

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE OF PAGES 1
2. AMENDMENT/MODIFICATION NO. 0001		3. EFFECTIVE DATE 2 June 2004	4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)
6. ISSUED BY CODE		7. ADMINISTERED BY (If other than Item 6)		CODE	
USA ENGINEER DISTRICT, JACKSONVILLE PRUDENTIAL OFFICE BLDG 701 SAN MARCO BLVD, ATTN: CESAJ-CT JACKSONVILLE, FL KATHIE DUKE 904-232-3713 OR 561-626-7324					
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(√)	9A. AMENDMENT OF SOLICITATION NO. W912EP-04-R-0006
				(X)	9B. DATED (SEE ITEM 11) 29 April 2004
					10A. MODIFICATION OF CONTRACTS/ORDER NO.
					10B. DATED (SEE ITEM 13)
CODE		FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers tended. is extended, is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, 8.5 SQUARE MILE AREA (SMA), PUMP STATION 357, CANALS & LEVEES, AND STORMWATER TREATMENT AREA (STA), DADE COUNTY, FLORIDA

ANY ENCLOSURES ACCOMPANYING THIS AMENDMENT SHOULD BE INSERTED INTO THE PLANS AND/OR SPECIFICATIONS AS APPLICABLE. ALL SUPERSEDED MATERIAL SHOULD BE REMOVED OR ADEQUATELY MARKED TO INDICATE THAT THEY HAVE BEEN SUPERSEDED.

BID OPENING DATE REMAINS 15 JUNE 2004.

SEE ATTACHED SF30 CONTINUATION PAGE.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)	16C. DATE SIGNED

SECTION SF-30 BLOCK 14 CONTINUATION PAGES

SPECIFICATIONS: Specifications for this project have been updated.

a. Asterisks appear before and after the line or lines where revisions have been made to the text on the enclosed revised pages and pertain only to the changes made by this amendment except where the reverse side of a page has been previously amended; however, these can be identified by the amendment number opposite the page number at the bottom of each page.

b. Some specification revisions include additions with underlined text or deletions with line/cross-outs.

c. The text changes may have necessitated reformatting of subsequent text or pages. If this is the case, those pages have also been issued as amended pages but are not marked with asterisks, underlining or line/cross-outs.

The following sections and pages have been replaced by this amendment:

Section 00010A

Section 00100A, Pages 00100-A-1 through 00100-A-3 (Revised),
Pages 00100-A-3-a through 00100-A-3-f (Added).

Section 00100B, Pages 00100-B-1 and 00100-B-2 (Revised).

Section 00700, Pages 00700-13 and 00700-18 (Revised)

Section 00800, Page 00800-5 (Revised)

Section 00800A

Section 01270

Submittal Register

Section 01355

Section 01500

Section 02164

Section 02331

Section 08810

Section 09900

Section 13850

Section 16415

DRAWINGS: The following drawings by D.O. File Number have been revised (see Revision Block) per this amendment.

D.O. File No. 402-38,237:

1. Drawing No. G-001.
2. Drawing No. C-101.
3. Drawing No. C-102.
4. Drawing No. M-603.

D.O. File No. 402-38,238:

1. Drawing No. G-001.
2. Drawing No. G-002.
3. Drawing No. G-003.
4. Drawing No. B-101 is deleted in its entirety.
5. Drawing No. B-102 is deleted in its entirety.
6. Drawing No. B-103 is deleted in its entirety.
7. Drawing No. B-104 is deleted in its entirety.
8. Drawing No. B-105 is deleted in its entirety.
9. Drawing No. C-112.
10. Drawing No. C-116.
11. Drawing No. C-118.
12. Drawing No. C-121.
13. Drawing No. C-122.

14. Drawing No. C-123.
15. Drawing No. C-124.
16. Drawing No. C-125.
17. Drawing No. C-126.
18. Drawing No. C-127.
19. Drawing No. C-129.
20. Drawing No. C-130.
21. Drawing No. C-141.
22. Drawing No. C-143.
23. Drawing No. S-102.

D.O. File No. 402-38,239:

1. Drawing No. G-003.
2. Drawing No. C-102.
3. Drawing No. C-103.
4. Drawing No. C-104.
5. Drawing No. C-106.
6. Drawing No. C-108.
7. Drawing No. C-112.
8. Drawing No. C-113.
9. Drawing No. C-114.
10. Drawing No. C-115.
11. Drawing No. C-116.
12. Drawing No. C-117.
13. Drawing No. C-118.
14. Drawing No. C-119.
15. Drawing No. C-120.

SECTION 00010A
LINE ITEMS AND PRICING SCHEDULE

MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK
8.5 SQUARE MILE AREA, PUMP STATION 357, CANALS & LEVEES, AND STORMWATER TREATMENT AREA
DADE COUNTY, FLORIDA

LINE ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
BASE BID, PUMP STATION 357:					
*0001	EXCAVATION, COMMON (ESTIMATED QUANTITY)	8,530	CUBIC YARD	\$ _____	\$ _____ *
0002	EXCAVATION, ROCK (ESTIMATED QUANTITY)	6,000	CUBIC YARD	\$ _____	\$ _____
*0003	PUMP STATION				
0003AA	CONSTRUCTION		LUMP SUM		\$ _____
0003AB	ELECTRICAL SERVICE		LUMP SUM		\$15,000.00
0003AC	TELEPHONE SERVICE		LUMP SUM		\$5,000.00
	TOTAL BASE BID (LINE ITEMS 0001 THROUGH 0003AC)				\$ _____ *
OPTION A, CANALS & LEVEES					
0004	COMMON EXCAVATION (ESTIMATED QUANTITY)	156,322	CUBIC YARD	\$ _____	\$ _____
0005	ROCK EXCAVATION (ESTIMATED QUANTITY)	250,489	CUBIC YARD	\$ _____	\$ _____
0006	CULVERT STRUCTURES		LUMP SUM		\$ _____
0007	TRAFFIC CONTROL AND SIGNAGE		LUMP SUM		\$ _____
0008	SEEDING (ESTIMATED QUANTITY)	125	ACRE	\$ _____	\$ _____
	TOTAL OPTION A (LINE ITEMS 0004 THROUGH 0008)				\$ _____
OPTION B, STORMWATER TREATMENT AREA:					
0009	COMMON EXCAVATION (ESTIMATED QUANTITY)	559,454	CUBIC YARD	\$ _____	\$ _____
0010	AGGREGATE PAVING FOR ACCESS ROAD		LUMP SUM		\$ _____
0011	CONCRETE APRON FOR WEIRS		LUMP SUM		\$ _____
0012	SEEDING (ESTIMATED QUANTITY)	22	ACRE	\$ _____	\$ _____
	TOTAL OPTION B (LINE ITEMS 0009 THROUGH 0012)				\$ _____
	TOTAL BASE BID PLUS OPTION A PLUS OPTION B (LINE ITEMS 0001 THROUGH 0012)				\$ _____

* SEE NOTES ON NEXT PAGE (00010A-2).

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SECTION 00010A
LINE ITEMS AND PRICING SCHEDULE

MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK
8.5 SQUARE MILE AREA, PUMP STATION 357, CANALS & LEVEES, AND STORMWATER TREATMENT AREA
DADE COUNTY, FLORIDA

NOTES: (1) OFFEROR MUST PRICE ALL LINE ITEMS. SEE PROVISION AT 52.236-28 (SECTION 00100).

* (2) THE AMOUNTS SHOWN IN LINE ITEMS 0003AB AND 0003AC ARE BASED ON ESTIMATES PROVIDED TO THE GOVERNMENT BY RESPECTIVE UTILITIES. THE CONTRACTOR WILL BE PAID FOR THE ACTUAL COSTS INCURRED UNDER LINE ITEMS 0003AB AND 0003AC (SEE SECTION 01270).

(3) ESTIMATED QUANTITY FOR LINE ITEMS 0004, 0005 AND 0009 DO NOT INCLUDE TOLERANCES (SEE SECTION 01270). OFFERORS ARE RESPONSIBLE FOR CONSIDERING THE COST OF TOLERANCES THEY REQUIRE, AND INCLUDE THESE COSTS IN THE UNIT PRICE FOR THE QUANTITY INDICATED IN LINE ITEMS 0004, 0005 AND 0009.

(4) FOR INFORMATION ON PERIOD OF PERFORMANCE AND OPTIONS, SEE THE "COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK" CLAUSE AT 52.211-10, SECTION 00700

(5) SEE PROVISION "OFFEROR'S CHECKLIST", 999.215-4011 AT SECTION 00100.

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SECTION III. EVALUATION FACTORS AND SUBFACTORS

SECTION 00100A INSTRUCTIONS, CONDITIONS, AND NOTICES TO OFFERORS

PROPOSAL SUBMISSION REQUIREMENTS

A-1 Notice. The Government intends to make award without holding discussions with offerors. Therefore, offerors are encouraged to include their best terms and conditions (both price and technical) in the initial offer. By submitting an offer in response to this solicitation, offerors are agreeing to comply with all terms and conditions contained in the solicitation. (See item 17, Standard Form 1442.) Unless the solicitation specifically invites the offeror to submit exceptions, the Contracting Officer may reject any offer that contains exceptions. If, despite the warning given in this paragraph, the offeror elects to include exceptions, the exceptions must be specifically and clearly identified on a separate page. In this solicitation, the words "offer" and "proposal" are used interchangeably. (See definition of "offer" at FAR 2.101.) Except for any portions of the offeror's proposal incorporated into the resulting contract by specific reference, the terms and conditions included in the solicitation, including any amendments, shall take precedence over the offeror's proposal.

A-1.1 Certain positions and/or items of work are considered particularly critical to successful completion of the project. The Government will consider the qualifications of these persons/subcontractors during its evaluation of the offeror's proposal. In accordance with the Limitations On Substitutions For Certain Positions And/Or Subcontractors paragraph of Section 00800 of this solicitation, if the offeror is awarded a contract the offeror will not be permitted to make substitutions without the approval of the Contracting Officer or Administrative Contracting Officer. If the offeror does not name a subcontractor for any identified item of work, the Government will assume the offeror intends to perform the work with its own forces and, if the offeror receives the contract, no substitutions will be allowed without prior approval of the Contracting Officer or Administrative Contracting Officer. Limitations apply to the following items of work; therefore, the offeror shall name in its proposal the persons/subcontractors it proposes to use for these items of work: **(1) Telemetry System and (2) any major or critical subcontractor that is used to show demonstrated experience or relevant past performance.**

A-2 The Proposal. Each offeror shall submit a written proposal consisting of the following documents:

A-2.1 Completed SF 1442 with price schedule (2 copies).

A-2.2 Offer guarantee (or bid bond) if required by item 13B, Standard Form 1442.

A-2.3 Completed representations & certifications (Section 00600 of this solicitation).

A-2.4 Past performance information.

A-2.4.1 For all subfactors except utilization of small business concerns (if used as a subfactor), submit information for all relevant contracts and subcontracts started or completed within the past 3 years (measured from the date of this solicitation). Submit a separate Past Performance Information Collection Sheet for each project. (A copy of the sheet is attached to the solicitation.) Include past performance information regarding predecessor companies, key personnel who have relevant experience, and **a letter of commitment from** subcontractors that will perform major or critical aspects of the work. (For proposed subcontractors, clearly identify the work each will perform.) For each project submitted, explain why it is relevant to this project, and provide information on problems encountered and the actions taken to correct such problems. (Relevancy is defined in the DOD guide to collection and use of past performance as "information that has a logical connection with the matter under consideration and applicable time span.")

A-2.4.2 Utilization of small business concerns.

A-2.4.2.1 This subparagraph applies to offerors that are small business concerns (including all categories) and to offerors that are other than small business concerns. FAR 52.219-8, Utilization Of Small Business Concerns, states the Government's policy that small business (SB) concerns, veteran-owned small business (VOSB) concerns, service-disabled veteran-owned small business (SDVOSB) concerns, HUBZone small business concerns, small disadvantaged business (SDB) concerns, and women-owned small business (WOSB) concerns have the maximum practicable opportunity to participate in performing contracts. For each of the 3 most recently completed federal contracts submit one of the following: (i) if the contract required a subcontracting plan, submit the final SF 294, Subcontracting Report For Individual Contract, or (ii) if the contract did not require a subcontracting plan, complete and submit the Past Performance Information Collection Sheet (Utilization of Small Business Concerns). (A copy of the sheet is attached.) Offerors that are SB, VOSB, SDVOSB, HUBZone SB, SDB, or WOSB may count work performed with in-house resources toward compliance with FAR 52.219-8 in the category (or categories) to which they belong. (For example, a HUBZone SDB could count work in 3 categories: SB, HUBZone, and SDB.)

A-2.4.2.2 This subparagraph applies to offerors that are other than small business concerns. FAR 52.219-9, Small, Small Disadvantaged And Women-Owned Small Business Subcontracting Plan, requires a subcontracting plan, where applicable, that separately addresses subcontracting with small business (SB) concerns, veteran-owned small business (VOSB) concerns, service-disabled veteran-owned small business (SDVOSB) concerns, HUBZone small business concerns, small disadvantaged business (SDB) concerns, and women-owned small business (WOSB) concerns. For each of the 3 most recently completed federal contracts that included FAR 52.219-9, the offeror shall submit a copy of the final SF 294, Subcontracting Report For Individual Contract.

A-2.5 A technical proposal consisting of:

SUBFACTOR	SUBMISSION REQUIREMENT (Note: To ensure the proposal adequately addresses areas the Government considers important, the offeror should review paragraph B-3 in Section 00100B prior to preparing the proposal.) Portions of the offered Technical Proposal may be incorporated into the contract at the discretion of the Contracting Officer
<p>* Demonstrated Experience of Prime Contractor</p> <p>- Experience in successfully completing a project requiring management of a multi-faceted project requiring the use of major subcontractors.</p>	<p>In responding to this subfactor, the objective should be to instill confidence that the offeror has the experience necessary to manage a multi-faceted project requiring management and coordination of major subcontractors.</p> <p>Provide a narrative of past experiences showing how you successfully completed a project that required extensive management and coordination of a multi-faceted project, to include the use of major/critical subcontractors. Discuss coordination and management requirements that were needed; any problems encountered and corrective actions taken to ensure project completion within the required timeframe.</p>

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<p>Demonstrated Experience of Prime/Sub-Contractor</p> <p>- Experience in installing a Programmable Logic Controller (PLC) based control and telemetry system</p>	<p>The pump station control system provides for local and remote operation and monitoring of the pumps and their associated station equipment. It is an Ethernet based system, which makes extensive use of networked PLCs to monitor and control station functions.</p> <p>Describe experience in installing integrated control and monitoring systems using a networked PLC based architecture to include programming of A-B and MOSCAD PLCs, and Intellution iFIX SCADA software. Include detailed information on projects to include technical data of system components, network, and extent of programming effort. Provide experience that demonstrates that the personnel who will install the pump station control systems have experience installing control systems for the specific diesel engine pump drives that are being provided. In accordance with Para A-1.1 above, provide resumes of key personnel performing this work. Also, if a subcontractor is being utilized to accomplish this work, provide a letter of commitment from the subcontractor.</p>
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A-2.6 Packaging the Proposal. The proposal shall be divided as indicated in the following table and each division shall be submitted in a separate sealed package. Each package shall be marked with the offeror's name, the solicitation number, and the package number.

Package	No. of Copies	Items
1	2	Price proposal, bond, representations & certifications, and information related to utilization of small business concerns for the past performance factor (Paragraphs A-2.1, A-2.2, A-2.3, and A-2.4). Each copy shall be separately bound.
2	2	Past performance information for all subfactors except utilization of small business concerns (Paragraph A-2.4). Each copy shall be separately bound. IF UTILIZATION OF SMALL BUSINESS CONCERNS IS A SUBFACTOR, DO NOT INCLUDE INFORMATION REGARDING UTILIZATION OF SMALL BUSINESS CONCERNS IN THIS PACKAGE.
3	8	Technical proposal except utilization of small business concerns (Paragraph A-2.5). Each copy shall be placed in a separate 3-ring binder. DO NOT INCLUDE PRICING INFORMATION OR (IF REQUIRED) INFORMATION REGARDING UTILIZATION OF SMALL BUSINESS CONCERNS IN THE TECHNICAL PROPOSAL.

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A-2-7 Proposal format. To assist in ensuring a complete, well-organized proposal, the Government has included a proposal format at the end of this section for the offeror's use.

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Source Selection Information -- See FAR 2.101 and 3.104

**PROPOSAL IN RESPONSE TO SOLICITATION NO.
W912EP-04-R-0006**

OFFEROR'S NAME: _____
OFFEROR'S ADDRESS: _____
OFFEROR'S POINT OF CONTACT (POC): _____
POC's TELEPHONE: _____
POC's FAX: _____
POC's EMAIL: _____

THIS OFFER IS SUBMITTED IN SEPARATE PACKAGES AS FOLLOWS:

[Offeror check each applicable item and enter NA for non-applicable items.]

____ Package one is submitted in 2 separately bound copies and contains our price proposal, bond (if required by the solicitation), representations & certifications, and information related to utilization of small business concerns (if required by the solicitation).

____ Package two is submitted in 2 separately bound copies and contains past performance information.

____ Package three is submitted in _____ separately bound copies and contains our technical proposal. There is no pricing information in this package.

Source Selection Information -- See FAR 2.101 and 3.104

SOLICITATION NO. W912EP-04-R-0006

OFFEROR: _____

**COVER SHEET
PACKAGE ONE**

This package contains the following documents:

[Offeror check applicable items and mark others NA.]

- 1. Signed price proposal (SF 1442, SF 33, or SF 1449) with line item pricing schedule.
- 2. Bid bond.
- 3. Representations and certifications.
- 4. A Utilization of Small Business Concerns Information Collection Sheet (Completed Contracts) or SF294, Subcontracting Report, for each of the 3 most recently completed federal contracts.
- 5. Information regarding proposed utilization of small business concerns on this contract.

Source Selection Information -- See FAR 2.101 and 3.104

SOLICITATION NO. W912EP-04-R-0006

OFFEROR: _____

**COVER SHEET
PACKAGE TWO**

[Offeror check applicable items]

____ 1. Past performance is not an evaluation factor in this solicitation; or,

____ 2. This package contains a Past Performance Information Collection Sheet for each relevant contract/subcontract (as defined in the solicitation). On each collection sheet, we have explained how we determined that the contract/subcontract is relevant to this project.

____ 3. If problems were encountered during performance of any of the referenced contracts/subcontracts, we have attached a paper to the collection sheet that fully explains the problem and details the corrective action we took to resolve the problem. If we did not check this paragraph and did not attach explanations to the collection sheets, you may assume that we consider any problems that may have occurred to be minor and insignificant.

Source Selection Information -- See FAR 2.101 and 3.104

SOLICITATION NO. W912EP-04-R-0006
OFFEROR: _____

COVER SHEET
PACKAGE THREE

[Offeror check applicable items]

____ 1. Technical merit is not an evaluation factor in this solicitation; or,

____ 2. This package contains a full and complete response to each technical subfactor.

____ 3. After carefully considering the Notice paragraph of the solicitation, we have determined that we must take exception to certain parts of the solicitation. As required by the Notice paragraph, we have included a separate page to document the exceptions. If we did not check this paragraph and did not include a separate page for exceptions, you may assume that we do not take exception to any part of the solicitation.

Source Selection Information -- See FAR 2.101 and 3.104

SOLICITATION NO. W912EP-04-R-0006
OFFEROR: _____

PACKAGE THREE
TECHNICAL MERIT SUBFACTOR ONE

SUBFACTOR ONE: Demonstrated Experience of Prime Contractor - Experience in successfully completing a project requiring management of a multi-faceted project requiring the use of major subcontractors.

In responding to this subfactor, the objective should be to instill confidence that the offeror has the experience necessary to manage a multi-faceted project requiring management and coordination of major subcontractors.

Provide a narrative of past experiences showing how you successfully completed a project that required extensive management and coordination of a multi-faceted project, to include the use of major/critical subcontractors. Discuss coordination and management requirements that were needed; any problems encountered and corrective actions taken to ensure project completion within the required timeframe.

OUR PROPOSAL: [Offeror enter complete, detailed response.]

Source Selection Information -- See FAR 2.101 and 3.104

SOLICITATION NO. W912EP-04-R-0006
OFFEROR: _____

PACKAGE THREE
TECHNICAL MERIT SUBFACTOR TWO

SUBFACTOR TWO: Demonstrated Experience of Contractor/Subcontractor - Experience in installing a Programmable Logic Controller (PLC) based control and telemetry system

The pump station control system provides for local and remote operation and monitoring of the pumps and their associated station equipment. It is an Ethernet based system, which makes extensive use of networked PLCs to monitor and control station functions.

