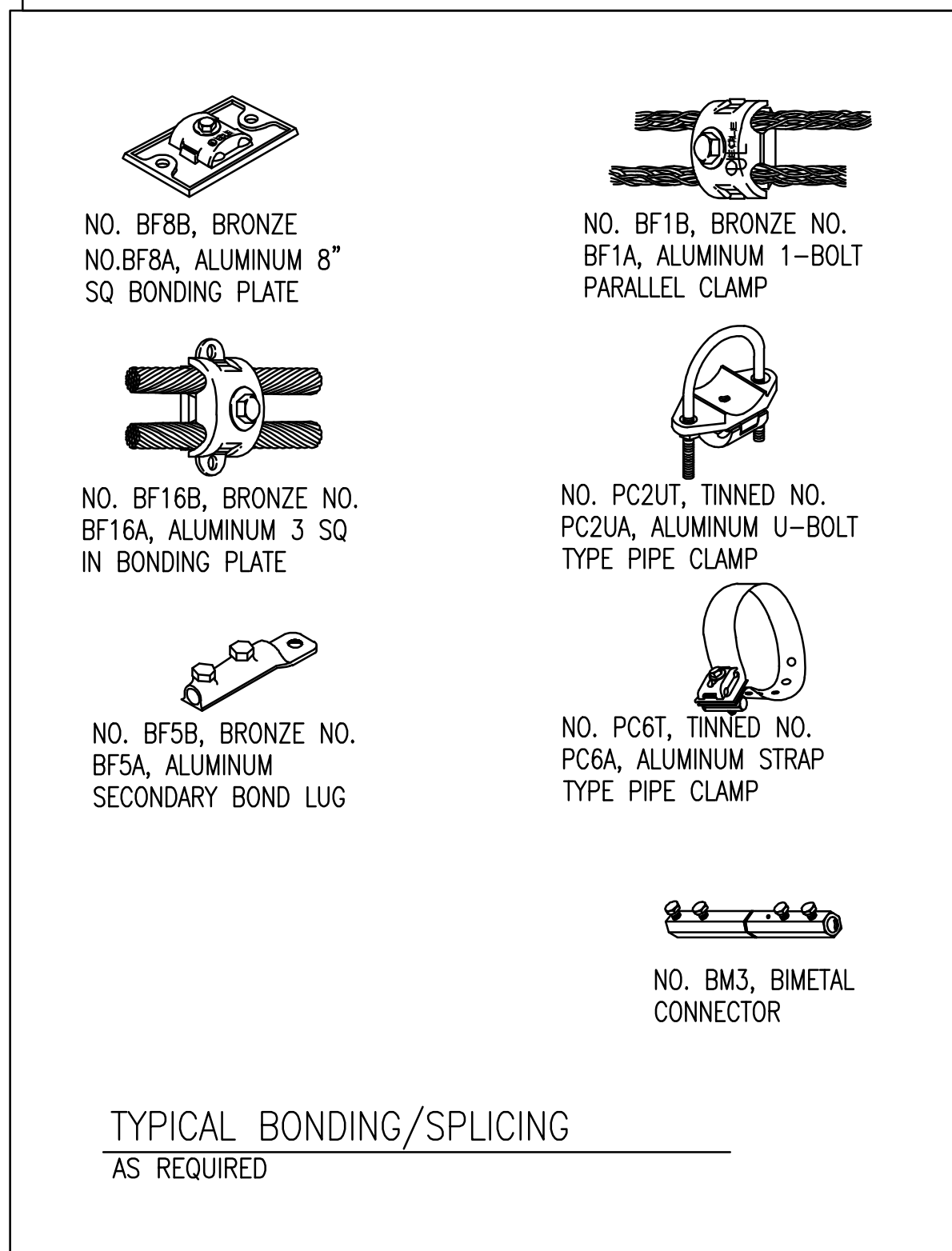
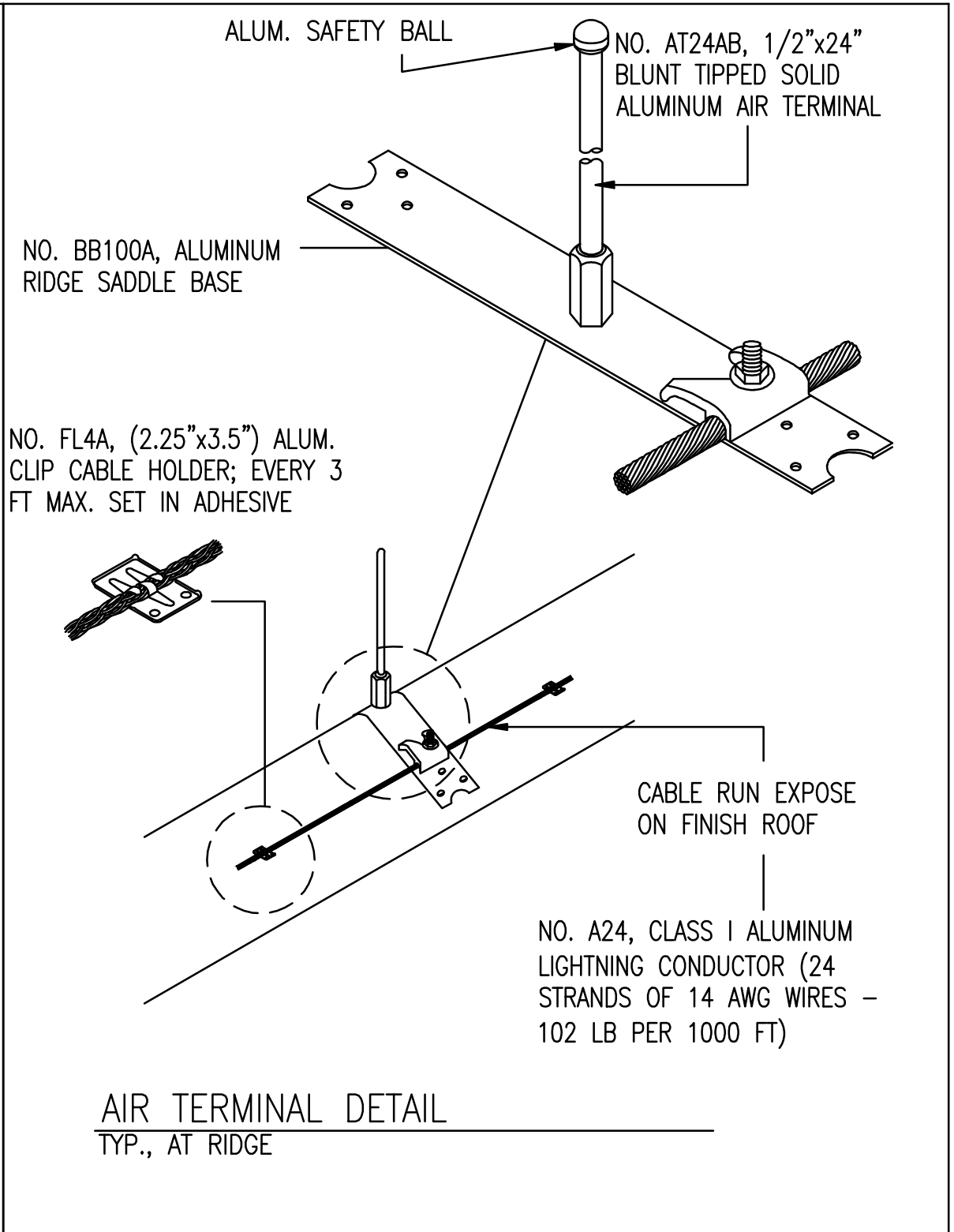