Describe experience in installing integrated control and monitoring systems using a networked PLC based architecture to include programming of A-B and MOSCAD PLCs, and Intellution iFIX SCADA software. Include detailed information on projects to include technical data of system components, network, and extent of programming effort. Provide experience that demonstrates that the personnel who will install the pump station control systems have experience installing control systems for the specific diesel engine pump drives that are being provided. In accordance with Para A-1.1 above, provide resumes of key personnel performing this work. Also, if a subcontractor is being utilized to accomplish this work, provide a letter of commitment from the subcontractor.

OUR PROPOSAL: [Offeror enter complete, detailed response.]

SECTION 00100B
EVALUATION FACTORS FOR AWARD

(TRADE-OFF AFTER DETERMINING TECHNICAL ACCEPTABILITY)
(AWARD WITHOUT DISCUSSIONS)

B-1 Applicable Regulatory Guidance. This source selection will be conducted in accordance with procedures prescribed in FAR Part 15.

B-2 Determining Best Value. After eliminating any proposal that does not meet standards of acceptability for the Technical Merit factor, the Contracting Officer will use a trade-off process (considering past performance and price) to determine which offer represents the best value to the Government. This process allows the Contracting Officer to consider making award to other than the lowest priced offer or other than the least risky (from a past performance point of view) offer. Past performance risk is slightly more important than price.

B-3 Evaluation Factors. The following factors and significant subfactors will be used to determine best value. Proposals will be evaluated for acceptability but will not be ranked by non-price factors.

EVALUATION FACTORS (TRADE-OFF AFTER DETERMINING TECHNICAL ACCEPTABILITY)		
FACTOR	SUBFACTOR	STANDARD OR RELATIVE IMPORTANCE
* Technical Merit	N/A	Standard - In order to receive an acceptable rating for the Technical Merit factor, all subfactors of the Technical Merit factor must be rated acceptable.
	Demonstrated Experience of Prime Contractor - Experience in successfully completing a project requiring management of a multi-faceted project and requiring the use of major subcontractors	Standard – Demonstrated Experience will be in a narrative format documenting at least one experience showing how you successfully completed a project that required extensive management and coordination of a multi-faceted project, to include the use of major/critical subcontractors in order to complete the project within the required timeframe. The narrative must discuss the type of project and the specific coordination requirements.

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	<p>Demonstrated Experience of Contractor/ Subcontractor</p> <p>- Experience in installing a Programmable Logic Controller (PLC) based control and telemetry system</p>	<p>Standard – Demonstrated experience will be in a narrative format documenting at least one experience showing how the contractor successfully completed installing a PLC based control and telemetry system. The narrative must include technical data of system components, network, and extent of programming effort for PLCs and SCADA software for computers. Demonstrate that the personnel who will install the pump station control systems have experience installing control systems for the specific diesel engine pump drives that are being provided. Information included system diagrams and other graphical data as needed for a clear explanation of experience. Provided qualifications and experience of personnel who will be performing the work. If a subcontractor is being utilized, a letter of commitment from the subcontractor was provided.</p>
Price	N/A	See paragraph B-2 above for relative importance.
Past Performance	N/A	<p>See paragraph B-2 above for relative importance.</p> <p>Generally, the Government will evaluate timely completion of work; quality of work; customer satisfaction; cost controls for additional work; utilization of small business concerns; and safety. However, the Government reserves the right to evaluate other areas and reserves the right to determine, on a case-by-case basis, how much emphasis is placed on any given area. If a subcontractor is being utilized to demonstrate experience on any of the above subfactors, provide relevant past performance information and a letter of commitment.</p>

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52.209-6 PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT (JUL 1995)

(a) The Government suspends or debar Contractors to protect the Government's interests. The Contractor shall not enter into any subcontract in excess of the \$25,000 with a Contractor that is debarred, suspended, or proposed for debarment unless there is a compelling reason to do so.

(b) The Contractor shall require each proposed first-tier subcontractor, whose subcontract will exceed \$25,000, to disclose to the Contractor, in writing, whether as of the time of award of the subcontract, the subcontractor, or its principles, is or is not debarred, suspended, or proposed for debarment by the Federal Government.

(c) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party that is debarred, suspended, or proposed for debarment (see FAR 9.404 for information on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs). The notice must include the following:

(1) The name of the subcontractor.

(2) The Contractor's knowledge of the reasons for the subcontractor being on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(3) The compelling reason(s) for doing business with the subcontractor notwithstanding its inclusion on the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

(4) The systems and procedures the Contractor has established to ensure that it is fully protecting the Government's interests when dealing with such subcontractor in view of the specific basis for the party's debarment, suspension, or proposed debarment.

(End of clause)

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

The Contractor shall be required to (a) commence work under this contract within 30 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use as follows: Base Work - 395 calendar days after receipt of the Notice to Proceed; Option A - 210 calendar days after receipt of the Notice to Proceed; Option B - 210 calendar days after receipt of the Notice to Proceed. **The Government plans to exercise options A and B prior to 30 December 2004.** Notices to proceed for the options will be issued at the time the options are exercised. The time stated for completion shall include final cleanup of the premises

(End of clause)

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount of \$1,445.00 for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(End of clause)

(1) The original contract or subcontract was granted an exception from cost or pricing data requirements because the price agreed upon was based on adequate price competition or prices set by law or regulation, or was a contract or subcontract for the acquisition of a commercial item; and

(2) The modification (to the contract or subcontract) is not exempted based on one of these exceptions, then the Contractor may provide information to establish that the modification would not change the contract or subcontract from a contract or subcontract for the acquisition of a commercial item to a contract or subcontract for the acquisition of an item other than a commercial item.

(B) For a commercial item exception, the Contractor shall provide, at a minimum, information on prices at which the same item or similar items have previously been sold that is adequate for evaluating the reasonableness of the price of the modification. Such information may include--

(1) For catalog items, a copy of or identification of the catalog and its date, or the appropriate pages for the offered items, or a statement that the catalog is on file in the buying office to which the proposal is being submitted. Provide a copy or describe current discount policies and price lists (published or unpublished), e.g., wholesale, original equipment manufacturer, or reseller. Also explain the basis of each offered price and its relationship to the established catalog price, including how the proposed price relates to the price of recent sales in quantities similar to the proposed quantities.

(2) For market-priced items, the source and date or period of the market quotation or other basis for market price, the base amount, and applicable discounts. In addition, describe the nature of the market.

(3) For items included on an active Federal Supply Service Multiple Award Schedule contract, proof that an exception has been granted for the schedule item.

(2) The Contractor grants the Contracting Officer or an authorized representative the right to examine, at any time before award, books, records, documents, or other directly pertinent records to verify any request for an exception under this clause, and the reasonableness of price. For items priced using catalog or market prices, or law or regulation, access does not extend to cost or profit information or other data relevant solely to the Contractor's determination of the prices to be offered in the catalog or marketplace.

(b) Requirements for cost or pricing data. If the Contractor is not granted an exception from the requirement to submit cost or pricing data, the following applies:

(1) The Contractor shall submit cost or pricing data and supporting attachments in accordance with Table 15-2 of FAR 15.408.

As soon as practicable after agreement on price, but before award (except for unpriced actions), the Contractor shall submit a Certificate of Current Cost or Pricing Data, as prescribed by FAR 15.406-2.
(End of clause)

52.217-7 OPTION FOR INCREASED QUANTITY--SEPARATELY PRICED LINE ITEM (MAR 1989)

* The Government may require the delivery of the numbered line item, identified in the Schedule as an option item, in the quantity and at the price stated in the Schedule. **The Contracting Officer may exercise the options by written notice to the Contractor anytime prior to 30 December 2004.** *
Delivery of added items shall continue at the same rate that like items are called for under the contract, unless the parties otherwise agree.
(End of clause)

DFARS 203-70 – CONTRACTOR STANDARDS OF CONDUCT

The following excerpt from DFARS subpart 203.70 is presented as a reminder:

203.7000 Policy. Government contractors must conduct themselves with the highest degree of integrity and honesty. Contractors should have standards of conduct and internal control systems that--

- (1) Are suitable to the size of the company and the extent of their involvement in Government contracting;
- (2) Promote such standards;
- (3) Facilitate timely discovery and disclosure of improper conduct in connection with Government contracts; and
- (4) Ensure corrective measures are promptly instituted and carried out.

203.7001 Procedures.

- (a) A contractor's system of management controls should provide for--
 - (1) A written code of business ethics and conduct and an ethics training program for all employees;
 - (2) Periodic reviews of company business practices, procedures, policies, and internal controls for compliance with standards of conduct and the special requirements of Government contracting;
 - (3) A mechanism, such as a hotline, by which employees may report suspected instances of improper conduct, and instructions that encourage employees to make such reports;
 - (4) Internal and/or external audits, as appropriate;
 - (5) Disciplinary action for improper conduct;
 - (6) Timely reporting to appropriate Government officials of any suspected or possible violation of law in connection with Government contracts or any other irregularities in connection with such contracts; and
 - (7) Full cooperation with any Government agencies responsible for either investigation or corrective actions.

(End of paragraph number 999.203-4000)

LIMITATIONS ON SUBSTITUTIONS FOR CERTAIN POSITIONS AND/OR SUBCONTRACTORS

The award decision for this contract was based, in part, on an evaluation of the personnel and/or subcontractors the Contractor included in its proposal for the positions and/or items of subcontracted work identified at the end of this paragraph. The Contractor agrees these personnel and/or subcontractors will be employed as described in its proposal and no substitutes will be employed without prior written approval of the Contracting Officer or Administrative Contracting Officer. The Contractor further agrees that any proposed substitutes shall meet or exceed the qualifications of the original personnel and/or subcontractors. If the Contractor's proposal did not name a subcontractor for an identified item of work, the Contractor will not be allowed to subcontract that item of work without prior approval of the Contracting Officer or Administrative Contracting Officer. The limitations described herein shall apply to the following positions and/or items of subcontracted work: **(1) Telemetry System and (2) any major or critical subcontractor that is used to show demonstrated experience or relevant past performance.**

(End of paragraph number 999.215-4001)

NOTE

NOTE

NOTE

THIS PROJECT INCORPORATES BOTH BUILDING AND HEAVY CONSTRUCTION WAGE DECISIONS.

THE BUILDING CONSTRUCTION WAGE DECISION MAY ONLY BE APPLIED TO THE CONSTRUCTION OF THE BUILDING HOUSING THE EQUIPMENT.

IF YOU HAVE ANY QUESTIONS CONCERNING THE APPLICATION OF THE WAGE DECISIONS FURNISHED FOR THIS PROJECT, PLEASE CONTACT PHYLLIS M. GARFIELD, LABOR RELATIONS SPECIALIST, OFFICE OF COUNSEL, 904-232-3761.

General Decision Number: FL030001 05/28/2004 FL1

Superseded General Decision Number: FL020001

State: Florida

Construction Type: Building

County: Miami-Dade County in Florida.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes and apartments up to and including four (4) stories)

Modification Number	Publication Date
0	06/13/2003
1	01/23/2004
2	04/09/2004
3	05/28/2004

* ASBE0060-001 09/01/2003

	Rates	Fringes
Asbestos Worker/Heat and Frost Insulator.....	\$ 23.65	8.79

ELEC0349-001 06/01/2002

Including Fire Alarm Installation

	Rates	Fringes
Electrician (Including Fire Alarm Installation)		
Electrical contracts including materials that are less than \$2,000,000.....	\$ 20.50	4.30 + 8%
Electrical contracts including materials that are over \$2,000,000.....	\$ 22.96	4.30 + 8%

ELEV0071-001 11/01/2001

	Rates	Fringes
Elevator Mechanic.....	\$ 25.285	7.455+A

FOOTNOTE FOR ELEVATOR CONSTRUCTORS:

A: Employer contributes 8% basic hourly rate for 5 years or more of service or 6% basic hourly rate for 6 months to 5 years of service as Vacation Pay Credit; Paid Holidays: New Year's Day; Memorial Day; Independence Day; Thanksgiving Day; Christmas Day, plus the Friday after Thanksgiving.

* ENGI0487-001 07/01/2002

	Rates	Fringes
Power equipment operators:		
Boom Truck Operator.....	\$ 22.40	4.50
Crane (Including Truck Crane).....	\$ 22.40	4.50
Crane Oiler (Including Truck Crane).....	\$ 16.15	4.50
Piledrivers.....	\$ 22.40	4.50

IRON0272-001 04/01/2003

	Rates	Fringes
Ironworkers:		
Ornamental.....	\$ 19.75	4.70
Reinforcing.....	\$ 19.75	4.70
Structural.....	\$ 19.75	4.70

PLUM0519-001 03/16/2003

	Rates	Fringes
Plumber.....	\$ 22.27	5.68

PLUM0725-001 07/16/2003

	Rates	Fringes
Pipefitter (Including HVAC)....	\$ 25.05	6.50

SFFL0821-001 01/01/2003

	Rates	Fringes
Sprinkler Fitter.....	\$ 22.40	6.27

SHEE0032-001 08/12/2003

	Rates	Fringes
Sheet metal worker (Including HVAC duct work)....	\$ 24.24	8.97

SUFL1999-001 03/04/1999

	Rates	Fringes
Acoustical Tile Installer.....	\$ 10.00	0.62
Bricklayer/Blocklayer.....	\$ 15.36	
Carpenter (Including		

Drywall Hanging and Batt Installation).....	\$ 12.90	2.40
Carpet Layer.....	\$ 14.25	
Cement Mason/Concrete Finisher.....	\$ 14.50	3.15
Drywall Finisher.....	\$ 12.50	
Glazier.....	\$ 13.05	2.42
Laborers:		
Pipelayers.....	\$ 13.81	
Plasterer Tenders.....	\$ 10.09	
Unskilled (Including Mason Tending).....	\$ 8.70	
Painter, Brush.....	\$ 9.61	
Plasterer.....	\$ 15.05	
Power equipment operators:		
Backhoe.....	\$ 15.71	2.85
Bulldozer.....	\$ 14.58	2.85
Concrete Pump Operator.....	\$ 14.78	
Grader.....	\$ 15.93	2.85
Loader.....	\$ 15.04	2.85
Roller.....	\$ 12.84	2.85
Rofer.....	\$ 9.99	
Tile Setter.....	\$ 12.50	0.87
Truck Driver.....	\$ 10.95	1.83

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.
=====

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can

be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====
END OF GENERAL DECISION

General Decision Number: FL030032 05/28/2004 FL32

Superseded General Decision Number: FL020032

State: Florida

Construction Types: Heavy

Counties: Broward, Collier, Lee, Martin, Miami-Dade, Palm Beach and St Lucie Counties in Florida.

HEAVY CONSTRUCTION PROJECTS (Excluding Sewer & Water Lines)

Modification Number	Publication Date
0	06/13/2003
1	01/23/2004
2	04/09/2004
3	05/28/2004

CARP1026-002 08/01/2002

	Rates	Fringes
Piledriverman.....	\$ 20.25	4.70

ELEC0323-001 09/05/1993

MARTIN, PALM BEACH, AND ST LUCIE COUNTIES

	Rates	Fringes
Electrician.....	\$ 15.88	21.5%

ELEC0349-002 06/01/2002

DADE COUNTY

	Rates	Fringes
Electricians: Electrical contracts including materials that are \$2,000,000 and over.....	\$ 22.96	4.30+8%
Electrical contracts: including-materials that are less than \$2,000,000.....	\$ 20.50	4.30+8%

ELEC0728-001 09/01/2003

BROWARD AND COLLIER COUNTIES

	Rates	Fringes
Electrician.....	\$ 22.96	3%+6.18

* ELEC0915-001 12/01/2003

LEE COUNTY

	Rates	Fringes
Electrician.....	\$ 21.63	29%+.25

ENGI0487-002 01/01/2004

DADE COUNTY

	Rates	Fringes
Power equipment operators:		
Backhoes, Bulldozers.....	\$ 18.55	7.05
Cranes.....	\$ 22.38	5.30
Oilers.....	\$ 16.30	5.30

ENGI0487-003 01/01/2004

BROWARD, COLLIER, LEE, MARTIN, PALM BEACH, AND ST LUCIE COUNTIES

	Rates	Fringes
Power equipment operators:		
All Tower Cranes and all Cranes with boom length 150 ft and over.....	\$ 22.89	7.05
Cranes with boom length less than 150 ft, Backhoes, and Bulldozers....	\$ 22.17	7.05
Oilers.....	\$ 18.39	7.05

PLUM0630-001 01/01/2003

LEE, MARTIN, PALM BEACH, AND ST LUCIE COUNTIES

	Rates	Fringes
Pipefitter.....	\$ 26.61	5.91

PLUM0725-002 01/16/2001

BROWARD AND DADE COUNTIES

	Rates	Fringes
Pipefitter.....	\$ 23.10	5.90

SUFL1990-006 01/26/1990

	Rates	Fringes
--	-------	---------

Carpenter.....	\$ 12.71	2.71
Cement Mason.....	\$ 10.50	
Laborer.....	\$ 5.72	
Power equipment operators:		
Loaders.....	\$ 11.25	2.55

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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WAGE DETERMINATION APPEALS PROCESS

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- * an existing published wage determination
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On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

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4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

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SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SUMMARY

This section describes how Line Items will be measured and paid for progress payments. Work to be measured is described in specification sections listed for each Line Item. Measurement procedures for payment, required quantity survey or procurement documentation and payment restrictions are described in applicable specification sections. Allocate costs for work not specifically mentioned to the Line Item most closely associated with work involved. Unless there is a specific Line Item for administrative costs, such as Quality Control and Safety, allocate such costs proportionally across all Line Items.

1.2 DEFINITIONS

The terms "Contract Line Item Number (CLIN)" and "Line Item" are interchangeable herein (e.g.: CLIN 0001 is Line Item 0001). The term "CLIN" is a contracting term used in the Quality Control System (QCS) payment data base. See Section 01312 QUALITY CONTROL SYSTEM (QCS).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Transmit submittal items in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Schedule of Values; G|COR

Provide a breakdown of lump sum items into proposed pay activities. Schedule of Values will become basis for CLIN and Pay Activity data in the QCS payment data base.

SD-07 Certificates

Invoices

Submit invoices from Florida Power and Light Company for establishment of electrical service under Line Item 0003AB, and BellSouth for establishment of telephone service under Line Item 0003AC after completion of work for each. Invoices shall indicate the Contractor's payment for services rendered.

1.4 LUMP SUM PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the LINE ITEMS AND PRICING SCHEDULE and

described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.4.1 Pump Station (Line Item 0003)

Payment will be made under Line Item 0003AA "Construction" for all costs associated with or incidental to pump station construction not in other bid items, including riprap, steel sheet pile walls, concrete placement, rock anchors, substructure, superstructure, mechanical work, pumping equipment, fuel system, electrical and control work, water well, test hole, well pump and piping to the building, sanitary holding tank and piping to the building, monitoring wells, levee construction, excavation and backfilling, equipment pads outside the building, pavement, aggregate surfacing, seeding, sodding, grading, concrete ramps, signs, barriers, and fences. Payment will also include actual cost for establishment of electrical service by Florida Power and Light Company under Line Item 0003AB "Electrical Service", and establishment of telephone service by BellSouth under Line Item 0003AC "Telephone Service" after the Government Receives valid invoices for these services (see paragraph SUBMITTALS above). The Contractor will be reimbursed no more than the amount indicated on the invoices under Line Items 0003AB and 0003AC. No payment will be made for establishment of electrical or telephone service prior to completion of this work and receipt of valid invoices by the Government.

1.4.2 Culvert Structures (Line Item 0006)

Payment will be made for costs associated with or incidental to all demolition, excavation, foundation preparation, furnishing and installation of the culvert structure, placing backfill, paving, and guardrails.

1.4.3 Traffic Control and Signage (Line Item 0007)

Payment will be made for costs associated with or incidental to furnishing, installing, and removing all temporary traffic control devices and features for temporary detours required for the full duration of culvert installations required under the contract. Also, payment will be made for costs associated with or incidental to furnishing and installing Type I and Type II dead end signs.

1.4.4 Aggregate Paving for Access Road (Line Item 0010)

Payment will be made for costs associated with or incidental to furnishing and constructing required aggregate paving.

1.4.5 Concrete Apron for Weirs (Line Item 0011)

Payment will be made for all costs associated or incidental to placement of concrete aprons levees to form three weirs, including preparation of levee subgrade.

1.5 UNIT PRICE PAYMENT ITEMS

Payment items for the work of this contract on which the contract unit price payments will be made are listed in the LINE ITEMS AND PRICING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

1.5.1 Excavation, ~~Unclassified~~ Common (Line Item 0001)

1.5.1.1 Payment

Payment will be made for costs associated with or incidental to excavation, transportation, and disposal of materials for channel, structure, and utilities; providing and maintaining access to the work site(s) and disposal area(s); removal of utility cable; noise control; debris removal; and, monitoring the eastern indigo snake.

1.5.1.2 Measurement

a. The maps and/or drawings already prepared (paragraph CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS of Section 00800 SPECIAL CONTRACT REQUIREMENTS) are believed to represent accurately average existing conditions, but the depths shown thereon may be verified. Determination of quantities removed and the deductions made therefrom to determine quantities by place measurement to be paid for in the area specified, after having once been made, will not be reopened, except on evidence of collusion, fraud, or obvious error.

b. The total amount of material removed, and to be paid for under the contract, will be measured by the cubic yard in place and quantities determined by the average end area method.

1.5.1.3 Unit of Measure

Cubic yard.

1.5.2 Excavation, Rock (Line Item 0002)

1.5.2.1 Payment

Payment will be made for costs associated with or incidental to drilling, blasting, excavation, transportation, embankment, fill, compaction, and disposal of rock for channel, structure, and utilities, and noise control.

1.5.2.2 Measurement

a. The maps and/or drawings already prepared (paragraph CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS of Section 00800 SPECIAL CONTRACT REQUIREMENTS) are believed to represent accurately average existing conditions, but the depths shown thereon may be verified. Determination of quantities removed and the deductions made therefrom to determine quantities by place measurement to be paid for within a specified reach or section, after having once been made, will not be reopened, except on evidence of collusion, fraud, or obvious error.

b. The total amount of material removed, and to be paid for under the contract, will be measured by the cubic yard in place and quantities determined by the average end area method.

1.5.2.3 Unit of Measure

Cubic yard.

1.5.3 Common Excavation (Line Items 0004 and 0009)

1.5.3.1 Payment

Payment will be made for costs associated with or incidental to clearing, grubbing, stripping, excavation, transportation, embankment, levee fill and compaction, and disposal of materials, filling and capping wells encountered, providing and maintaining access to the work site(s) and disposal area(s), removal of utility cable, noise control, and debris removal.

1.5.3.2 Measurement

The total amount of material removed, and to be paid for under this contract, will be measured by the volume in place prior to excavation with quantities determined by the average end area method. The Government will perform initial and final surveys in accordance with the clause QUANTITY SURVEYS of Section 00700 CONTRACT CLAUSES. Cross sections will be taken at an 100-foot interval. The cross sections used for calculation of final quantities will be determined from the original survey performed by the Government after clearing and before excavation, and the finished grades shown on the drawings. The final survey performed by the Government will be used to verify that excavation and embankment/levee fill are complete to the required finished grades, and that tolerances have not been exceeded. Embankment and levee fill will not be included in quantities calculated for final payment. Excavation below required finished grades will not be included in quantities calculated for final payment. The estimated quantity for this line item does not include tolerances. The Contractor is responsible for considering the cost of required tolerances, and including this cost in the unit price for this line item (See Section 00010A LINE ITEMS AND PRICING SCHEDULE). Cross sections used for calculation of quantities for progress payments will be determined from the original survey performed by the Government, and elevations above finished grade obtained from progress surveys performed by the Contractor in accordance with the clause QUANTITY SURVEYS of Section 00700 CONTRACT CLAUSES.

1.5.3.3 Unit of Measure

Cubic yard.

1.5.4 Rock Excavation (Line Item 0005)

1.5.4.1 Payment

Payment will be made for costs associated with or incidental to drilling, blasting, excavation, transportation, embankment, levee fill, compaction and disposal of rock, and noise control.

1.5.4.2 Measurement

The total amount of rock removed, and to be paid for under this contract,

will be measured by the volume in place prior to excavation with quantities determined by the average end area method. The Government will perform initial and final surveys in accordance with the clause QUANTITY SURVEYS of Section 00700 CONTRACT CLAUSES. Cross sections will be taken at an 100-foot interval. The cross sections used for calculation of final quantities will be determined from the original survey performed by the Government after clearing and before excavation, and the finished grades shown on the drawings. The final survey performed by the Government will be used to verify that excavation is complete to the required finished grades, and that tolerances have not been exceeded. Excavation below required finished grades will not be included in quantities calculated for final payment. The estimated quantity for this line item does not include tolerances. The Contractor is responsible for considering the cost of required tolerances, and including this cost in the unit price for this line item (See Section 00010A LINE ITEMS AND PRICING SCHEDULE). Cross sections used for calculation of quantities for progress payments will be determined from the original survey performed by the Government, and elevations above finished grade obtained from progress surveys performed by the Contractor in accordance with the clause QUANTITY SURVEYS of Section 00700 CONTRACT CLAUSES.

1.5.4.3 Unit of Measure

Cubic yard.

1.5.5 Seeding (Line Items 0008 and 0012)

1.5.5.1 Payment

Payment will be made for costs associated with or incidental to furnishing, planting, and maintaining seed, that results in a healthy stand of grass cover as required, including the provision and use of equipment, erosion control methods and materials, fertilizers, soil amendments, mulch, pesticides, and water.

1.5.5.2 Measurement

The actual horizontal area that receives seed will be measured for payment.

1.5.5.3 Unit of Measure

Acre.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 PAYMENT PROCEDURES

See Section 01312 QUALITY CONTROL SYSTEM (QCS) for in-depth payment procedure instructions. Upon receiving initial Resident Management System import file, go to "Pay Activities" and establish a link between bid breakdown schedule of values of "Pay Activities" to contract CLINs using "Schedule Activities" data entry page.

3.1.1 Requesting Progress Payment

For progress payments, ensure "Activity Schedule", "Feature Schedule", submittal register, and punchlists are all up to date. Use "Progress

Payments" to "request Activity Earnings" for both "Activity Earnings" data entry page and "Other Earning". Provide hard copies of supporting invoices and quantity measurements to support all requested earnings. Ensure that sum of payment activities do not exceed contract award CLIN funding amounts, or "unbalanced" CLINs error will prevent processing the payment.

3.1.2 Options and Modification CLINS

When additional work is added by modification, existing CLINs funding amounts must be updated, or new CLINs for modification will be created. If contract has option CLINs not yet awarded, option CLINs will appear as zero dollar CLINs until option is awarded by modification. No payment may be requested for Options or Modification CLINs until contract modification has been funded and signed.

-- End of Section --

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		01270	SD-01 Preconstruction Submittals														
			Schedule of Values		G COR												
			SD-07 Certificates														
			Invoices														
		01310	SD-01 Preconstruction Submittals														
			List of Subcontractors														
			Signature Authority														
			Drug-Free Work Place Record														
		01312	SD-01 Preconstruction Submittals														
			First QCS Export		G COR												
		01320	SD-01 Preconstruction Submittals														
			Preliminary Project Schedule		G COR												
			(PPS)														
			Initial PPS		G COR												
			SD-07 Certificates														
			Periodic Schedule Updates	3.4.3	G COR												
		01330	SD-01 Preconstruction Submittals														
			Export File		G COR												
		01355	SD-01 Preconstruction Submittals														
			Environmental Protection Plan		G PD												
			Eastern Indigo Snake Observer		G PD												
			SD-11 Closeout Submittals														
			Logs/Final Summary Report														
			FIO														
			Eastern Indigo Snake Monitoring Report														

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		01355	Project Environmental Summary Sheet														
		01451	SD-01 Preconstruction Submittals														
			Laboratory Qualifications	3.7.2	G COR												
			Contractor Quality Control (CQC) Plan	3.2	G COR												
			Letter of Authority	3.2.2													
		01500	SD-01 Preconstruction Submittals														
			Mobilization/Demobilization Plan														
			Security Plan	3.7													
			Manufacturer's Literature for Equipped Boat, Trailer, and Hand-Held Radios														
			SD-02 Shop Drawings														
			Contractor's Temporary Facilities	3.6													
			Contracting Officer's Field Office Trailer	2.1													
			Temporary Electric Drawings														
			Construction Drawings		G COR												
		01525	SD-01 Preconstruction Submittals														
			Accident Prevention Plan (APP)	1.6	G COR												
			Activity Hazard Analyses (AHA)	1.7	G COR												
			Employee Safety and Health Indoctrination (ESHI) and Training Plan														
			Hazard Communication Plan	1.9													

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		01525	Emergency Response Plan	1.11													
			Hurricane and Severe Storm Plan	1.10	G COR												
			Dive Operations Plan		G COR												
			Critical Lift Plan		G COR												
			Confined Space Plan	1.14	G COR												
			Spill Response Plan		G COR												
			Blasting Safety Plan		G COR												
			SD-04 Samples														
			Sample Scaffold														
			SD-07 Certificates														
			Safety Officer Qualifications	1.16.1	G COR												
			Crane Equipment	1.21.5													
		01550	SD-01 Preconstruction Submittals														
			Traffic Control Plan		G COR												
		01780	SD-02 Shop Drawings														
			As-Built Drawings	1.2.1	G COR												
			SD-03 Product Data														
			As-Built Record of Equipment and Materials	1.2.2	G ED												
			Warranty Management Plan	1.3.1	G ED												
			Warranty Tags	1.3.5	G ED												
			Final Cleaning	1.6	G ED												
		01810	SD-01 Preconstruction Submittals														
			Commissioning Team		G COR												
			SD-03 Product Data														
			Tests		G COR												

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		01810	Test Schedule		G COR												
			SD-06 Test Reports														
			Test Reports		G COR												
		02164	SD-01 Preconstruction Submittals														
			Employee Experience														
			SD-02 Shop Drawings														
			Load Test Set-Up														
			Installation		G ED												
			SD-06 Test Reports														
			Grouting Records														
			Anchor Test Results														
			Core Log of Each Hole														
			Grout Compression Tests														
			Installation														
			SD-07 Certificates														
			Threadbars		G ED												
			Grout Ingredients		G ED												
			Test Jacks and Gages		G ED												
		02222	SD-01 Preconstruction Submittals														
			Shot Plans		G COR												
		02230	SD-03 Product Data														
			Materials Other Than Salable		G COR												
			Timber														
		02315	SD-06 Test Reports														
			Testing	3.12													
		02316	SD-06 Test Reports														

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		02316	Field Density Tests	3.4.3	G ED												
		02331	SD-03 Product Data														
			Earthwork		G EN												
			Excavation		G COR												
			Plan of Operations		G COR												
			Nuclear Density		G COR												
			SD-06 Test Reports														
			Testing		G EN												
			Nuclear Density Test Report		G ED												
			Measurement of Fill Material		G COR												
			SD-07 Certificates														
			Testing		G EN												
		02380	SD-03 Product Data														
			Riprap	2.2.2	G ED												
			SD-04 Samples														
			Stone		G ED												
			SD-06 Test Reports														
			Gradation Test	2.2.1.2	G ED												
			SD-07 Certificates														
			Stone		G ED												
			Weigh Scale Certification														
			Certified Weight Scale Tickets														
		02464	SD-02 Shop Drawings														
			Metal Sheet Piling	2.1	G COR												
			Driving	3.1.4													
			SD-03 Product Data														

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		02464	Pile Driving Equipment	3.1.1	G COR												
			Pulling and Redriving	3.1.7	G COR												
			SD-06 Test Reports														
			Materials Tests	2.3.1													
		02510	SD-03 Product Data														
			Installation	3.1													
			Waste Water Disposal Method		G ED												
			Satisfactory Installation														
			SD-06 Test Reports														
			Bacteriological Disinfection	3.3.1													
		02521	SD-01 Preconstruction Submittals														
			Qualifications	1.5													
			Permits														
			SD-02 Shop Drawings														
			Installation Diagrams	3.13.2	G ED												
			Submersible Well Pump		G ED												
			Assembly														
			Electrical Well Pump Controls		G ED												
			SD-03 Product Data														
			Well Installation Plan	1.4	G ED												
			Catalog Data		G ED												
			SD-06 Test Reports														
			Survey Maps and Notes	3.13.6													
			Boring Logs														
			Well Development Records	3.13.3													

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		02521	Decommissioning/Abandonment Records	3.12													
			Project Photographs	3.13.5													
			Water Source	3.2.1	G ED												
			Filter Pack	2.3													
			Tests	3.5													
			SD-10 Operation and Maintenance Data														
			Operation and Maintenance Manuals		G ED												
		02522	SD-02 Shop Drawings														
			Installation Diagrams	3.7.2	G ED												
			Survey Maps and Notes	3.7.4													
			SD-03 Product Data														
			Borehole Logs	3.7.1													
			Well Development Records	3.7.3													
			Monitoring Wells		G ED												
			Permits	1.8													
			Installation Plan	1.5	G COR												
			SD-06 Test Reports														
			Water Source	3.2.2													
			Filter Pack	2.4													
			Drilling Fluid Additive	3.3.1													
		02635	SD-07 Certificates														
			Mill Analyses Certificate														
			SD-08 Manufacturer's Instructions														

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		02635	Assembly Instructions														
		02741	SD-03 Product Data														
			Mix Design	2.3	G CO												
			Contractor Quality Control	3.9	G												
			CO														
			Material Acceptance and Percent Payment		G												
			SD-06 Test Reports														
			Aggregates	2.1	G CO												
			QC Monitoring	3.9.3.10													
			SD-07 Certificates														
			Asphalt Cement Binder	2.2	G CO												
			Testing Laboratory	3.5	G CO												
		02748	SD-03 Product Data														
			Waybills and Delivery Tickets		G COR												
			SD-06 Test Reports														
			Sampling and Testing	3.7	G COR												
		02821	SD-07 Certificates														
			Chain Link Fence	2.1.1	G COR												
		02921	SD-03 Product Data														
			Equipment	3.1.2													
			Equipment	3.1.2													
			Surface Erosion Control Material	2.6													
			Chemical Treatment Material	1.3.3													
			Delivery	1.3.1													
			Finished Grade	3.2.1													

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		02921	Quantity Check	3.5	G COR												
			Seed Establishment Period	3.9	G COR												
			Maintenance Record	3.9.3.5													
			Application of Pesticide	3.6	G COR												
			SD-04 Samples														
			Soil Amendments	2.2													
			Mulch	2.3													
			SD-06 Test Reports														
			Equipment Calibration	3.1.2	G COR												
			Soil Test	3.1.3													
			SD-07 Certificates														
			Seed	2.1	G COR												
			pH Adjuster	2.2.1	G COR												
			Fertilizer	2.2.2	G COR												
			Organic Material	2.2.4	G COR												
			Soil Conditioner	2.2.5	G COR												
			Mulch	2.3	G COR												
			Asphalt Adhesive		G COR												
			Pesticide	2.5	G COR												
		02922	SD-03 Product Data														
			Delivery	1.4.1													
			Finished Grade and Topsoil	3.2.1													
			Topsoil	2.2													
			Quantity Check	3.4													
			Sod Establishment Period	3.7													
			Maintenance Record	3.7.3.4													

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		02922	SD-06 Test Reports														
			Equipment Calibration	3.1.3													
			Soil Test	3.1.4													
			SD-07 Certificates														
			Sod	2.1													
			Topsoil	2.2													
			Fertilizer	2.3.1													
		03100	SD-02 Shop Drawings														
			Formwork	3.1.1	G ED												
			SD-03 Product Data														
			Design	1.3	G ED												
			Form Materials	2.1	G ED												
		03151	SD-03 Product Data														
			Splicing Waterstops	2.2.2													
			SD-04 Samples														
			Field Molded Sealants and Primer	2.1.2.1													
			Waterstops	2.1.3													
			SD-06 Test Reports														
			Premolded Expansion Joint Filler Strips	2.1.1													
		03201	SD-02 Shop Drawings														
			Fabrication and Placement	3.1													
			SD-06 Test Reports														
			Material														
			Tests, Inspections, and Verifications														

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		03230	SD-02 Shop Drawings														
			Installation Drawings	3.1.2	G ED												
			SD-03 Product Data														
			Prestressing Method and Equipment	3.1.1	G ED												
			Materials Disposition Records	3.3													
			Prestressing Operations Records	3.1.8													
			SD-06 Test Reports														
			Stressing Tendons and Accessories	2.1													
			SD-07 Certificates														
			Certification of Prestressing Technicians	1.3													
		03301	SD-02 Shop Drawings														
			Lift Drawings														
			SD-03 Product Data														
			Concrete Mixture Proportioning	2.2	G ED												
			Batch Plant	3.1.2													
			Concrete Mixers	3.1.3	G COR												
			Capacity	3.1.1	G COR												
			Conveying Equipment and Methods		G COR												
			Placing Equipment and Methods		G COR												
			Testing Technicians	3.8.1	G COR												
			Concrete Construction Inspector		G COR												
			Construction Joint Treatment	3.2.3													

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		03301	Curing and Protection	3.5													
			Hot-Weather Placing	3.3.4													
			Underwater Concrete Methods and Equipment		G COR												
			Dewatering Methods and Equipment														
			Level 1 Quality Control Plan		G COR												
			SD-04 Samples														
			Curing Compound		G COR												
			SD-06 Test Reports														
			Quality of Aggregates														
			Mixer Uniformity	3.8.6													
			Tests and Inspections	3.8													
			SD-07 Certificates														
			Cementitious Materials	2.1.1													
			Fly Ash														
			Impervious-Sheet Curing Materials	2.1.4.1													
			Air-Entraining Admixture														
			Other Chemical Admixtures														
			Membrane-Forming Curing Compound	2.1.4.2													
			Epoxy Resin	2.1.8													
			Latex Bonding Compound	2.1.7													
			Nonshrink Grout	2.1.6													
		03415	SD-02 Shop Drawings														

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		03415	Erection	3.10	G ED												
			SD-03 Product Data														
			Erection Plan	3.10.5	G ED												
			Design Calculations	1.3.1.3	G ED												
			Concrete Mixture Proportions	2.2	G ED												
			Construction Records	3.11													
			SD-06 Test Reports														
			Materials	2.1													
			Concrete	1.3.2.2													
			SD-07 Certificates														
			Cement	2.1.1													
			Pozzolan	2.1.2													
			Air-Entraining Admixture														
			Aggregates	2.1.3.1													
			Air Content	1.3.2.3													
		04200	SD-02 Shop Drawings														
			Masonry Work	1.4													
			SD-03 Product Data														
			Concrete Masonry Units														
			SD-04 Samples														
			Concrete Masonry Units (CMU)	2.2													
			Anchors, Ties, and Bar Positioners	2.6													
			Expansion-Joint Materials	2.10													
			Joint Reinforcement	2.7													
			SD-06 Test Reports														

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		04200	Field Testing of Mortar	3.15.1													
			Field Testing of Grout	3.15.2													
			Prism tests	3.15.3													
			Masonry Cement	2.4													
			Special Inspection	1.4													
			SD-07 Certificates														
			Concrete Masonry Units (CMU)	2.2													
			Control Joint Keys	2.9													
			Anchors, Ties, and Bar Positioners	2.6													
			Expansion-Joint Materials	2.10													
			Joint Reinforcement	2.7													
			Reinforcing Steel Bars and Rods	2.8													
			Masonry Cement	2.4													
		05055	SD-02 Shop Drawings														
			Detail Drawings	1.3	G ED												
			SD-03 Product Data														
			Welding of Structural Steel	2.2.2.1	G ED												
			Welding of Aluminum	2.2.2.4	G ED												
			Structural Steel Welding Repairs	2.3.4	G ED												
			Materials Orders	2.1.1													
			Materials List	2.1.2													
			Shipping Bill	2.1.3													
			SD-06 Test Reports														
			Tests, Inspections, and Verifications	2.3													

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		05055	SD-07 Certificates														
			Qualification of Welders and Welding Operators	1.4													
			Application Qualification for Steel Studs	2.2.2.5	G ED												
			Welding of Aluminum	2.2.2.4													
		05500	SD-02 Shop Drawings														
			Miscellaneous Metal Items	1.6	G ED												
		05502	SD-02 Shop Drawings														
			Shop Fabricated Metal Items	2.2	G ED												
			SD-03 Product Data														
			Miscellaneous Metals and Standard Metal Articles	2.1	G ED												
			Shop Fabricated Metal Items	2.2	G ED												
			SD-06 Test Reports														
			Miscellaneous Metals and Standard Metal Articles	2.1													
			Shop Fabricated Metal Items	2.2													
		05615	SD-02 Shop Drawings														
			Detail Drawings	2.3.1	G ED												
			SD-03 Product Data														
			Welding	2.3.3													
			Materials	2.1													
			Materials Disposition Records														
			SD-06 Test Reports														

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		05615	Tests, Inspections, and Verifications	2.4													
		06410	SD-02 Shop Drawings														
			Shop Drawings	1.7	G ED												
			Installation	3.1	G ED												
			SD-03 Product Data														
			Wood Materials	2.1	G ED												
			SD-04 Samples														
			Plastic Laminates	2.2	G ED												
			Cabinet Hardware	2.4	G ED												
			SD-07 Certificates														
			Quality Assurance	1.4	G ED												
			Laminate Clad Casework	3.1	G ED												
		07220	SD-03 Product Data														
			Application of Insulation	3.6	G ED												
			Inspection	3.7	G ED												
			SD-07 Certificates														
			Insulation	2.2	G ED												
		07551	SD-03 Product Data														
			EVT and Flash Point	3.6	G ED												
			Materials	3.15	G ED												
			Installation	3.9	G ED												
			SD-06 Test Reports														
			Test		G ED												
			SD-07 Certificates														
			Manufacturer	1.2	G ED												