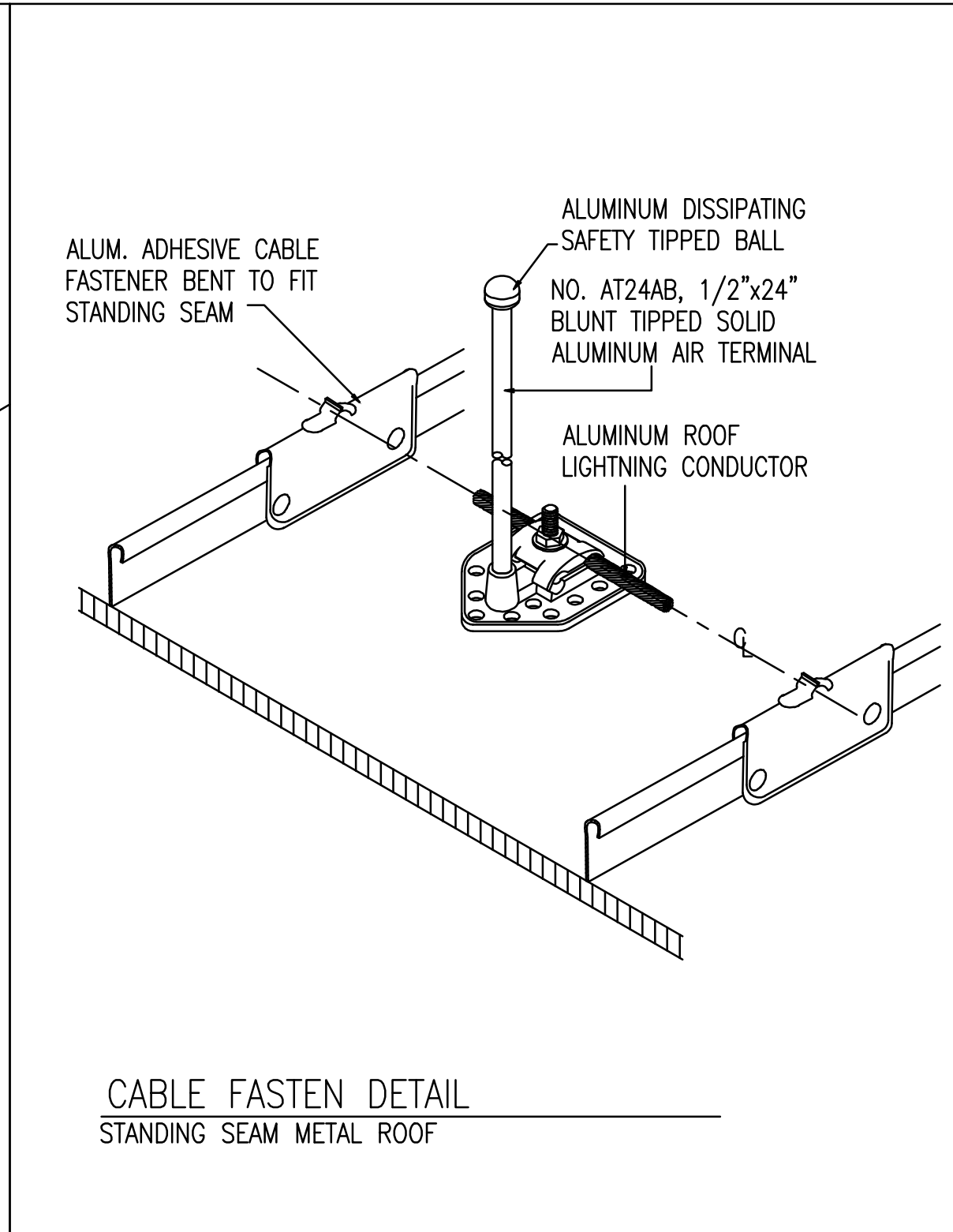
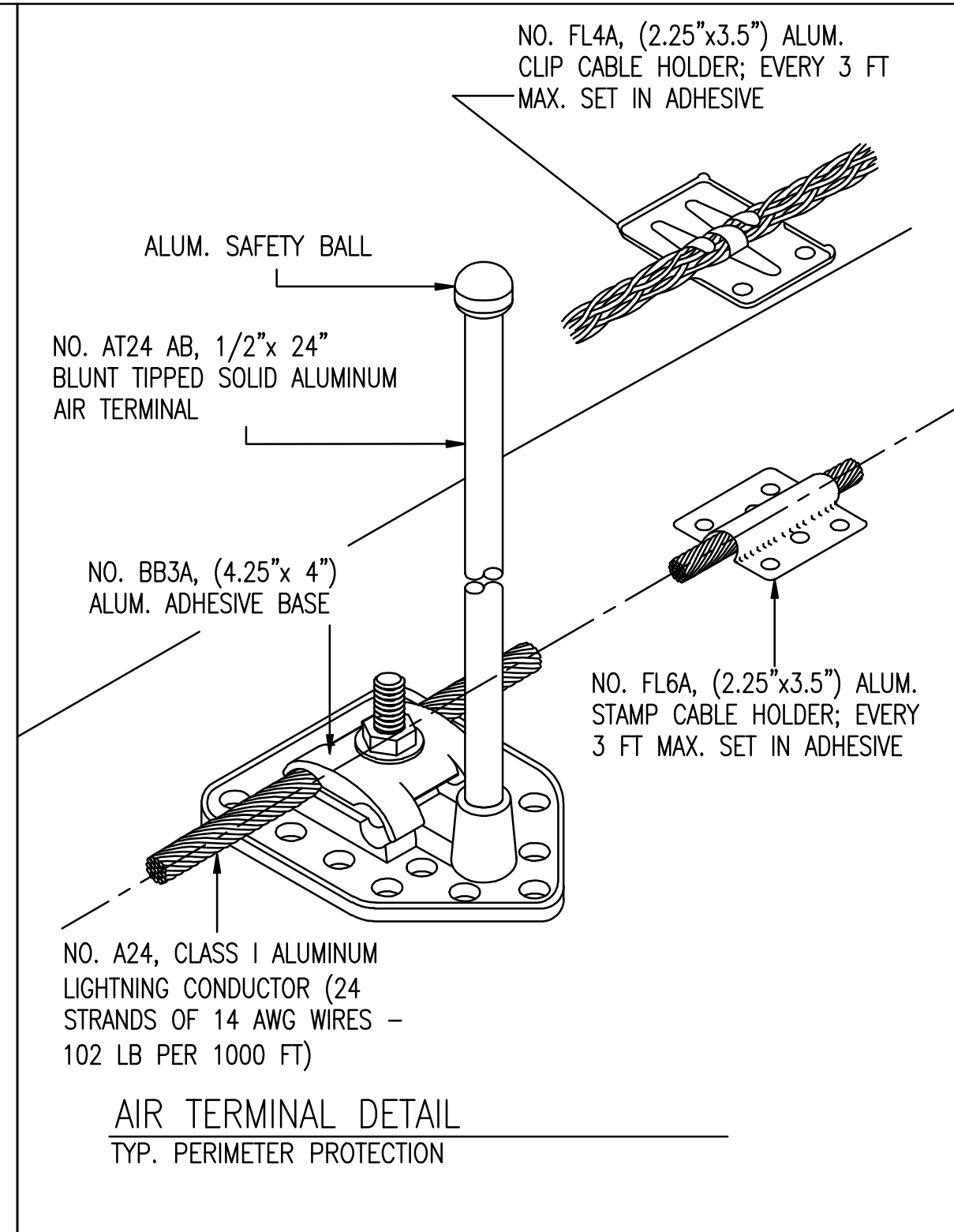