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		07551	Materials	3.15	G ED												
		07600	SD-02 Shop Drawings														
			Materials	2.1	G ED												
		07920	SD-03 Product Data														
			Sealants	2.1													
			Primers	2.2													
			Bond breakers	2.3													
			Backstops	2.4													
		08110	SD-02 Shop Drawings														
			Doors	2.1	G ED												
			Frames	2.3	G ED												
			Accessories														
			Weatherstripping	2.4													
			SD-03 Product Data														
			Doors	2.1	G ED												
			Frames	2.3	G ED												
			Accessories														
			Certified Test Data		G ED												
			SD-04 Samples														
			Factory-applied enamel finish		G ED												
		08330	SD-02 Shop Drawings														
			Overhead Rolling Door Unit		G ED												
			SD-03 Product Data														
			Overhead Rolling Door Unit		G ED												
			SD-06 Test Reports														
			Tests		G ED												

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		08330	SD-04 Samples														
			Overhead Rolling Door Unit		G ED												
			SD-10 Operation and Maintenance Data														
			Operation Manual		G ED												
			Maintenance and Repair Manual		G ED												
		08710	SD-02 Shop Drawings														
			Hardware schedule	1.3	G ED												
			Keying system	2.3.4													
			SD-03 Product Data														
			Hardware items	2.3	G ED												
			SD-08 Manufacturer's Instructions														
			Installation	3.1													
			SD-10 Operation and Maintenance Data														
			Hardware Schedule	1.3	G ED												
			SD-11 Closeout Submittals														
			Key bitting	1.4													
		08810	SD-02 Shop Drawings														
			Installation	3.2	G ED												
			SD-03 Product Data														
			Insulating Glass		G ED												
			Glazing Accessories	2.4	G ED												
			Plastic Glazing		G ED												
			SD-07 Certificates														
			Insulating Glass		G ED												

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		09100	SD-03 Product Data Metal support systems	2.1	G ED												
		09225	SD-02 Shop Drawings Lathing and Stucco		G ED												
			SD-03 Product Data Materials	1.3	G ED												
			SD-04 Samples Textured Stucco Finish Coat		G ED												
		09250	SD-03 Product Data Water-Resistant Gypsum Backing Board	2.1.2													
			Accessories	2.1.5													
			SD-07 Certificates Asbestos Free Materials	2.1	G ED												
		09310	SD-03 Product Data Tile	2.1	G ED												
			Setting-Bed		G ED												
			Mortar, Grout, and Adhesive	2.3	G ED												
			SD-04 Samples Tile	2.1	G ED												
		09510	SD-03 Product Data Acoustical Ceiling Systems		G ED												
			SD-04 Samples Acoustical Units	2.1	G ED												
		09900	SD-02 Shop Drawings Piping identification	3.8													

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		09900	stencil	3.8													
			SD-03 Product Data														
			Coating	2.1	G ED												
			Manufacturer's Technical Data Sheets	2.1													
			Manufactured labels for piping identification														
			Piping Legend														
			Valve Identification List														
			SD-04 Samples														
			Color	1.8	G ED												
			SD-07 Certificates														
			Applicator's qualifications	1.3													
			Qualification Testing		G ED												
			SD-08 Manufacturer's Instructions														
			Application instructions														
			Mixing	3.5.2													
			Manufacturer's Material Safety Data Sheets	1.6.2													
			SD-10 Operation and Maintenance Data														
			Coatings:	2.1	G ED												
		09915	SD-04 Samples														
			Color Schedule	2.2	G ED												
		09965	SD-03 Product Data														
			Inspections and Operations		G ED												

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		09965	Qualifications	1.4	G ED												
			Safety and Health Provisions	1.6	G SO												
			Ventilation	1.6.6.1	G SO												
			Respirators	1.6.7.1	G SO												
			Airborne Sampling Plan		G SO												
			Paint Application	1.6.6	G SO												
			Medical Status	1.7	G												
			SD-04 Samples														
			Special Paint Formulas	2.1	G ED												
		10201	SD-02 Shop Drawings														
			Wall louvers	2.2	G ED												
			SD-06 Test Reports														
			Test Data and Certification														
		10716	SD-02 Shop Drawings														
			Roll shutters	2.2.1													
			SD-03 Product Data														
			Roll shutters	2.2.1													
			SD-06 Test Reports														
			Test Data														
			SD-10 Operation and Maintenance														
			Data														
			Shutters	2.2	G ED												
		10800	SD-03 Product Data														
			Finishes	2.1.2	G ED												
			Accessory Items	2.2	G ED												
		11150	SD-02 Shop Drawings														

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		11150	Wiring and Schematic Diagrams		G ED													
			SD-03 Product Data															
			Trash Rake/Rack System		G ED													
			Spare Parts Data															
			SD-06 Test Reports															
			Electrification System Tests															
			Acceptance Testing															
			SD-07 Certificates															
			Electric Motors															
			Wiring															
			Contact Conductors															
			Controls															
			Overcurrent Protection															
			Grounding															
			Trash Rake/Rack System and Controls															
			Sample Rake System															
			Thermal Monitoring of Motor Components															
			SD-10 Operation and Maintenance Data															
			Operation Manuals		G ED													
			Maintenance Manuals		G ED													
		11242	SD-02 Shop Drawings															
			Installation	3.1	G ED													
			SD-03 Product Data															

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		11242	Chemical Feed System	1.3	G ED												
			Chemical Feed System	1.3	G ED												
			Material Safety Data Sheet														
			Framed Instructions	3.4													
			Auxiliary Equipment and Spare Parts	1.6													
			SD-06 Test Reports														
			Field Testing	3.3													
			SD-07 Certificates														
			Chemicals	2.1													
			SD-10 Operation and Maintenance Data														
			Chemical Feed System	1.3	G ED												
		13100	SD-02 Shop Drawings														
			Drawings		G ED												
			SD-07 Certificates														
			Materials	2.1	G ED												
		13202	SD-02 Shop Drawings														
			Fueling System	3.3.2.1	G ED												
			Monitoring Systems		G ED												
			SD-03 Product Data														
			Fueling System	3.3.2.1	G ED												
			Permitting	1.5.1	G ED												
			Registration	1.5.2													
			Spare Parts Data														
			Installation	3.1													

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		13202	Framed Instructions	3.1.6													
			Experience	1.4.1													
			Welding	1.4.2													
			SD-06 Test Reports														
			Tests	3.2													
			SD-10 Operation and Maintenance														
			Data														
			Operation Manuals		G ED												
			Maintenance Manuals	3.4	G ED												
		13702	SD-02 Shop Drawings														
			IDS components	1.6.1.1	G ED												
			Overall system schematic	1.6.1.2	G ED												
			SD-03 Product Data														
			Interior point sensors	2.5.12.1	G ED												
			Interior volumetric (space) sensors	2.5.12.2	G ED												
			Keypad	2.4.14.2	G EDO												
			cables	3.1.7	G ED												
			Communications interface	2.5.13	G ED												
			devices														
			Siren	2.5.15	G ED												
			Batteries	2.4.5.2	G ED												
			Tamper switches	2.4.4.2	G ED												
			Tamper switches	3.1.4	G ED												
			SD-06 Test Reports														
			IDS operational test	3.2.1	G ED												

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		13702	final test	3.2.2.2	G ED												
			SD-07 Certificates														
			IDS operational test plan	1.6.3	G ED												
			Installer's qualifications	1.6.2.1	G ED												
			Instructor's qualifications	1.6.2.2	G ED												
			Year 2000 (Y2K) Compliance Warranty	1.7.1	G ED												
			IDS equipment	1.6.4	G ED												
			SD-10 Operation and Maintenance Data														
			IDS	2.2	G ED												
			SD-11 Closeout Submittals														
			Posted operating instructions	3.2.2.5	G ED												
		13850	SD-02 Shop Drawings														
			Fire Alarm Reporting System	1.4.1	G ED												
			SD-03 Product Data														
			Storage Batteries	2.2	G ED												
			Voltage Drop		G ED												
			Spare Parts	2.7.3	G ED												
			Technical Data and Computer Software	1.5	G ED												
			Training	3.5	G ED												
			Testing	3.4	G ED												
			SD-06 Test Reports														
			Testing	3.4	G ED												
			SD-07 Certificates														

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		13850	Equipment		G ED												
			Qualifications	1.3.7	G ED												
			SD-10 Operation and Maintenance Data														
			Technical Data and Computer Software	1.5	G ED												
		14602	SD-02 Shop Drawings														
			Wiring and Schematic Diagrams		G ED												
			SD-03 Product Data														
			Hoist Hook Assembly	2.2.2	G ED												
			Heat Treatment														
			Bridge Crane System		G ED												
			Hoist	2.1	G ED												
			Spare Parts														
			SD-06 Test Reports														
			Electrification System Tests	3.2													
			Acceptance Testing	3.3													
			SD-07 Certificates														
			Hoist	2.1													
			Hoist	2.1													
			Track Design														
			Hoist controls	2.1.1													
			Hoist controls	2.1.1													
			Motor Controller	2.7.2													
			Electric Hoists														
			Trolleys	2.3													

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		14602	Wiring	2.7													
			Contact Conductors	2.7.1.1													
			Overcurrent Protection	2.7													
			Grounding	2.7													
			SD-10 Operation and Maintenance Data														
			Operation Manuals		G ED												
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		15005	SD-02 Shop Drawings														
			Speed Reducers	1.4.1	G ED												
			Lubrication System	2.8	G ED												
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			Bearings	2.2	G ED												
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			Shafts	2.4	G ED												
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			Housing	2.7	G ED												
			Lubrication System	2.8	G ED												
			Instrumentation	2.9	G ED												
			Speed Reducers	1.4.1	G ED												
			Lubricant	2.8.7	G ED												
			SD-06 Test Reports														
			Shop Testing	3.1.1													

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		15005	Field Testing	3.1.3													
			SD-10 Operation and Maintenance Data														
			Operation and Maintenance Manual		G ED												
		15131	SD-02 Shop Drawings														
			Drawings		G ED												
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			Materials	2.1	G ED												
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			Total Head		G ED												
			Shipping Bills	1.4.1													
			Dynamic Analysis	2.6.1	G ED												
			Dynamic Analysis	2.6.1.1	G ED												
			Pump Frame Anchor Bolt Design		G ED												
			Pump Base Plate Design		G ED												
			Installation and Erection	3.1													
			Instructions Manual														
			Instructions and Procedures														
			SD-04 Samples														
			Materials	2.1	G ED												
			SD-06 Test Reports														
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			Factory Test	2.6.2													

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		15131	Welding Procedures and Qualifications														
			Examination of Castings														
			SD-10 Operation and Maintenance Data														
			Operation and Maintenance Instructions Manual		GED												
		15133	SD-02 Shop Drawings														
			Layout and Shop Drawings		GED												
			Installation	3.1	GED												
			As-Built Drawings		GED												
			SD-03 Product Data														
			Diesel Engine	2.2	GED												
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			Dynamic Analysis of Engine, Pump, and Governor		GED												
			Project/Site Conditions	1.7													
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			Manufacturer's Published Instructions	3.4.3.3													
			Field Engineer	3.5.2													
			Diesel Engine Pump Drive		GED												
			Welder Qualifications	1.4													
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		15133	SD-07 Certificates Pressure Vessels														
			Regulatory Requirements	1.5													
			Air General Permit	1.5.2													
			SD-10 Operation and Maintenance Data														
			Diesel Engine	2.2	G ED												
		15400	SD-02 Shop Drawings Plumbing System	3.8.1	G ED												
			Electrical Schematics		G ED												
			SD-03 Product Data Welding	1.3.1													
			Plumbing Fixture Schedule	3.9													
			SD-06 Test Reports Tests, Flushing and Disinfection	3.8													
			Backflow Prevention Assembly Tests														
			SD-07 Certificates Materials and Equipment														
			SD-10 Operation and Maintenance Data														
			Plumbing System	3.8.1	G ED												
		15653	SD-02 Shop Drawings Air-Conditioning System		G ED												
			SD-03 Product Data Air-Conditioning System		G ED												

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		15653	Spare Parts Data														
			SD-06 Test Reports														
			Tests	3.2													
			System Performance Tests	3.2.2													
			SD-07 Certificates														
			Air-Conditioning System														
			Service Organizations														
			SD-10 Operation and Maintenance														
			Data														
			Operation Manual		G ED												
			Maintenance Manuals		G ED												
		15895	SD-02 Shop Drawings														
			Drawings	3.1.1	G ED												
			Installation	3.1	G ED												
			SD-03 Product Data														
			Components and Equipment	2.1	G ED												
			Test Procedures														
			System Diagrams		G ED												
			Test Schedules														
			Field Training Schedule														
			SD-06 Test Reports														
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			SD-10 Operation and Maintenance														
			Data														
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			Ventilation, and Exhaust Manuals														

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		16120	SD-03 Product Data														
			Installation Instructions	2.3	G ED												
			SD-06 Test Reports														
			Tests, Inspections, and Verifications	2.4	G ED												
		16221	SD-02 Shop Drawings														
			Motors		G ED												
			SD-03 Product Data														
			Insulated Windings	2.1.5	G ED												
			Duty Cycle		G ED												
			Motor Design Curves		G ED												
			Motors		G ED												
			Government Study Design Data		G ED												
			Spare Parts List														
			SD-07 Certificates														
			Power Factor and Efficiency		G ED												
			Factory Tests	3.1	G ED												
			SD-09 Manufacturer's Field Reports														
			Starting Capabilities		G ED												
			Factory Tests	3.1	G ED												
			SD-10 Operation and Maintenance Data														
			Instruction Manuals		G ED												
		16264	SD-02 Shop Drawings														
			Layout and Shop Drawings		G ED												

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		16264	As-Built Drawings		G ED												
			SD-03 Product Data														
			Equipment Performance		G ED												
			Sound Power Level		G ED												
			Generator Data		G ED												
			Power Factor Capability Curve		G ED												
			Heat Rejected to		G ED												
			Engine-Generator Space														
			Alarm Setpoints		G ED												
			Cooling Equipment and Performance		G ED												
			Manufacturer's Catalog Data		G ED												
			Vibration-Isolation														
			Posted Data		G ED												
			Instructions		G ED												
			Component Manufacturer														
			Manufacturer/Assembler														
			Field Engineer														
			Welder Qualification														
			Installation Procedures														
			SD-06 Test Reports														
			Onsite Test		G ED												
			SD-07 Certificates														
			Torsional Vibration														
			Prototype Tests														
			Reliability and Durability														

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		16264	Emissions														
			Sound limitation														
			Flywheel Balance														
			Standards Compliance														
			Factory Tests														
			Functional Facilities														
			Cooling System														
		16403	SD-02 Shop Drawings														
			Outline Drawings		GED												
			Motor Controllers		GED												
			SD-03 Product Data														
			Equipment		GED												
			Factory Tests	2.16	GED												
			SD-06 Test Reports														
			Factory Tests	2.16	GED												
			SD-07 Certificates														
			Motor Controllers		GED												
		16410	SD-01 Preconstruction Submittals														
			Material, Equipment, and Fixture Lists		GED												
			SD-04 Samples														
			Switches		GED												
			Equipment	1.2.1	GED												
			SD-06 Test Reports														
			Tests		GED												
			SD-07 Certificates														

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		16410	Equipment and Materials		G ED												
			Switching Equipment		G ED												
			SD-10 Operation and Maintenance Data														
			Switching Equipment		G ED												
		16415	SD-02 Shop Drawings														
			Interior Electrical Equipment		G ED												
			SD-03 Product Data														
			Manufacturer's Catalog		G ED												
			Material, Equipment, and Fixture Lists		G ED												
			Installation Procedures		G ED												
			As-Built Drawings	1.2.6	G ED												
			Onsite Tests	3.22.2	G ED												
			SD-06 Test Reports														
			Factory Test Reports		G ED												
			Field Test Plan		G ED												
			Field Test Reports	3.20	G ED												
			SD-07 Certificates														
			Materials and Equipment	1.4	G ED												
		16450	SD-01 Preconstruction Submittals														
			Tests														
			Demonstrations		G ED												
			SD-02 Shop Drawings														

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		16450	SCS, Water Level Sensing and Monitoring System, and Miscellaneous Items		G ED												
			Microwave Tower/Pole and Foundation		G ED												
			Graphic Screens		G ED												
			SD-03 Product Data														
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			Spare Parts Data		G ED												
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			Verification of Dimensions														
			Service Organizations		G ED												
			SD-08 Manufacturer's Instructions														
			Instructions for Water Level Sensing and Monitoring System, SCS, and Other Items														
			SD-09 Manufacturer's Field Reports														
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		16450	Operations, Maintenance, and Parts Manuals		G ED												
		16710	SD-02 Shop Drawings														
			Premises Distribution System Installation	1.7	G ED												
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			Record Keeping and Documentation		G ED												
			Manufacturer's Recommendations	3.1.2	G ED												
			Test Plan	3.6	G ED												
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SECTION 01355

ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 SCOPE

This Section covers prevention of environmental damage as the result of construction operations under this contract and for those measures set forth in other Technical Requirements of these specifications. For the purpose of this specification, environmental damage is defined as the presence of hazardous, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; affect other species, biological communities, or ecosystems; or degrade the quality of the environment for aesthetic, cultural, and/or historical purposes. The control of environmental damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

1.2 REFERENCES

1.2.1 Miscellaneous Environmental Laws And Regulations

There are numerous environmental laws and regulations. At the Federal level, the applicable laws and regulations include compliance with the Clean Water Act (CWA); Clean Air Act (CAA); Coastal Zone Management Act (CZMA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Endangered Species Act (ESA); Fish and Wildlife Coordination Act (FWCA); Marine Protection, Research, and Sanctuaries Act (MPRSA); National Environmental Policy Act (NEPA); National Historic Preservation Act (NHPA); National Pollution Discharge Elimination System (NPDES); Research and Sanctuaries Act; Native American Graves Protection and Repatriation Act (NAGPRA); Resource Conservation and Recovery Act (RCRA); Rivers and Harbors Act (R&H); Safe Drinking Water Act (SDWA); Toxic Substance Control Act (TSCA); Wild and Scenic Rivers Act (WSRA); Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); Code of Federal Regulations (CFRs); Executive Orders; and, Environmental Protection Agency (EPA) requirements. NEPA compliance measures specified in an Environmental Assessment (EA) or Environmental Impact Statements (EIS) are also applicable with regard to compliance.

1.2.2 Publication Reference(s)

The publication(s) listed below form(s) a part of this specification to the extent referenced. The publication(s) is referred to in the text by basic designation only.

ENGINEERING MANUALS (EM)

EM 385-1-1

(2003) Safety and Health Requirements

1.3 QUALITY CONTROL

The Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. The Contractor shall record on daily quality control reports or attachments thereto, any problems in complying with laws, regulations and ordinances, and corrective action taken.

1.4 PERMITS

The Contractor shall comply with all requirements under the terms and conditions set out in all permits including State NPDES Permit Number 06132604959.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals having an "FIO" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan; G|PD.

Within 20 calendar days after the date of Notice of Award, the Contractor shall submit an Environmental Protection Plan for review and acceptance by the Contracting Officer. The Government will consider an interim plan for the first 30 days of operations. However, the Contractor shall furnish an acceptable final plan no later than 30 calendar days after receipt of Notice to Proceed. Acceptance of the Contractor's plan shall not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and other environmental protection measures. Acceptance of the plan is conditional and predicated on satisfactory performance during construction. The Government reserves the right to require the Contractor to make changes to the Environmental Protection Plan or operations if the Contracting Officer determines that environmental protection requirements are not being met. No physical work at the site shall begin prior to acceptance of the Contractor's plan or an interim plan covering the work to be performed. The Environmental Protection Plan shall include but not be limited to the following:

- a. A list of Federal, State, and local laws, regulations, and permits concerning environmental protection, pollution control, and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations, and permits.
- b. Methods for protection of features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection, i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archeological, and cultural resources.
- c. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall provide written assurance that immediate corrective action will be taken to correct pollution of the environment due to

accident, natural causes, or failure to follow the procedures set out in accordance with the environmental protection plan.

- d. A permit or license for and the location of the solid waste disposal area.
- e. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossing, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.
- f. Environmental monitoring plans for the job site, including land, water, air, and noise monitoring.
- g. Traffic control plan.
- h. Methods of protecting surface and ground water during construction activities.
- i. Spill prevention. The Contractor shall specify all potentially hazardous substances to be used on the job site and intended actions to prevent accidental or intentional introduction of such materials into the air, ground, water, wetlands, or drainage areas. The plan shall specify the Contractor's provisions to be taken to meet Federal, State, and local laws and regulations regarding labeling, storage, removal, transport, and disposal of potentially hazardous substances.
- j. Spill contingency plan for hazardous, toxic, or petroleum material.
- k. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas.
- l. Plan of borrow area(s).
- m. A statement as to the person who shall be responsible for implementation of the Environmental Protection Plan. The Contractor personnel responsible shall report directly to the Contractor's top management and shall have the authority to act for the Contractor in all environmental protection matters.
- n. Recycling and Waste Management Plan. Executive Order 12873 of 20 October 1993 requires a number of considerations in planning a project. Fallen trees should not be burned or buried. Mulching, composting, and other uses for trees should be considered. Also, recovery of metals at the job site, including aluminum cans, should be considered with proceeds to be retained by the Contractor. Non-Federal recycling and waste minimization efforts shall also be incorporated into this plan.
- o. Appendices (Permits and Ocean Dredged Material Disposal Site Monitoring and Management Plan if applicable). A copy of all permits (and Ocean Dredged Material Disposal Site Monitoring and Management Plans) applicable to the project shall be attached as appendices to the Environmental Protection Plan.
- p. Steps to be taken to construct the project in such a manner as not to impact migratory birds or induce their nesting.

q. Steps to be taken to construct the project in such a manner as not to impact gopher tortoises.

r. A protection and education plan for the Eastern indigo snake.

Eastern Indigo Snake Observer; G|PD.

Within 20 calendar days after the date of Notice of Award, the Contractor shall furnish to the Contracting Officer for approval, the qualifications of the eastern indigo snake observer.

SD-11 Closeout Submittals

Logs/Final Summary Report; FIO.

Contractor shall submit as specified, logs and final summary report of sightings and incidents with endangered species.

Eastern Indigo Snake Monitoring Report; FIO.

Contractor shall submit an Eastern indigo snake monitoring report to the appropriate U.S. Fish and Wildlife (FWS) Field Office within 60 days of the conclusion of clearing phases. The report shall be submitted whether or not Eastern indigo snakes are observed. The report shall contain any sightings of Eastern indigo snakes, summaries of any relocated snakes if relocation was approved for the project (e.g., locations of where and when they were found and relocated), and other obligations required by the State that may or may not be stipulated in the permit.

Project Environmental Summary Sheet; FIO.

Contractor shall submit within 30 days following completion of the project, a written report of the absence or occurrence of environmental incidents. In addition, for construction activities whose anticipated duration is more than one calendar year, the Contractor shall complete a sheet each May 31st (plus/minus 14 days).

1.6 SUBCONTRACTORS

Assurance of compliance with this section by subcontractors shall be the responsibility of the Contractor.

1.7 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with the aforementioned Federal, State, or local laws or regulations, permits and other elements of the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Contracting Officer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for any such suspension.

Additionally, the Contractor shall notify the Contracting Officer, in writing, of the absence or occurrence of environmental incidents, as required on the Project Environmental Summary Sheet, copy appended to the end of this Section. (Refer to paragraph SUBMITTALS above.)

1.8 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL

The Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and careful installation and monitoring of the project to ensure adequate and continuous environmental pollution control. Quality Control and supervisory personnel shall be thoroughly trained in the proper use of monitoring devices and abatement equipment, and shall be thoroughly knowledgeable of Federal, State, and local laws, regulations, and permits as listed in the Environmental Protection Plan submitted by the Contractor.

Quality Control personnel will be identified in the Quality Control Plan submitted in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 PROTECTION OF ENVIRONMENTAL RESOURCES

For contract work, the Contractor shall comply with all applicable Federal, State, or local laws and regulations. The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected at least during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications. Deviations from drawings or specifications (e.g., proposed alternate borrow areas, disposal areas, staging areas, and alternate access routes) could result in the need for the Government to reanalyze and re-approve the project from an environmental standpoint. Environmental protection shall be as stated in the following subparagraphs.

3.1.1 General Project Environmental Design and Installation Criteria

Some project sites have features that shall not be impacted in any way, including cultural, historic, or archeological features. At all sites, project plans should minimize disturbance to existing features at the site to the extent possible, including vegetative, topographic, and drainage pattern features. Wetland impacts (temporary access, detours, staging areas, and other work area impacts) to project sites should be avoided and may require separate permitting action. Any wetlands temporarily impacted shall have its soil restored upon project completion. Expansion of previously permitted project footprints may likewise require separate permitting action.

In all cases, the design and/or installation of project system shall provide for protection of the environment during handling, installing, storing, utilizing, transporting, servicing, testing, refilling, transferring, pumping, processing, removing waste products, repairing and maintaining systems and their components. Necessary design protection shall also be considered that would prevent contamination of the environment from impacts to the system caused by storm water runoff and flooding. Retrofit of connected systems on project sites to modern environmental protection design standards shall also be considered.

In the event environmental protection measures fail, the Contractor shall implement procedures to control and correct environmental damage.

3.1.1.1 Petroleum-Based Systems Environmental Design and Installation Criteria

For petroleum-based systems, a statement of site suitability shall be provided and shall include what would be necessary to prevent adverse impact to water quality; natural resources; habitat; historic, cultural, and archeological sites; and fragile local resources in the event of a fuel spill. Human error and mechanical/electrical failure of components without human intervention shall also be considered in the design with regard to spills. Additionally, appropriate noise and emissions controls shall be incorporated into the design, including vapor and exhaust controls.

At a minimum, environmental protection design requirements shall also include the following: (1) stationary tanks and piping shall have secondary containment features; (2) approved materials and corrosion protection systems shall be utilized; (3) system leaks shall be readily detected and contained without human intervention; and, (4) overfill containment systems shall be provided.

Applicable Federal, State, and local codes and requirements shall be strictly adhered to in the design, including those of the U.S. Environmental Protection Agency (EPA), the State of Florida, the South Florida Water Management District (SFWMD), and other local governing agencies such as those of counties and municipalities. In the case of the State, requirements include Chapter of the Florida Administrative Code (FAC) such as 62-17 (Approved Materials), 62-252 (Vapor Emissions), 62-296 (Emissions), 62-761 (Underground Storage Tanks), and 62-762 (Aboveground Tanks). Note that Chapters 62-761 and 62-762 of the FAC may be combined into one Chapter. Best Management Practices from the applicable agencies shall also be adhered to in the design.

3.1.1.2 Sewage-Based Systems Environmental Design and Installation Criteria

In general, there shall be no waste or debris discharges of any kind for a project unless authorized by the Contracting Officer. This shall include the Contractor's providing sufficient temporary sanitary equipment and facilities for the project. The design and/or installation of temporary or permanent sewage systems shall ensure that waters will be free of effects of sewage discharges. Applicable Federal, State, or local codes and requirements regarding sewage shall be strictly adhered to in the design, such as those of the EPA and, in the case of the State, Chapter 62-620 (Wastewater Facilities) of the FAC. Best Management Practices from the applicable agencies shall also be adhered to in the design.

3.1.2 Protection of Land Resources

Prior to the beginning of any construction, the Contractor shall identify all land resources to be preserved or avoided within the Contractor's work area. Materials displaced into uncleared areas shall be removed. The Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without special permission from the Contracting Officer. The Contractor shall engage a qualified tree surgeon to perform all tree surgery. The Contractor shall be responsible to repair injuries to bark, trunk, branches, and roots of protected trees by dressing, cutting, and painting as specified for Class I Fine Pruning, of the National Arborist Association Pruning Standards for Shade Tree or as per State's Agricultural Extension Agency Guidelines, immediately as occurrences arise. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless

specifically authorized. Where such special emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs.

3.1.2.1 Work Area Limits

Prior to any construction, the Contractor shall mark the areas that are not required to accomplish all work to be performed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. The Contractor shall protect from damage all existing trees designated to remain. Protection of tree roots shall be provided against noxious materials in solution caused by run-off or spillage. Fires shall be located outside the canopy of protected trees. No materials, trailers, or equipment shall be stored within the drip line of any protected tree. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The Contractor shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

The Contractor shall thoroughly clean all construction equipment at the prior job site in a manner that ensures all residual soil is removed and that egg deposits from plant pests are not present. The Contractor shall consult with the U.S. Department of Agriculture (USDA) regarding additional cleaning requirements that may be necessary.

3.1.2.2 Protection of Landscape

Trees and their roots, shrubs, vines, grasses, land forms, and other landscape features shall be clearly identified and protected by fencing or any other approved techniques. Protection of trees shall be as illustrated in the Tree Protection Plan Detail on the web site indicated in the paragraph CONSTRUCTION FORMS AND DETAILS below. Tree protection fencing shall be placed before excavation or grading is begun and maintained in place until construction is complete. Branches of protected trees, if required, shall be removed to clear for construction and pruning shall subsequently be performed to restore the natural shape of the entire tree. Branches or roots, if required, shall be cut with sharp pruning instruments and not broken or chopped. Protected trees shall be fertilized to compensate for root loss with 6-6-6 as per manufacturer's application direction. Any damage to tree crowns or roots shall be repaired promptly after damage occurs.

a. Trench or Bore Under Trees

Where trenching for utilities is required within tree driplines, the Contractor shall hand dig under and around roots or bore under them. The Contractor shall protect roots from drying and cover exposed roots within an hour as specified in subparagraph "Excavation for Structures" below. No lateral roots which interfere with new construction shall be cut. Boring is permitted.

b. Excavation for Structures

Where excavating for new construction is required within tree drip lines, the Contractor shall hand excavate to minimize damage to root systems. The Contractor shall use narrow tine pitchforks and comb soil to expose roots. The Contractor shall relocate roots in backfill areas. If large, main lateral roots are encountered that are exposed beyond the excavation

limits, the Contractor shall bend and relocate these roots without breaking or girdling. If roots are encountered immediately adjacent to new construction such that relocation is not practical, the Contractor shall saw roots approximately 3" back from the new construction, seal with tree wound dressing, and protect any exposed embankment of roots from drying by covering with straw and black plastic. The Contractor shall irrigate affected areas daily until final grade conditions are established and the exposed roots are backfilled properly for continued plant growth.

c. Replacement

The Contractor shall remove dead or damaged protected trees determined, by the Government, to be incapable of restoration to normal health growth. The Contractor shall replace each removed tree up to 4" caliper with tree of equal specie and size. For each tree removed larger than a 4" caliper, the Contractor shall replace the tree with one 4" caliper tree per 4" caliper increment or fraction thereof.

3.1.2.3 Unprotected Erodible Soils

Earthwork brought to final grade shall be finished as indicated. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils. Except in instances where the constructed feature obscures borrow areas, quarries, and waste material areas, these areas shall not initially be totally cleared. Clearing of such areas shall progress in reasonably sized increments as needed to use the areas developed as approved by the Contracting Officer.

3.1.2.4 Disturbed Areas

The Contractor shall effectively prevent erosion and control sedimentation through approved methods including, but not limited to, the following:

a. Retardation and Control of Runoff

Runoff from the construction site or from storms shall be controlled, retarded, and diverted to protected drainage courses by means of diversion ditches, benches, and by any measures required by area wide plans approved under paragraph 208 of the Clean Water Act.

b. Erosion and Sedimentation Control Devices

The Contractor shall construct or install temporary and permanent erosion and sedimentation control features as directed by the Contracting Officer. Temporary velocity dissipation devices shall be placed along drainage courses so as to provide for non-erosive flows. Temporary erosion and sediment control measures such as berms, dikes, drains, sediment traps, sedimentation basins, grassing, mulching, baled hay or straw, and silt fences shall be maintained until permanent drainage and erosion control facilities are completed and operative. For silt fences, the filter fabric is to be of nylon, polyester, propylene, or ethylene yarn of at least 50 lb/in strength and able to withstand a flow rate of at least 0.3 gal/ft sq/minute. The fabric should contain ultraviolet ray inhibitors and stabilizers and be a minimum of 45 inches in width. The toe of the fence shall be buried at least 8 inches deep to prevent undercutting and shall be secured to posts by suitable staples, tie wire, or hog rings. Posts shall have a cross section of at least 2"x4" and a minimum of 4 foot in length.

Fence shall be overlapped to the next post if fabric joints are necessary.

c. Sediment Basins

Sediment from construction areas shall be trapped in temporary or permanent sediment basins in accordance with basin plans shown on the drawings. The basins shall accommodate the runoff of a local 24-hour storm. After each storm, the basins shall be pumped dry and accumulated sediment shall be removed as necessary to maintain basin effectiveness. Overflow shall be controlled by paved weir or by vertical overflow pipe, draining from the surface. The collected topsoil sediment shall be reused for fill on the construction site, and/or conserved (stockpiled) for use at another site(s). The Contractor shall institute effluent quality monitoring programs as required by State and local environmental agencies.

3.1.2.5 Contractor Facilities and Other Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities shall be made when approved by the Contracting Officer. Borrow areas shall be managed to minimize erosion and to prevent sediment from entering nearby watercourses, wetlands, or lakes. Spoil areas shall be managed and controlled to limit spoil intrusion into areas designated on the drawings and to prevent erosion of soil or sediment from entering nearby watercourses, wetlands, or lakes. Spoil areas shall be developed in accordance with the grading plan indicated on the drawings. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas from despoilment. If there is suspicion that sediment may be unsuitable for disposal at a specified location, the Contractor shall immediately take measures to contain the suspect sediment and notify the Contracting Officer.

3.1.2.6 Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination. Solid waste materials shall be hauled to an approved solid waste disposal site designated by the Contracting Officer. The Contractor shall comply with Federal, State, and local regulations pertaining to the use of the solid waste disposal site.

3.1.2.7 Fuel, Oil, and Lubricants

Fuel, oil, and lubricants shall be managed so as to prevent spills and evaporation. To prevent spills, fuel dispensers shall have a 4-foot square, 16-gauge metal pan with borders banded up and welded at corners right below the bibb. Edges of the pans shall be 8-inch minimum in depth to ascertain that no contamination of the ground takes place. Pans shall be cleaned by an approved method immediately after every dispensing of fuel and wastes disposed of offsite in an approved area. Should any spilling of fuel occur, the Contractor shall immediately recover the contaminated ground and dispose of it offsite in an approved area. Petroleum waste generated shall be stored in marked corrosion-resistant containers and recycled or disposed of in accordance with 40 CFR 279, State, and local regulations.

3.1.2.8 Hazardous Waste

Hazardous wastes are defined in 40 CFR 261. The Contractor shall ensure that hazardous wastes are stored and disposed of in accordance with 40 CFR 261 and State and local regulations. The Contractor shall ensure that hazardous wastes are packed, labeled, and transported in accordance with 49 CFR 173 and State and local regulations.

3.1.2.9 Hazardous Materials

The Contractor shall ensure that hazardous materials are labeled, stored, and transported in accordance with 49 CFR 173, State, and local regulations.

3.1.2.10 Disposal of Other Materials

Other materials than previously discussed (Construction and Demolition, vegetative waste, etc.) shall be handled as directed.

3.1.3 Preservation and Recovery of Historic, Archeological, and Cultural Resources

3.1.3.3 Inadvertent Discoveries

If, during construction activities, the Contractor observes items that may have historic or archeological value, such observations shall be reported immediately to the Contracting Officer so that the appropriate Corps staff may be notified and a determination for what, if any, additional action is needed. Examples of historic, archeological and cultural resources are bones, remains, artifacts, shell, midden, charcoal or other deposits, rocks or coral, evidences of agricultural or other human activity, alignments, and constructed features. The Contractor shall cease all activities that may result in the destruction of these resources and shall prevent his employees from further removing, or otherwise damaging, such resources.

3.1.3.4 Claims for Downtime due to Inadvertent Discoveries

Upon discovery and subsequent reporting of a possible inadvertent discovery of cultural resources, the Contractor shall seek to continue work well away from, or otherwise protectively avoiding, the area of interest, or in some other manner that strives to continue productive activities in keeping with the contract. Should an inadvertent discovery be of the nature that substantial impact(s) to the work schedule are evident, such delays shall be coordinated with the Contracting Officer.

3.1.4 Protection of Water Resources

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface, ground waters, and wetlands. The Contractor shall plan his operation and perform all work necessary to minimize adverse impact or violation of the water quality standard. Special management techniques as set out below shall be implemented to control water pollution by the listed construction activities which are included in this contract. The Contractor's construction methods shall protect wetland and surface water areas from damage due to mechanical grading, erosion, sedimentation and turbid discharges. There shall be no storage or stockpiling of equipment, tools, or materials within wetlands or along the shoreline within the littoral zone unless specifically authorized.

3.1.4.1 Washing and Curing Water

Waste waters directly derived from construction activities shall not be allowed to enter water areas. These waste waters shall be collected and placed in retention ponds where suspended materials can be settled out or the water evaporates so that pollutants are separated from the water. Analysis shall be performed and results reviewed and approved by Corps staff before water in retention ponds is discharged.

3.1.4.2 Stream Crossings

Stream crossings shall be controlled during construction. Crossings shall provide movement of materials or equipment without violating water pollution control standards of the Federal, State, or local government.

3.1.4.3 Monitoring of Water Areas

Monitoring of water areas affected by construction activities shall be the responsibility of the Contractor. All water areas affected by construction activities shall be monitored by the Contractor.

3.1.4.4 Dewatering

Off site discharge of ground water produced from dewatering is prohibited.

3.1.4.5 Turbidity

The Contractor shall conduct his operations in a manner to minimize turbidity and shall conform to all water quality standards as prescribed by Chapter 62-302, State of Florida, Department of Environmental Protection (FDEP). FDEP surface water quality standards can be obtained from the following websites:
<http://www.dep.state.fl.us/ogc/documents/rules/shared/62-302.pdf> and
<http://www.dep.state.fl.us/ogc/documents/rules/shared/62.302t.pdf>.

3.1.4.6 Oil, Fuel, and Hazardous Substance Spill Prevention and Mitigation

The Contractor shall prevent oil, fuel, or other hazardous substances from entering the air, ground, drainage, local bodies of water, or wetlands. This shall be accomplished by design and procedural controls. In the event that a spill occurs despite the design and procedural controls, the following shall occur:

- (1) Immediate action shall be taken to contain and cleanup any spill of oil, fuel or other hazardous substance.
- (2) Spills shall be immediately reported to the Contracting Officer.
- (3) Spill contingency planning shall be strictly in accordance with the criteria of 40 CFR, Part 109.
- (4) To control the spread of any potential spill, absorbent materials shall be readily available and capable of absorbing the contents of the single largest tank.
- (5) To control the spread of any potential spill, the Contractor shall provide a written certification of commitment of manpower, equipment, and materials required to expeditiously cleanup and

dispose of spill materials.

a. Spill Preventive Systems

System design and installation requirements have been discussed at the beginning of this Section. Temporary or portable tanks shall conform to applicable Federal, State, and local codes and requirements and shall not be placed where they may be affected by storm, flooding, or washout. Diversionary structures for spills shall be put in place in advance where practical. Both spill preventive systems and any deviations from associated requirements must be approved by the Contracting Officer prior to implementation.

b. Liabilities

The Contractor shall be liable in the amounts established in 40 CFR, Part 113 when it can be shown that oil was discharged as a result of willful negligence or willful misconduct. The penalty for failure to report the discharge of oil shall be in accordance with the provision of 33 CFR, Part 153.

3.1.4.7 Adjacent Wetlands

Prior to commencement of construction, the Contractor shall stake and fence off any adjacent wetlands along the construction easement line, without leaving the construction footprint, with construction fencing or other effective physical barriers to prevent encroachment into wetlands. The Contractor shall prevent any disturbance of adjacent wetlands. The Contractor shall coordinate with the Contracting Officer to notify the staff of the FDEP Southeast Field Office (Inger Hansen, Phone Number (561) 681-6703) in writing upon completion of staking/fencing to set up a joint inspection of this work.

3.1.5 Protection of Fish and Wildlife Resources

The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife. Species that require specific attention along with measures for their protection shall be listed in the Contractor's Environmental Protection Plan prior to the beginning of construction operation.