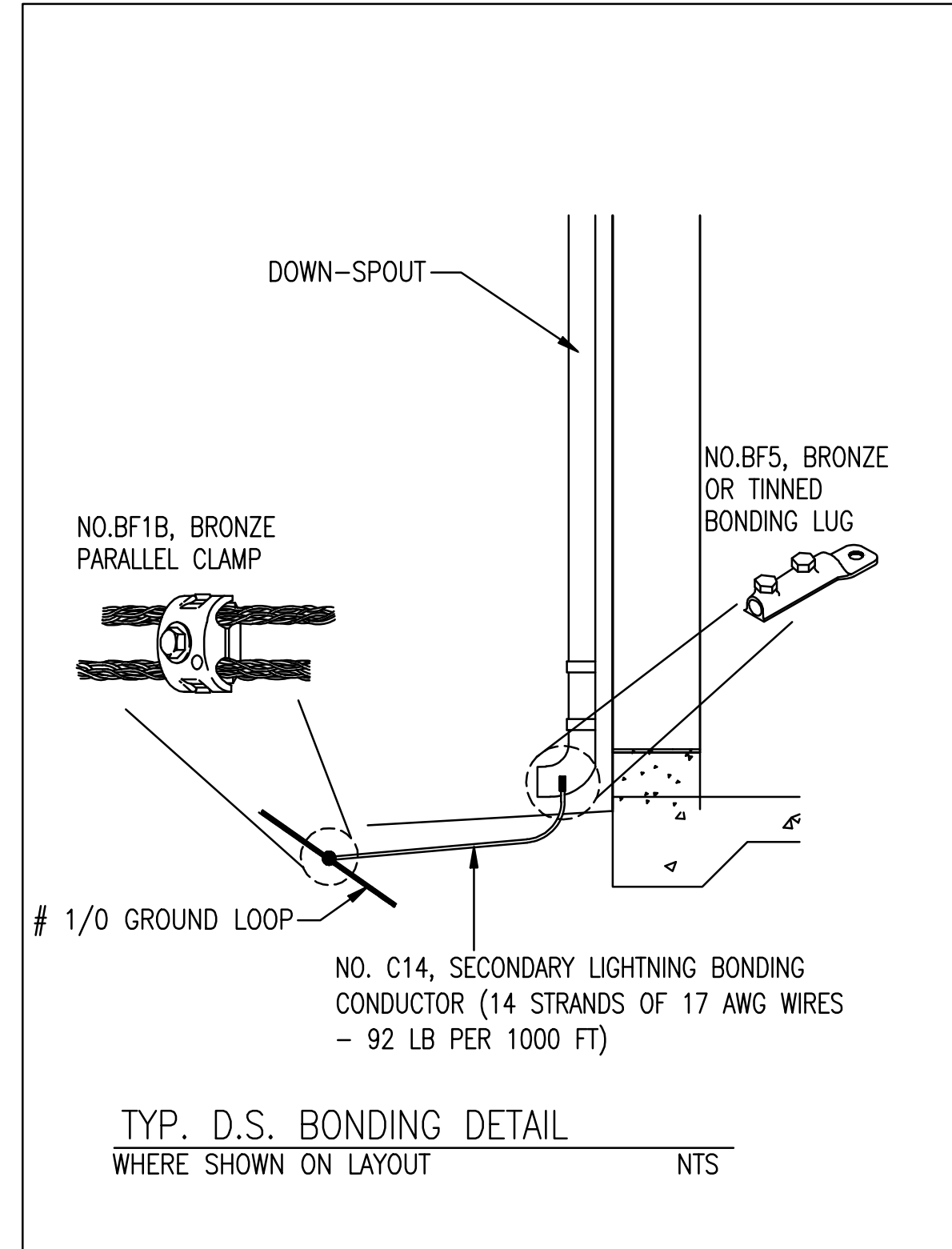
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DESTIN-FORT WALTON BEACH AIRPORT
FUEL FARM EXPANSION
LIGHTNING PROTECTION DETAILS

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