3.1.5.1 Protection of Migratory Bird Species

The Contractor shall keep construction activities under surveillance, management, and control to prevent impacts to migratory birds and their nests. All construction personnel shall be advised that migratory birds are protected by the Florida Endangered and Threatened Species Act of 1977, Title XXVIII, Chapter 372.072, and the U.S. Fish and Wildlife Service pursuant to the Migratory Bird Treaty Act of 1918 and the Endangered and Threatened Species Act of 1982, as amended. The Contractor may be held responsible for harming or harassing the birds, their eggs or their nests as a result of the construction.

a. Monitoring of Construction Area

In order to meet these responsibilities, the Contractor shall conduct monitoring of the construction area beginning 1 April through 31 August, if construction activities occur during that period. Daily monitoring using

the Daily Bird Monitoring Report shall be conducted during the dawn or dusk time frames by a bird monitor approved by the Contracting Officer (Caution shall be taken by the monitor to avoid disturbance to the nesting birds). The Contractor shall maintain a daily log detailing monitoring and nesting activity (not all bird species are listed). Sample monitoring report and qualification sheet are on the web site indicated in the paragraph CONSTRUCTION FORMS AND DETAILS below. Within 30 days after completion of construction, a summary of monitoring shall be submitted to the Corps detailing nesting and nesting success/failure including species, number of nests created, location, number of eggs, number of offspring generated during the project and reasons for nesting success or failure, if known.

Order of Contact of Corps Personnel
to Report Bird Nesting Activities

<u>Title</u>	<u>Telephone Number</u>	
	<u>Work Hours</u>	<u>After Hours</u>
<u>Dr. Loren Mason, Chief,</u> <u>Environmental Branch, Planning</u> <u>Division (CESAJ-PD-E)</u> Corps, Inspector	904-232-2202 On site	To be Provided Lodging Location
Mr. George Cooper, Area Engineer, Chief, Construction Branch Construction-Operations Division (CESAJ-CO-C)	561-626-5299 904-232-1122	To be Provided To be Provided
Mr. John Adams, Acting Chief, Construction-Operations Division (CESAJ-CO)	904-232-3765	To be Provided

b. Nesting Within Construction Area

(1) Should nesting begin within the construction area, a temporary, 200-foot buffer shall be created around the nests and marked to avoid entry (the Contracting Officer will provide signs). The area shall be left undisturbed until nesting is completed or terminated, and the chicks fledge. The decision to allow construction in a former nesting site will be determined by the Contracting Officer in consultation with the U.S. Fish and Wildlife Service and the FF&WCC. Access to the nesting sites by humans (except limited access when accompanied by the bird monitor or Contracting Officer), equipment or pets under control of the Contractor is prohibited.

(2) If nesting occurs within the construction area, a bulletin board shall be placed and maintained by the Contractor in the contracting shed with the location map of the construction site showing the bird nesting areas and a warning, clearly visible, stating that "BIRD NESTING AREAS ARE PROTECTED BY THE FLORIDA THREATENED AND ENDANGERED SPECIES ACT AND THE FEDERAL MIGRATORY BIRD TREATY ACT".

(3) Birds will find the top of the dike or the flat interior desirable nesting habitat. If construction activity ceases for any period of time, nesting may occur before work can resume. Any stoppage of activity could induce nesting, subsequently, construction could be altered or stopped to avoid impacting the birds unless the State of Florida and the U.S. Fish and Wildlife Service authorizes the interruption of nesting and/or destruction

of the eggs. (NOTE: This authorization is highly unlikely.) Areas which are potentially suitable for nesting can be altered to make the area undesirable. One approved method is the placement of stakes at 10- to 15-foot intervals and tie flagging between the stakes in a web fashion. This may dissuade bird nesting until construction can be resumed. In addition, the disposal area basin can be flooded prior to the beginning of nesting season to the elevation required for displacement from the disposal of dredged material in order to make the basin undesirable for bird nesting.

c. Bird Monitoring Qualifications

The Contractor's Environmental Protection Plan shall contain the qualifications of the bird monitor and the steps to be taken to construct the project in such a manner as not to impact migratory birds or induce their nesting. The qualifications of the bird monitor are a demonstrated ability to identify bird species, general and nesting behavior characteristics, nests and eggs, and a knowledge of habitat requirements. In addition, references must be provided to verify non-educational experience.

d. Work Delay

Delays in work due to the fault of negligence of the Contractor or the Contractor's failure to comply with this specification shall not be compensable. Any adjustments to the contract performance period or price that are required as a result of compliance with this section shall be made in accordance with the Clause SUSPENSION OF WORK of Section 00700 CONTRACT CLAUSES.

3.1.5.2 Protection of Gopher Tortoise (GT) Populations (*Gopherus polyphemus*)

The Contractor shall keep construction activities under surveillance, management, and control to prevent impacts to GTs and their burrows. All construction personnel shall be advised that GTs are listed by the State of Florida as a Species of Special Concern and protected by the FAC, Chapter 39-27.002(4). The Contractor may be held responsible for taking, harming, or harassing the tortoises, their eggs or their burrows as a result of the construction. The destruction of GT burrows constitutes taking under this law except as authorized by specific permit.

a. General

(1) In order to meet these responsibilities, the Contractor shall conduct gopher tortoise surveys prior to the beginning of construction activities. The surveys shall be conducted by a qualified gopher tortoise biologist. A list of qualified individuals may be obtained from the FF&WCC.

(2) The Contractor shall stay at least 25 feet from entrances of individual burrows.

b. Relocation Permit Requirements

If five or fewer tortoises will be affected and adequate habitat will exist on the site following construction, tortoises may be captured and released back onto the site in an area where they can move freely. A special permit is required. If more than five (5) GTs are to be relocated, a capture/release/relocation permit is required from the FF&WCC; contact the

FF&WCC for a list of GT relocation contacts.

c. Taking

If the work will probably kill tortoises, a taking permit is required from the State for the taking of any tortoises. Taking includes the entombment or killing of gopher tortoises as a result of bulldozing, grading, paving, or building construction.

d. State Permit Applications

Pursuant to the requirements of Rules 68-25.002 and 68-27.002 of the Wildlife Code of the State of Florida (Title 68A, FAC), a permit for a GT capture/relocation/release project must be secured from the FF&WCC prior to initiating any relocation work. Applications shall be submitted at least 30 days prior to the time needed from Office of Environmental Services, Division of Wildlife, Florida Fish and Wildlife Conservation Commission, 620 S. Meridian Street, Tallahassee, Florida 32399-1600, ATTN: Mr. Rick McCann, Endangered Species Coordinator, telephone 850-488-6661. Permits to capture and release GTs on site will be issued by regional Division of Wildlife or Office of Environmental Services personnel based on telephone requests (field verifications may be conducted by FF&WCC personnel if deemed necessary).

e. Relocation Window

GT relocation within the State of Florida can occur year-round in the geographic area below State Highway 50. Relocation of GTs between State Highway 50 and the counties bordering the State of Georgia, excluding Duval and Suwannee Counties, can only occur between 1 March and 1 December. Relocation within the counties bordering the State of Georgia, including Duval and Suwannee Counties, can only occur between 1 April and 1 October.

f. Application Information

The application will contain, but not be limited to, aerial photography of the donor and recipient sites, a detailed map showing the location of the active and inactive burrows sites, the location and number of acres of GT habitat, the carrying capacity of the recipient site and any management plans for the recipient site.

g. Applicant Qualifications

Applicants for relocation permits shall be suitably trained or experienced in such work. Copies of applicant credentials demonstrating such shall be appended to applications. A list of qualified individuals may be obtained from the FF&WCC.

h. Temporal Considerations

(1) Tortoises shall not be captured/relocated on days for which the overnight low temperature for that day and the two consecutive days thereafter is forecasted by the U.S. National Weather Service to be below 50 degrees F. This 3-day window of milder overnight temperatures is to allow the relocated tortoises to settle into the recipient site.

(2) During summer months, releases shall not be made during the hottest part of the day at sites where shade is limited.

i. Donor Site Surveys

No more than 60 days prior to relocation, all potential GT habitat on a given development site shall be thoroughly and systematically surveyed using appropriate, biologically sound methodology. Permit applicants are to submit preliminary estimates of the total number of tortoises on a subject site, size of that portion of the site which is potential tortoise habitat, and a general characterization of the habitat. Recommended survey techniques for estimating population density and classification systems for GT habitat types are available from the FF&WCC.

(1) All burrows found to be "active" or "inactive" shall be plotted on maps to facilitate efficient future relocation. Criteria for determining the status of GT burrows may be obtained from the FF&WCC.

j. Recipient Site Selection and Treatment

Sites selected to receive relocated tortoises shall be either of similar habitat character and quality as corresponding donor sites, or demonstrated to be otherwise suitable for GT occupancy.

(1) Sites already occupied by tortoises at or near carrying capacity shall not be selected as recipient sites. In some instances, especially at sites of marginal habitat quality, certain habitat manipulation measures (such as burning) could be employed to improve habitat quality and thereby increase carrying capacity, rendering the site acceptable as a recipient site. In those cases, continuous, periodic management treatments would normally be necessary to maintain carrying capacity at the elevated levels. Permit applications opting for this course shall append their applications with a proposed long-term management plan for recipient sites. Carrying capacity may be determined by the FF&WCC.

(2) Relocation of 20 or fewer tortoises shall be to recipient sites already occupied. Relocation of more than 20 should be to recipient sites either vacant or occupied at population levels substantially below carrying capacity. Carrying capacity criteria may be obtained from FF&WCC.

(3) Recipient sites shall be situated any distance east or west of donor sites, but no more than 50 miles north or south of donor sites unless appropriately justified.

(4) Recipient sites should not overlap or abut sites supporting genetically unique or discrete tortoise populations, or sites supporting populations which otherwise merit protection from genetic swamping. Genetically unique or discrete populations will be determined by the FF&WCC. In instances where such a potential exists, the FF&WCC shall be consulted for a determination as to the site's acceptability.

(5) Recipient sites already occupied by tortoises shall be thoroughly surveyed prior to relocation and all encountered burrows plotted on maps and categorized as "active," "inactive" or "old" per the criteria of the FF&WCC.

k. Capture Methodology

Tortoises shall be excavated from burrows (i.e., with backhoe), trapped, or otherwise captured by non-harmful means. If trapped, five-gallon pitfall bucket traps shall be buried at burrow entrances, shaded and covered with paper or cheesecloth overlain with a thin layer of soil. A hole at least one inch in diameter should be drilled into the bottom of each bucket for drainage. Each bucket shall be checked at least once per day for at least 28 consecutive days. Capture methodology may be modified on persistently wet sites or during periods of heavy rainfall.

l. Transport and Release Methodology

Captured tortoises must be transported without undue delay and under shaded and sanitary conditions. Care shall be taken to avoid any physical damage (i.e., abrasion) to tortoises in transit.

(1) Prior to release, each relocated tortoise shall be sexed (adults only), measured and permanently and uniquely marked by scute-notching. Criteria for marking and measuring relocated GTs may be obtained from the FF&WCC.

(2) On unoccupied recipient sites, relocated individuals shall be released in groups of no more than 20 in the same general vicinity with access to shade nearby. On already occupied sites, relocated tortoises shall be distributed throughout the site and, when possible, individuals shall be released at "old" or "inactive" burrows, criteria of which is available through the FF&WCC.

m. Reporting

Any tortoise mortality or debilitating injury occurring during the capture, relocation and release phases of a relocation is to be reported to:

Order of Contact of Corps Personnel
to Report Gopher Tortoise Activities

<u>Title</u>	<u>Telephone Number</u>	
	<u>Work Hours</u>	<u>After Hours</u>
<u>Dr. Loren Mason, Chief,</u> <u>Environmental Branch, Planning</u> <u>Division (CESAJ-PD-E)</u> Corps, Inspector	904-232-2202 On site	<u>To be Provided</u> Lodging Location
Mr. George Cooper, Area Engineer, Mr. John Adams, Chief, Operations Branch, Construction-Operations Division (CESAJ-CO-CO)	561-626-5299	To be Provided
Mr. Michael Abbott, Florida Fish and Wildlife Conservation Commission 1239 SW 10th Street Ocala, FL 34474	904-232-1123 352-732-1225	To be Provided To be Provided

n. Report Submission

Within 30 days of the final survey, a detailed and comprehensive final report is to be prepared and submitted to the Division of Wildlife, FF&WCC, and U.S. Army Corps of Engineers (Dr. Loren Mason, Chief, Environmental Branch, P.O. Box 4970, Jacksonville, Florida 32232-0019), such report to

include a compilation of all data and all maps prepared during the surveys and all information regarding relocation of the GTs.

o. Qualifications

The Contractor's Environmental Protection Plan shall contain the qualifications of the GT survey/relocation contract and the steps to be taken to construct the project in such a manner as not to impact GTs.

p. Work Delay

Delays in work due to the fault or negligence of the Contractor or the Contractor's failure to comply with this specification shall not be compensable. Any adjustments to the contract performance period or price that are required as a result of compliance with this section shall be made in accordance with the provisions of the Clause SUSPENSION OF WORK of Section 00700 CONTRACT CLAUSES.

3.1.5.3 Protection of Eastern Indigo Snake Populations

a. Monitoring of Construction Area

The requirements of this paragraph only apply if Eastern indigo snakes (indigo snakes) are observed in the construction area. The Contractor shall coordinate with the Jacksonville District Corps of Engineers, Environmental Studies Section (CESAJ-PD-ES) and the U.S. Fish and Wildlife Service's (FWS) South Florida Field Office during the establishment and implementation of an indigo snake protection/education plan.

b. Qualified Observer

A qualified observer shall be present on site to watch for indigo snakes during all construction and clearing phases of the project. The name(s) and qualifications of the proposed observer shall be submitted to the Contracting Officer for approval. The information submitted should indicate what experience the individual has that would qualify the person to act as an indigo snake observer.

c. Indigo Snake Protection/Education Plan

Immediately prior to beginning site work, all workers and managers that will be present at the site during any phase of the project should take part in a protected Eastern Indigo Snake education presentation. The individual or group making the presentation should meet the following requirements:

- (1) Presenter should have experience giving education presentations about indigo snake ecology and conservation.
- (2) Presenter should use multi-media products such as slides or overheads depicting the indigo snake unless a live animal is available.
- (3) Presenter should be able to answer questions relating to construction activities in indigo snake habitat and assist with worker recognition of the indigo snake.
- (4) Ideally, the presenter could show a live captive indigo and a live captive black racer. Access to other captive common species

would also be helpful.

(5) All workers that will be involved at the work site at any time during the project should go through the protected species education presentation.

The education presentation should last 30-60 minutes and contain at least the following information:

(1) Photos and explanation of indigo snakes showing coloration, scale pattern, size and habitat. Ideally, a live animal could be substituted for the snake pictures, but photos of habitat should still be used. Similar materials for the other protected species should be used.

(2) Explanation of indigo snake natural history including their use of tortoise burrows, reasons for protection, and common behaviors. Similar instruction for the other protected species should be given.

(3) Photos of similar species such as the Black Racer and how to distinguish between the species.

(4) Detailed explanation of the laws protecting the indigo snake, including definitions of harassment, "take" etc., and the associated consequences for breaking the laws. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing indigo snakes which are protected under the Endangered Species Act of 1973. The Contractor may be held responsible for any individuals harmed, harassed, or killed as a result of construction activities. There should be an emphasis on the realization that accidents can happen and that if all measures of protection are used, there is still a possibility of killing an indigo and that it should be reported. The presentation should discourage "hiding" sightings or injuries to indigos. Similar instruction for the other protected species should be given.

(5) Explanation of protocol for seeing any indigo on the project site. Similar instruction for the other protected species should be given.

(6) Show locations of educational materials including signs and contact information.

(7) Provide educational materials to be kept in the construction trailer for review.

(8) Showing a live indigo and a live racer would be very beneficial; however, captive indigos and racers may be difficult to locate, and should not be required.

In addition to the presentation, signs with a color picture of an indigo snake will be posted in all construction trailers, on the permit/inspection board, on any work scheduling or project schedule locations, in any heavy machinery maintenance/parking locations, and at other appropriate gathering places such as break or eating sites. These signs will contain basic identification information that includes color pictures of indigos and similar species. The signs should be original and laminated with no

photocopies used. The sign will have the protocol to follow in case an indigo snake is observed, injured, or killed during the project, and will include phone numbers of U.S. Fish and Wildlife Service and Florida Fish and Wildlife Conservation Commission contacts.

d. Gopher Tortoise Burrows

If gopher tortoise burrows are present, refer to subparagraph "Protection of Gopher Tortoise (GT) Populations (Gopherus polyphemus)" above. If gopher tortoise burrows are present, the requester should coordinate with the FF&WCC for information on the relocation program for gopher tortoises. As a part of the relocation program, the FF&WCC reviews and approves preserve areas for gopher tortoises. These same areas may be used for the release of indigo snakes. Therefore, prior to any construction or clearing activities in areas where gopher tortoise burrows have been identified the following measures should be incorporated into the indigo snake plan:

(1) A qualified individual should map and flag the locations of all gopher tortoise burrows on the site. Prior to actual clearing, the qualified individual should update that initial survey no more than two weeks prior to clearing. These maps should be made available to all construction crews.

(2) In some circumstances, an underground camera may be needed to investigate gopher tortoise burrows for indigo snakes. If an indigo snake is found, and the burrow will be destroyed by construction activity then the burrow should be carefully excavated with a backhoe while monitoring the snake's position and condition with the underground camera. In burrows that are suitable for camera use, the burrow will be carefully excavated with a combination of backhoe and hand excavation. Before excavating any burrow, it is recommended that a strong, flexible tube or hose be inserted into the burrow to the end to mark the course of the entire burrow in case it collapses during excavation. If a backhoe is used, the bucket should be equipped with a straight blade, not a blade with teeth. The excavation must be done with caution to prevent potential injury to an indigo snake.

(3) An indigo snake protection/education plan shall be developed for all construction crews to follow. The plan shall be provided to the Contracting Officer for review and approval at least 30 days prior to any construction or clearing activities. The educational materials for the plan could consist of a combination of posters or videos, pamphlets, and lectures and should include the following information:

e. Reporting

Refer to subparagraph "Protection of Gopher Tortoise (GT) Populations (Gepherus polyphemus)" above. Reporting of indigo snake mortality or debilitating injury occurring during the capture, relocation and release phases of a relocation will be reported as required in referenced subparagraph.

3.1.6 Protection of Air Resources

The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources. All

activities, equipment, processes and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the applicable air pollution standards of the State of Florida (Florida Statute, Chapter 403 and others and Chapters 200 series of the FAC) and all Federal emission and performance laws and standards, including the U.S. Environmental Protection Agency's Ambient Air Quality Standards. Information regarding Florida Statutes can be obtained from the following websites:

<http://www.dep.state.fl.us/ogc/documents/statutes/text/403.doc>;

<http://www.dep.state.fl.us/ogc/documents/rules/aiur/62-213.doc>; and,

<http://www.dep.state.fl.us/ogc/documents/rules/mainrule.htm>.

3.1.6.1 Particulates

Particulates, such as dust, shall be controlled at all times, including weekends, holidays, and hours when work is not in progress. The Contractor shall maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and work areas within or outside the project boundaries free from particulates that would cause air pollution standards to be exceeded or that would cause a hazard or nuisance. The Contractor shall have the necessary equipment and approved methods to control particulates as the work proceeds and before a problem develops.

3.1.6.2 Burning

All burning shall be subject to State and local requirements, including requirements for burn permits and bans during certain conditions such as droughts.

3.1.6.3 Odors

Odors shall be controlled at all times for all construction activities.

3.1.7 Protection of Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize damage to the environment by noise.

3.2 POSTCONSTRUCTION CLEANUP

The Contractor shall clean up any area(s) used for construction.

3.3 PRESERVATION AND RESTORATION OF LANDSCAPE AND MARINE VEGETATION DAMAGES

The Contractor shall restore all landscape features and marine vegetation damaged or destroyed during construction operations outside the limits of the approved work areas. Such restoration shall be a part of the Environmental Protection Plan as defined in subparagraph "Environmental Protection Plan" of paragraph SUBMITTALS above. This work shall be accomplished at the Contractor's expense.

3.4 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The Contractor shall maintain all constructed facilities and pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.5 CONSTRUCTION FORMS AND DETAILS

From the Jacksonville District Home Page, click the links ORGANIZATIONS, ENGINEERING, then CONSTRUCTION FORMS AND DETAILS. See web site address www.saj.usace.army.mil/cadd/end/construction_forms_and_details.htm.

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SECTION 01500

TEMPORARY CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 SUMMARY

In addition to Construction Facilities this Section covers:

Temporary Utilities
Construction Aids
Vehicular Access and Parking
Project Identification

See Section 01355 ENVIRONMENTAL PROTECTION for requirements including silt control, trailer placement, fueling restrictions, dust control, solid waste, and clean-up. Upon completion of project, clean-up and restore area in accordance with Clause CLEANING UP of Section 00700 CONTRACT CLAUSES.

a. Construction Facilities include, but are not limited to, the following:

- (1) Contracting Officer's Field Office
- (2) Contractor Offices
- (3) Information Bulletin Board
- (4) Material and Equipment Storage Area
- (5) Fueling Area
- (6) Secured Storage Area
- (7) Employee Parking Area
- (8) Debris Container (dumpster)
- (9) Construction Signage to include Project Sign; Safety Sign; and, Construction Warning Signs

b. Temporary Utilities include, but are not limited to, the following:

- (1) Water
- (2) Electric
- (3) Sewage
- (4) Communications
- (5) Lighting

1.2 REFERENCES

The publications listed below form a part of this specification to extent referenced. The publications are referred to in text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C2

(1997) National Electrical Safety Code

FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

FDOT (2000) Standard Specifications for Road
and Bridge Construction

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (1999) National Electrical Code

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CESAJR 385-1-1 (1998) Safety and Occupational Health
Program

COE EM 385-1-1 (2003) U.S. Army Corps of Engineers Safety
and Health Requirements Manual

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation;
submittals not having a "G" designation are for information only. Within
30 days following date of receipt of Notice to Proceed and prior to
mobilization to site submit following in accordance with Section 01330
SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Mobilization/Demobilization Plan

Plan shall include, but not be limited to, the following:

a. Mobilization Requirements:

- (1) Methods, equipment and materials
- (2) Connection of utilities
- (3) Placement of site facilities and temporary controls
- (4) Construction of facilities

b. Demobilization Requirements (methods, equipment and
materials required to clean-up and restore site at project
conclusion):

- (1) Collection, recycle and disposal of solid waste
- (2) Contract-generated material
- (3) Utility disconnection
- (4) Removal of Contractor facilities
- (5) Repair and restoration of site (i.e., fences, roads,
or permanent facilities)

Security Plan

Prepare a Security Plan for Contracting Officer describing site
security as follows:

- a. Day and night security
- b. Weekend and holiday security
- c. General security duties

Manufacturer's Literature for Equipped Boat, Trailer, and

Hand-Held Radios

Within 20 calendar days after date of Notice of Award, the Contractor shall submit manufacturer's literature of all items to be furnished for exclusive use of Government personnel.

SD-02 Shop Drawings

Contractor's Temporary Facilities

General layout sketch of temporary site facilities shall include, but not be limited to, the following:

- a. Trailer locations
- b. Parking areas
- c. Material storage
- d. Equipment lay down area
- e. Areas for gravel
- f. Fuel areas
- g. Supplemental or other staging area
- h. Temporary well, water supply
- i. Septic field or holding tanks, port-a-lets
- j. Contaminated water handling
- k. Concrete cleaning area and methods of disposal
- l. Fences -- location and dimensions, entrance and exit points, and details of installation
- m. Explosives storage

Contracting Officer's Field Office Trailer

Supplier or Manufacturer scale drawings of trailer floor plans for Contracting Officer's Field Office. Plans should show a minimum of two offices, toilet, and conference area.

Temporary Electric Drawings

Electricity supply and lighting - from Florida Power & Light (FP&L) transformer source sketch layout locations, fixtures, and materials, to include outdoor lighting as described in subparagraph "Electric Power" below.

Construction Drawings; G|COR

Contractor shall prepare and furnish six (6) copies each of Construction Drawings for approval at least 20 calendar days before work on the applicable feature is commenced. Prepare construction drawings in accordance with the paragraph SUBMITTAL PROCEDURES of Section 01330 SUBMITTAL PROCEDURES, and consisting of the following features:

- a. Plant Layout. The Contractor shall submit drawings for the structure area to show his plant layout, storage/area yards, shops, offices, concrete batching and mixing plant location, access and haul roads, and other pertinent features. The drawings shall also show the general features of the aggregate processing plant; aggregate transporting, storage and reclaiming facilities; aggregate rinsing and dewatering plant, if required; coarse aggregate rescreening plant, if required; concrete conveying and placing plant; and, when precooling of concrete is required, the

cooling plant. The drawings shall appropriately show the capacity of each major feature of the plant including the rated capacity of the aggregate production plant in tons per hour of fine and coarse aggregates; rated capacity of the aggregate transporting, storage and reclaiming facilities; volume of aggregate storage; capacity of cement and pozzolan storage; rated capacity of the concrete batching and mixing plant in cubic yards per hour; rated capacity of the concrete transporting and placing plant in cubic yards per hour; and, when used, rated capacity of plant for precooling of concrete.

b. Excavation Plan. The Contractor shall submit drawings showing the structure excavation area with details of his plan for excavation to include slopes, lines, grades, and shoring required for the structure excavation.

c. Dewatering Plan. Refer to paragraph SUBMITTALS of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS for data to be furnished. This plan is to be furnished for information purposes only and the Contractor is solely responsible for the technical and operational features of his dewatering system.

1.4 EXISTING UTILITIES

Contractor shall locate nearest electric and telephone lines. Contractor is responsible for electricity from transformer. There is no potable water, sanitary sewer, or natural gas available at the site. Contractor is responsible for locating sources, and furnishing at the project site.

1.4.1 Water

In addition to the above, the Contractor shall provide and maintain at his own expense an adequate supply of water for his use for construction, and to install and maintain necessary supply connections and piping for same, but only at such locations and in such manner as may be approved by the Contracting Officer. The Contractor shall also provide and maintain his own temporary toilet and washing facilities. Toilet and washing facilities shall be installed and maintained in a location approved by the Contracting Officer. Refer to paragraph AVAILABILITY AND USE OF UTILITY SERVICES below.

1.4.2 Electricity

In addition to the above, all electric current required by the Contractor shall be furnished at his own expense. All temporary lines will be furnished, installed, connected, and maintained by the Contractor in a workmanlike manner satisfactory to the Contracting Officer and shall be removed by the Contractor in like manner at his expense prior to completion of the construction. Refer to paragraph AVAILABILITY AND USE OF UTILITY SERVICES below.

1.5 TEMPORARY SERVICES

Furnish following services for Contracting Officer's Field Office:

- a. Janitorial service
- b. Lawn service
- c. Waste removal
- d. Pest control -- sufficient to prevent interior infestation
- e. Office Services -- Photo-static copy machine

1.6 RESIDENT MANAGEMENT SYSTEM (RMS)

Contractor shall use Government-furnished Construction Contractor module of RMS, referred to as Quality Control System (QCS), software for construction information management (CIM). QCS will be the latest version of "QCS" which is personal computer based. Additional information will be provided to the Contractor at the Preconstruction Conference. Refer to Section 01312 QUALITY CONTROL SYSTEM (QCS).

PART 2 PRODUCTS

2.1 CONTRACTING OFFICER'S FIELD OFFICE TRAILER

Trailer in first class condition, not greater than two years old, with a minimum total space of 600 square feet.

2.2 CONSTRUCTION PROJECT SIGNS

Refer to paragraph BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN below and the web site indicated in paragraph CONSTRUCTION FORMS AND DETAILS below.

2.2.1 Haul Road Traffic and Construction Warning Signs

1/2 inch HDO plywood, or aluminum sheet, conforming to FDOT Section 700 Uniform Traffic Manual Standard Signs, non-standard signage high visibility orange with black lettering. Orange fabric mesh acceptable for temporary survey crew use.

2.3 STORAGE CONTAINERS

Welded steel construction, locking, shipping containers or equal.

2.4 QCS HARDWARE AND SOFTWARE REQUIREMENTS

Refer to Section 01312 QUALITY CONTROL SYSTEM (QCS).

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

3.1.1 Identification of Employees

The Contractor shall be responsible for furnishing to each employee, and for requiring each employee engaged on the work to display, identification as approved and directed by the Contracting officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

3.1.2 Employee Parking

a. Park employee's vehicles in areas designated by Contractor, away from construction traffic, within reasonable walking distance of site. Maintain area free of ruts, mud holes and puddles. Place gravel where

required by deteriorated conditions.

b. Provide Contracting Officer six gravel parking spaces at Contracting Officer's Field Office. Place parking signs reserved for use of Contracting Officer and visitors. Contractor shall maintain these spaces clear of other vehicles.

c. Contractor should protect unattended equipment as it may be subject to vandalism.

d. Storage trailers and storage area with Government material should be locking type with lighting.

3.1.3 Onsite Information

Keep copy of contract drawings, specifications, and other contract documents at Contractor's Office onsite, available for use at all times.

3.1.4 Janitorial Services

- a. Daily -- Sweep; empty wastebaskets; service toilets
- b. Weekly -- Mop floors; sanitize toilet seats
- c. Monthly -- Wash floors, windows (inside and out)
- d. Cut grass as needed to keep below 3 inches high

3.2 AVAILABILITY AND USE OF UTILITY SERVICES

Install temporary facilities and utilities in accordance with ANSI C2, COE CESAJR 385-1-1, COE EM 385-1-1, NFPA 70. Obtain necessary construction, building, zoning, or soil erosion and sediment control approvals required by local authorities and utility companies. Equip trailer(s) with wind tie downs in accordance with local wind and building code requirements.

3.2.1 Lighting

Electric light, non-glare type luminaries to provide a minimum illumination, level of 30-foot candles at desk height level. Comply with temporary lighting, wiring and Ground Fault Circuit Interrupter (GFCI) requirements found in COE EM 385-1-1.

3.2.2 Heating and Cooling

Adequate equipment to maintain internal ambient air temperature of 75 degrees F in 105 degrees F and 70 degrees F in 30 degrees F. Equip trailer(s) with smoke alarms. If bottled gas is used to heat, equip trailer(s) with carbon monoxide alarms.

3.2.3 Water

Non-potable well water may be used to flush toilets, dish and hand washing. Provide bulk potable water storage tanks or provide bottled water for drinking.

3.2.4 Fire Extinguisher

Refer to COE EM 385-1-1. Non-toxic, dry chemical, fire extinguisher meeting Underwriters Laboratories, Inc., approval for Class A, Class B, and Class C fires with a minimum rating of 2A; 10B; and 10C.

3.2.5 Utility Lines

Install, connect and modify temporary lines as coordinated with owning utility. Conform requirements in accordance with ANSI C2 and NFPA 70 for Temporary Electric Lines. Remove temporary line at completion of project.

3.2.6 Electric Power

Provide Contracting Officer's Field Office sufficient continuous power and electric supply to assure operation of systems, including computer, light and HVAC. Provide electrical service and transformers sufficient to operate heating/air conditioning units. Electrical power shall be purchased directly by Contractor.

3.3 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

3.3.1 Bulletin Board

Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

3.3.2 Project and Safety Signs

The requirements for the signs, their content, and location shall be as indicated on the web site indicated in paragraph CONSTRUCTION FORMS AND DETAILS below. The signs shall be erected within 15 days after receipt of the Notice to Proceed. The data required by the safety sign shall be corrected daily, with light colored metallic or non-metallic numerals. Upon completion of the project, the signs shall be removed from the site.

3.4 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

3.4.1 Barricades

The Contractor shall erect and maintain temporary barricades to limit

public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

3.5 HAUL ROADS

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

Whenever practical, one-way haul roads shall be used on this contract. Haul roads built and maintained for this work shall comply with the following:

- a. One-way haul roads for off-the-road equipment; e.g., belly dumps, scrapers, and off-the-road trucks shall have a minimum usable width of 25 ft. One-way haul roads for over-the-road haulage equipment only (e.g., dump trucks, etc.) may be reduced to a usable width of 15 feet. When the Contracting Officer determines that it is impractical to obtain the required width for one-way haul roads (e.g., a road on top of a levee), a usable width of not less than 10 feet may be approved by the Contracting Officer, provided a positive means of traffic control is implemented. Such positive means shall be signs, signals, and/or signalman and an effective means of speed control.
- b. Two-way haul roads for off-the-road haulage equipment shall have a usable width of 60 feet. Two-way haul roads for over-the-road haulage equipment only may be reduced to a usable width of 30 feet.
- c. Haul roads shall be upgraded and otherwise maintained to keep the surface free from potholes, ruts, and similar conditions that could result in unsafe operation.
- d. Grades and curves shall allow a minimum sight distance of 200 feet for one-way roads and 300 feet for two-way roads. Sight distance is defined as the centerline distance an equipment operator (4.5 feet above the road surface) can see an object 4.5 feet above the road surface. When conditions make it impractical to obtain the required sight distance (e.g., ramps over levees), a positive means of traffic control, indicated above, shall be implemented.
- e. Dust abatement shall permit observation of objects on the roadway at a minimum distance of 300 feet.
- f. Haul roads shall have the edges of the usable portion marked with posts at intervals of 50 feet on curves and 200 feet maximum elsewhere.

Such markers shall extend 6 feet above the road surface, and for nighttime haulage, be provided with reflectors in both directions.

3.6 CONTRACTOR'S TEMPORARY FACILITIES

3.6.1 Contractor Field Office

Provide on-site field office of sufficient size and staff capability to manage project activities. Provide communications and computer capabilities to manage the work, including implementing QCS (refer to Section 01312 QUALITY CONTROL SYSTEM (QCS)), facsimile, electronic mail, reproduction, to schedule and cost tracking. Contractor's field office should include a conference area with table and chairs to accommodate a minimum of 8 people. Provide handicap access with a 1 on 12 ramp and gravel parking spot marked with handicap parking sign.

3.6.2 Appearance of Trailer(s)

Trailer(s), used for both office and material storage purposes, shall be clean, neat exterior appearance and in good repair. Trailer(s) requiring exterior painting or maintenance will not be allowed on site until determined satisfactory by Contracting Officer.

3.6.3 Storage Area

Provide temporary six-foot high chain link fence for storage containers, trailers or sheds containing Government property. Fence posts may be driven. Ground chain link fence against lightning. Store Contracting Officer's property, owned materials and equipment within fenced storage area. Store small size Government property, equipment, tools, materials in locked steel containers. No Government property and materials shall be stockpiled outside fence in preparation for next day's work. Park mobile equipment, tractors, wheeled lifting equipment, cranes, trucks, and like equipment, within fenced areas on weekends.

3.6.3.1 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion. Grass located within the boundaries of the construction site shall be mowed for the duration of the project. Grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers shall be edged or trimmed neatly.

3.6.4 Waste Storage

Provide dumpsters or suitable debris containers. Prevent wind blown trash; cover as needed. Dispose of offsite when needed. Refer to Section 01355 ENVIRONMENTAL PROTECTION.

3.6.5 Fuel Storage and Fueling Operations

Refer to Section 01355 ENVIRONMENTAL PROTECTION. Provide light when fueling at night.

3.7 SECURITY PLAN

Provide site security person at all times when there are no on-site activities. Maintain 24-hour security during weekends and holidays. Site security shall include, but not be limited, to:

- a. Limit vehicular access to authorized vehicles and personnel only.
- b. Limit public access to travel along access road only. Access road shall be kept closed at all times except for passage of authorized personnel and vehicles.
- c. Maintain a list of authorized personnel and subcontractors available at site offices.
- d. Maintain a sign-in log documenting visitors, deliveries, and security incidents. Include date, name, address, company, time in and time out for each employee and visitor.
- e. Check fenced areas, equipment, trailers on a daily basis. If damage is observed or vandalism is found report to Contracting Officer.

3.7.1 Visitors

No visitors will be allowed on site without knowledge of Contractor and permission of Contracting Officer. Direct visitors to report upon arrival to Contractor's Field Office for site safety and accident prevention briefing. Provide visitors appropriate protective equipment (i.e., ear plugs, safety glasses, etc.).

~~3.8 TEMPORARY PROJECT SAFETY FENCING~~

~~As soon as practicable, but not later than 15 days after the date established for commencement of work, the Contractor shall furnish and erect temporary project safety fencing at the work site. The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.~~

~~3.9 CONSTRUCTION FENCING AND DANGER SIGNS~~

- ~~a. The Contractor shall furnish, install, and maintain barbed wire fencing along the entire right of way lines. The fence shall be installed prior to construction. The fence shall contain a minimum of four strands of barbed wire and be at least 4 feet in height. Access gates (size and quantity determined by the Contractor) shall be provided to permit movement of machinery and equipment. The fence shall be grounded to reduce possibilities of electrical shock. The fence shall be maintained to restrain the public until completion of construction.~~
- ~~b. The Contractor shall furnish 28 danger signs, as indicated on the sketch on the web site indicated in paragraph CONSTRUCTION FORMS AND DETAILS below, and post them on the fence at locations directed by the Contracting Officer. The signs shall be of the format, style, and~~

~~minimum size indicated, shall be neatly and sturdily constructed, and shall be securely erected in a workmanlike manner to support the sign properly for the life of the contract. Contractor is required to post both the English and Spanish version of the sign. The signs shall be posted together.~~

~~c. Upon completion of construction and when so directed by the Contracting Officer, the fencing and signs shall be removed by the Contractor during the final cleanup process. The fencing and signs shall be disposed of by the Contractor in a manner satisfactory to the Contracting Officer.~~

3.10 CONTRACTING OFFICER'S FIELD OFFICE

Supply and maintain lockable field office separate from Contractor for use by Contracting Officer. The Contractor shall furnish all communication, utility, and other services requested herein at his expense.

3.10.1 Office Trailer

a. An all metal exterior, sides and roof; double-insulated walls, floor, and roof; electric baseboard heat; self-contained, built-in air conditioning; and 110 volt wall outlets.

b. Security guard screens, screens, and blinds for all windows.

c. Toilet facility -- A separately enclosed room with mechanical ventilation and complying with applicable sanitary codes including hot and cold running water and flush type toilet.

d. Installed during site mobilization.

3.10.2 Office Equipment

Provide following furnishings:

2 - Office desks with five lockable drawers (60 inches by 30 inches, laminated top) and swivel chair for each (desks should be designed for use with PCs)

1 - Conference Table with eight chairs

1 - First aid kit, wall mounted

Intercom connection to Contractor's secretarial station

1 - Fire resistant, five drawer, legal size lockable filing cabinet

2 - Five drawer, letter size lockable filing cabinets

Provide two telephone lines (one voice and one fax) and one T1 line

1 - Telephone with speakerphone

1 - Telephone answering machine with remote answering capability and voice time/day stamp

1 - Table to support FAX and printer

2 shelf sets - Four shelves high by 12 inches deep by 3 feet long (attachable to wall)

2 - 3' x 6' Cork Bulletin Boards

3 - 3' x 6' Dry Erase Boards

3 - Waste baskets

1 - Plan Table installed in one office (may be built in) with a minimum working surface of 4 feet by 6 feet, and draftsman stool

1 - Vertical filing plan rack sufficient for contract drawings

1 - Seven cubic foot refrigerator with freezer

1 - Microwave oven

- 1 - Water cooler/dispenser with minimum 3 gallon capacity
- 1 - Photo-static copy machine

3.11 CLEAN UP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored. Refer to Section 01355 ENVIRONMENTAL PROTECTION for solid waste and post construction clean up.

3.12 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

3.13 CONSTRUCTION FORMS AND DETAILS

From the Jacksonville District Home Page, click the links ORGANIZATIONS, ENGINEERING, then CONSTRUCTION FORMS AND DETAILS. See web site address www.saj.usace.army.mil/cadd/end/construction_forms_and_details.htm.

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SECTION 02164

ROCK ANCHORS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 722	(1990) Uncoated High-Strength Steel Bar for Prestressing Concrete
ASTM C 109	(1993) Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)

1.2 DATUM

All elevations are in feet and refer to the National Geodetic Vertical Datum (NGVD).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals having no designation are for information only. The following shall be submitted according to Section 01330 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Employee Experience

The Contractor shall submit evidence that the work will be performed by workers who specialize in the installation and testing of rock anchors and have experience in installing and testing the specified system under similar subsurface conditions.

SD-02 Shop Drawings

Load Test Set-Up

Detailed sketches of the proposed load test set-up, including the reaction platform or reaction member and methods for obtaining measurements.

Installation; G|ED

Submit drawings, including shop and erection details, including a schematic diagram showing complete anchor dimensions and details, installation sequences, and description of testing equipment, setup, and procedures for stressing the anchors required to be prestressed in the drawings.

SD-06 Test Reports

Grouting Records

Anchor Test Results

Core Log of Each Hole

Grout Compression Tests

Installation

An installation report will be prepared for each anchor. The record shall include proof, creep and liftoff test result; acceptance criterial calculations; and installation details.

SD-07 Certificates

Threadbars; G|ED

Grout Ingredients; G|ED

Test Jacks and Gages; G|ED

Current calibration certificate of each pressure gage for their accuracy at their range of capacity. A calibration curve for the test jack(s) (gauge pressure versus transfer load in kips) to be used during the tensioning operations shall be provided. A curve for each combination of jack and gauge is required. This calibration shall have been performed withing 6 weeks prior to the time the jack will be brought on site.

1.4 TOLERANCES

Each hole's centerline shall be within 3 inches of the indicated location. Deviation of the centerline in any direction shall not exceed 1/4 inch per foot of penetration.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Threadbars

Threadbars shall be fabricated from steel bars conforming to ASTM A 722, with minimum yield strength of 150 ksi. (Reference William R71 bars.) The bars shall have a continuous rolled-in pattern of threadlike deformations along their entire length to permit anchorage and couplers to thread on to the bar at any point. Machined threads will not be permitted. Accessories such as couplings, nuts, bearing plates, sheathing covers, and centralizers necessary to assemble the bars shall be in accordance with threadbar manufacturers' specifications. The bars may be cut or coupled in order to fabricate a threadbar of the required length.

2.1.2 Grout

Grout shall consist of Portland cement, sand, fluidifier, and water; use 1 cf (1 bag) of cement; 1 cf of sand; 1 lb. of fluidifier; 0.6 cf of water. See paragraph MATERIALS of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE

FOR CIVIL WORKS for material specifications.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Drilling

Drilling for the concrete seal anchors shall be performed after the excavation within the cofferdam is complete, prior to placement of the underwater concrete, and without dewatering, which will require drilling to be performed in approximately 26.5 feet of water. Each hole shall be advanced by core drilling or rotary drilling to the indicated bottom elevation of the hole. Drilling shall be carried on by the use of any equipment adapted to the work and able to produce the indicated holes. Fixed leads shall be used to maintain alignment. Drilling mud will not be allowed.

3.1.2 Grouting

Grouting shall be performed without dewatering. A threadbar and tremie grout pipe shall be inserted to the bottom of each hole. Provide sheathing covers for each prestressed ring beam anchor to cover the unbonded bar length. Each threadbar shall be centered with centralizers. Each hole shall be grouted from the lowest point of the anchor. Casing removal shall be accomplished in a way that leaves the hole filled with grout. During removal of the casing, its lower end shall always be filled with grout. When the bottom of the casing reaches the top of excavation, the grout pipe shall be withdrawn; however, sufficient grout to properly fill the hole shall be injected before the bottom of the grout pipe reaches the top surface of the grout. ~~Fill each concrete seal anchor hole with grout.~~ The threadbar shall remain undisturbed for a minimum of 7 days.

a. Only approved mixing and pumping equipment shall be used in preparing and handling the grout. All materials shall be fed to the mixer. The fluidifier shall be accurately measured by weight, all other ingredients shall be measured by volume. The order of placing materials shall be as follows: (1) water; (2) fluidifier; and, (3) other solids in order of increasing particle size. The time of mixing shall be such as to produce a homogeneous mix, whether mixed on the site or obtained from a ready mix plant, but shall not be less than one minute.

b. Equipment shall be sized to enable each threadbar to be grouted in one continuous operation. Grout pump shall be a positive displacement pump of an approved design. The pump discharge capacity shall be calibrated in strokes per cubic foot or revolutions per cubic foot by an approved method. All oil or other rust inhibitors shall be removed from mixing drums and pumps prior to mixing and pumping.

c. Grout tests shall be conducted in accordance with ASTM C 109 in an approved laboratory. Test specimens shall be prepared by pouring grout into 2-inch by 2-inch by 2-inch mold. Not less than nine cubes shall be cast during each 8-hour shift. Three cubes shall be tested at the end of 7 days, 28 days, and 90 days.

d. A pressure gage in good condition shall be located on the pump, so that the pressure may be checked by the operators and the Contracting Officer's Representative.

- e. The volume of grout per linear foot of threadbar shall be measured. Volume measurements shall be made in the presence of the Contracting Officer or his authorized representative.

3.2 TEST ROCK ANCHORS

Loading, testing, and recording of data shall be under the direct supervision of a registered professional engineer from the State of Florida who can document sufficient load test experience under conditions similar to project conditions. The registered engineer shall be provided and paid by the Contractor.

3.2.1 Pullout Load Test

Pullout tests shall be performed on indicated concrete seal rock anchors. Refer to Pump Station Dwg. No. S-101 for pullout test locations. A total tensile load equivalent to 133 percent of the design load shall be applied to each test anchor in increments of 10 tons. For each load increment, the deflection shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total measurement between 1 and 10 minutes exceeds 0.04 inch (1 mm), the test load shall be maintained for an additional 50 minutes with total movement recorded at 20, 30, 40, 50, and 60 minutes. Instrument readings shall be made during the loading interval and immediately before applying the next load increment. Two measuring instruments shall be affixed to the test rock anchor. At the request of the Contracting Officer, the accuracy of the equipment shall be checked by a qualified testing laboratory.

The test load shall be removed in increments in the reverse order of application in order to check recovery of the anchors. The procedure outlined above is tentative and may be varied as directed. The device and method of attachment to the test anchors for applying tension shall be the responsibility of the Contractor.

3.2.2 Prestressing

All prestressed anchors shall be proof-tested using the following schedule of loads. Record the results of the proof tests. All anchors not meeting the acceptance criteria defined in the paragraph PRESTRESSED ACCEPTANCE CRITERIA, overstressed, or otherwise damaged in any way, shall be replaced, or incorporated into modifications to compensate for the damage.

Percent Design Load

Alignment
25
50
75
100
120
133 (Test and Creep Load)
Alignment
115 (Transfer Load, Locked Off)

The loading sequence requires reduction to the alignment load after completion of the creep test, then reloading the anchor to the transfer load. The reloading cycle shall apply the load uniformly from the alignment load to the transfer load. Extension at the final transfer load and the alignment load shall be recorded.

Acceptable creep is defined as 0.040 inches or less between 1 and 10 minutes. If creep exceeds 0.040 inches within the first 10 minutes, the creep test shall be extended to 60 minutes, with readings taken at 20, 30, 40, 50, and 60 minutes. Jack pressures shall be within 50 psi of the required test load pressure during the test. Jack pressures for the creep test must be kept within 50 psig of the desired pressure. The load shall be checked and adjusted if required just prior to the reading.

The test data shall be reviewed immediately to determine if the anchor is acceptable or if additional stressing or testing is required on a case-by-case basis. If an anchor has an atypical load-extension curve, shows excessive incremental extension at the higher load increments, or fails the initial 10 minute creep test, more testing to verify the anchor load may be required by the Government.

One anchor shall be liftoff tested after a minimum of 24 hours to verify its lockoff load.

Anchors shall be stressed with a hydraulic jack recommended by the manufacturer. Initial liftoff readings shall be made for each anchor. If the load determined from the initial liftoff reading is less than 95 percent of the transfer load, the nut shall be tightened and another liftoff test shall be performed. The Government will determine if the load is acceptable or if additional stressing is required if the second attempt at lockoff is not successful.

Anchors shall be tensioned by means of calibrated jack. Tensioning equipment shall be capable of tensioning the anchor to yield. The jack shall have sufficient travel to allow for the maximum elongation of the anchor during the testing without having to be reset.

Provide a tripod, clamps, and a micrometer, caliper, or dial gauge accurate to 0.001 inch for measuring the strain in the anchor during proof and performance testing. Travel in the indicator shall be sufficient to measure the total extension without resetting. Total bar movement shall be measured relative to an independent fixed reference located off the structure being stressed.

3.2.3 Reports

Results from each test shall be furnished to the Contracting Officer with a copy furnished to the Chief, Geotechnical Branch of the Jacksonville District immediately after each test is complete.

3.3 PRESTRESSED ACCEPTANCE CRITERIA

An anchor will be acceptable if the following criteria are met:

The load-extension curve is a smooth curve and falls within the envelope defined by a minimum of 80 percent of the elastic extension computed using the anchor free length and a maximum extension computed using the free length plus half of the bond length.

Creep at the test load is less than or equal to 0.040 inch between 1 and 10 minutes, or less than 0.080 inches in 60 minutes.

Transfer loads are within 5 percent of the design transfer load.

Liftoff tests between 24 hours and 7 days indicate an anchor load within 10 percent of the design transfer load.

Anchors not meeting these criteria require an engineering disposition regarding replacement or acceptance at a reduced load.

3.4 PRESTRESSED INSTALLATION COMPLETION

After the anchor has been accepted, the portion of the anchor protruding beyond the stressing anchorage may be cut, if not otherwise required. Cutting shall be done in accordance with anchor manufacturer's recommendations.

Secondary grout shall be tremied into the anchor hole as necessary to eliminate any void at the top of the stressing length. Secondary grout shall be the same mix as the embedment grout. Secondary grout may require topping off to ensure that it has filled the hole to the bottom of the bearing plate.

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SECTION 02331

CANAL EXCAVATION AND LEVEE CONSTRUCTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 1140	(1997) Amount of Material in Soils Finer Than the No. 200 (75-Micrometer) Sieve
ASTM D 1556	(2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(2000) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³))
ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996e1) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1996) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ENGINEERING MANUALS (EM)

EM 385-1-1	(2004) U.S. Army Corps of Engineers Safety and Health Requirements Manual
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FLORIDA DEPARTMENT OF TRANSPORTATION (FDOT)

FDOT	(2004) Standard Specifications for Road and Bridge Construction
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1.2 DEFINITIONS

1.2.1 Clearing

As defined in Section 02230 CLEARING AND GRUBBING.

1.2.2 Grubbing

As defined in Section 02230 CLEARING AND GRUBBING.

1.2.3 Stripping

Stripping shall consist of the removal and satisfactory disposal of crops, weeds, grass, and other vegetative materials to the ground surface, by using a root rake or other device as approved by the Contracting Officer.

1.2.4 Satisfactory Materials

Satisfactory materials shall be the earth and rock materials excavated from the canal prism, crushed, and otherwise processed to conform to FDOT Standard Specification 911 for Limerock Base.

1.2.5 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter. The Contracting Officer shall be notified of any contaminated materials.

1.2.6 Embankment

The terms "levee" or "embankment" as used in these specifications are defined as the earth fill portions of the levee structure or other fills related to the levee structure.

1.2.7 Classification of Soils

Materials used to construct the embankments and for backfills shall be classified in accordance with ASTM D 2487 (Unified Soil Classification System).

1.2.7.1 Cohesionless and Cohesive Materials

Cohesionless materials shall include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

1.2.8 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density.

1.3 CLASSIFICATION OF EXCAVATION

Excavation specified shall be done on a classified basis, in accordance with the following designations and classifications.

1.3.1 Rock Excavation

Rock excavation shall include drilling, blasting, excavating, grading, and

processing of material classified as rock and shall include the satisfactory removal of material which cannot be removed without systematic drilling and blasting. If at any time during excavation, the Contractor encounters material that may be classified as rock excavation, such material shall be uncovered by the Contractor at no additional cost to the Government, and the Contracting Officer notified by the Contractor. The Contractor shall not proceed with the excavation of this material until the Contracting Officer has classified the materials as common excavation or rock excavation, and has taken cross sections as required. Failure on the part of the Contractor to uncover such material, notify the Contracting Officer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Contracting Officer for area of work in which such deposits occur. The Contractor shall review the available geotechnical data and determine the limits of rock excavation.

1.3.2 Common Excavation

Common excavation shall include the satisfactory removal and disposal of all materials not classified as rock excavation. The Contractor shall assume that common excavation will require ripping at a minimum. Ripping shall be performed using a D-8 dozer or equivalent with single or multiple ripping teeth as a minimum.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Earthwork; G|EN

Submit procedure and location for disposal of unused satisfactory material, blasting plan when blasting is permitted, and proposed source of borrow material.

Excavation; G|COR

Submit a written excavation plan 2 days prior to the beginning of any excavation. Approval of the detailed plan shall be obtained from the Contracting Officer prior to starting the work. If necessary, the plan shall be modified as required to meet field conditions, and the modifications shall be approved prior to use. As a minimum, the plan shall contain, the following:

a. Proposed methods for preventing interference with, or damage to, existing underground or overhead utility lines, trees designated to remain and other man-made facilities or natural features designated to remain within or adjacent to the construction rights-of-way.

b. Provision for coordinating the work with other Contractors working in the construction rights-of-way or on facilities crossing or adjacent to this work.

- c. A complete listing of equipment used for excavation and to transport the excavated material.
- d. The Contractor's proposed road pattern, and plan for implementing dust control measures.

Plan of Operations; G|COR

Thirty (30) days prior to commencement of haul road construction or placing embankment and fill which ever is earlier, the contractor shall submit for approval a Plan of Operations for accomplishing all embankment and backfill construction and for the location and construction of haul roads. This plan shall include but not be limited to the Contractor's proposed sequence of construction for embankment and backfill items, and methods and types of equipment to be utilized for all embankment and backfill operations, including transporting, placing, and compaction. This plan shall also include the names and addresses of the commercial testing labs which will perform the soil testing and inspection and describe how all required soils testing will be performed.

Nuclear Density; G|COR

Nuclear density testing equipment shall be used in accordance with ASTM D 2922 and ASTM D 3017. In addition, the following condition shall apply:

- a. Prior to using the nuclear density testing equipment on the site, the Contractor shall submit to the Contracting Officer a certification that the operator has completed a training course approved by the nuclear density testing equipment manufacturer, the most recent data sheet from the manufacturer's calibration, and a copy of the most recent statistical check of the standard count precision.
- b. The nuclear density testing equipment shall be capable of extending a probe a minimum of 8 inches down into a hole.

SD-06 Test Reports

Testing; G|EN

Within 24 hours of conclusion of all physical tests, submit 3 copies of test results, including calibration curves and results of calibration tests.

Nuclear Density Test Report; G|ED

Submit a copy of the report including the results of all daily nuclear density tests, and water contents obtained from these tests, on the next work day following the test.

Measurement of Fill Material; G|COR

Submit a copy of the records of each compliance survey the next work day following the survey.

SD-07 Certificates

Testing; G|EN

Qualifications of the commercial testing laboratory or Contractor's testing facilities.

1.5 SYSTEM DESCRIPTION

The work covered by this section consists of furnishing all equipment, labor, materials, and incidentals, and performing all operations necessary for the clearing, grubbing, and stripping of the areas specified herein or indicated on the drawings, and for the removal and disposal of cleared, grubbed, and stripped materials, and refilling of holes resulting from grubbing; all excavations, as specified and shown; foundation preparation and the construction of levee embankments, including new levee, berms, road crossings, and other incidental earthwork as may be necessary to complete the levee as specified herein and as shown on the drawings. All work under this section shall comply with the requirements of EM 385-1-1.

1.6 BLASTING

Blasting shall be performed as specified in Section 02222 BLASTING.

1.7 GENERAL CONDITIONS

1.7.1 Lines and Grades

Excavation, embankment and fill shall be constructed to the lines, grades, and cross sections indicated on the drawings, unless otherwise directed by the Contracting Officer. The Government reserves the right to increase or decrease the foundation widths and embankment slopes or to make such other changes in the excavation, embankment or fill sections as may be deemed necessary to produce a safe structure. Changes in quantities resulting from such revisions will not constitute justification for change in contract unit prices, except as provided for in the Variations in Estimated Quantities Clause. Increases in height of section, made to compensate for settlement or consolidation of the embankment material subsequent to the completion of the embankment, will not exceed 10 percent of the height above the foundation at the levee centerline indicated. The end slopes and side slopes of partial fill sections shall not be steeper than one vertical on three horizontal, unless otherwise shown on the drawings.

1.7.2 Conduct of the Work

The Contractor shall maintain and protect the excavation, embankment and fill in a satisfactory condition at all times until final completion and acceptance of all work under the Contract. If, in the opinion of the Contracting Officer, the hauling equipment causes horizontal shear planes or slicken sides, rutting, quaking, heaving, cracking, or excessive deformation of the embankment or fill, the Contractor shall limit the type, load, or travel speed of the hauling equipment on the embankment or fill. The Contractor may be required to remove, at his own expense, any embankment material placed outside of prescribed slope lines. Any approved embankment or fill material which is lost in transit or rendered unsuitable after being placed in the embankment or fill and before final acceptance of the work shall be replaced by the Contractor in a satisfactory manner and no additional payment will be made therefor. The Contractor shall excavate and remove from the embankment or fill any material which is unsatisfactory and shall also dispose of such material and refill the excavated area as

directed, all at no cost to the Government.

1.7.3 Utilization of Excavated Materials

Unsatisfactory excavated materials shall be disposed of in designated waste disposal or spoil areas. Satisfactory material removed from excavations shall be used, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Surplus satisfactory excavated material not required for fill shall be disposed of in areas approved for surplus material storage. Newly designated waste areas on Government-controlled land shall be cleared and grubbed before disposal of waste material thereon. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

1.7.4 Haul Roads

Haul roads shall be located and constructed as approved by the Contracting Officer within the project boundaries shown on the drawings. Prior to the commencement of construction the contractor shall submit for approval a site plan detailing the location of all haul roads within the project limits. Haul roads shall be constructed to maintain the intended traffic, be free draining, and be maintained in good condition throughout the contract period. Any haul road which crosses any creek or drainage channel shall be constructed, and maintained by the Contractor so as to not flood either upstream areas by restricting stream flows or flood downstream areas by the release of any stored water in the event that the crossing fails for any cause. Haul roads constructed during the contract duration shall be removed after work is completed and the impacted area restored to its preconstruction conditions. All haul roads within the right-of-way that will remain as public thoroughfares after construction shall be cleaned daily and maintained in the preconstruction condition. All costs associated with these haul roads shall be considered as a subsidiary obligation of the Contractor.

1.7.5 Drainage

The Contractor shall not block or restrict the flow in a natural drain, existing culvert, ditch or channel at any time without obtaining prior written approval from the Contracting Officer. This approval shall not relieve the Contractor from responsibility for any damage caused by his operation. Surface water shall be directed away from excavations and construction sites so as to prevent erosion and undermining of foundations. Diversion ditches, dikes, and grading shall be provided and maintained as necessary during construction. Excavated slopes and fill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

1.8 PERMITS

In accordance with clause PERMITS AND RESPONSIBILITIES of Section 00700 CONTRACT CLAUSES, the Contractor shall obtain all necessary permits required for disposal, hauling, erosion control, burning, and pay all fees associated with permitting and compliance.

1.9 PROJECT SITE CONDITIONS

1.9.1 Protection of Cultural and Natural Resources

All work and Contractor operations shall comply with the requirements of Section 01355 ENVIRONMENTAL PROTECTION and with the requirements of this section.

1.9.2 Protection of Existing Man-Made Facilities and Natural Features

Trees within the clearing area shall be felled in such a manner as to avoid damage to trees left standing and trees outside the clearing area, existing buildings, man-made facilities and natural features, with due regard to the safety of employees and others, and in compliance with EM 385-1-1.

Excavation shall be conducted in such a manner as to avoid damage to trees left standing and trees outside the clearing and excavation area, existing buildings, man-made facilities and natural features, with due regard to the safety of employees and others, and in compliance with EM 385-1-1.

Existing utility lines that are shown on the drawings or the locations of which are made known to the Contractor prior to excavation and that are to be retained shall be protected from damage during excavation. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the applicable utility companies in sufficient time for measures to be taken to prevent interruption of the services.

1.9.3 Historical, Archeological, and Cultural Resources

Historical, archeological, and cultural resources within the Contractor's work limits may exist. If, during construction activities, the Contractor observes items that may have historical or archeological value, such observations shall be reported immediately to the Contracting Officer so that appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. The Contractor shall cease all activities that may result in the destruction of these resources and shall prevent his employees from trespassing on or otherwise damaging such resources.

1.9.4 Subsurface Data

Subsurface soil boring logs are included in these specifications. Subsurface investigation reports may be examined at the Jacksonville District Office. These data represent subsurface information at the boring locations; however, variations may exist in the subsurface between boring locations. Groundwater levels indicated on the soil boring logs were levels found at the time of exploration. The groundwater table can vary significantly depending on time of year, variation from normal precipitation, and river stage or tide level.

1.10 SEQUENCE OF WORK

1.10.1 Clearing and Grubbing

All clearing and grubbing work shall be completed at least 300 feet in advance of excavation and embankment construction. If regrowth of vegetation or trees occurs after clearing and grubbing and before placement of embankment, the Contractor shall clear and grub again prior to embankment construction.

1.10.2 Stripping

After inspection and acceptance of cleared and grubbed areas, stripping may proceed. All stripping work shall be completed not more than 300 feet in advance of excavation and embankment construction.

PART 2 PRODUCTS

2.1 TYPES OF FILL MATERIALS

2.1.1 Select Fill

The select fill material shall consist of satisfactory materials.

PART 3 EXECUTION

3.1 CLEARING

Clearing shall be accomplished within the entire construction easement limits. Trees, downed timber, snags, slash, brush, garbage, trash, debris, fencing and other items shall be cleared flush with the existing ground surface. Trees and vegetation designated to be left standing or to remain shall be protected from damage from construction operations.

3.2 GRUBBING

Grubbing shall be accomplished within the entire construction easement limits. Grubbing shall be accomplished to a depth of at least one foot below the existing ground surface.

3.2.1 Filling of Holes

All holes caused by grubbing operations and removal of pipes and drains, excluding holes in borrow areas, channels and ditches shall be filled with satisfactory material. This material shall be placed in 12-inch layers to the elevation of the adjacent ground surface, and each layer compacted to a density at least equal to 90 percent of the maximum dry density of the material in accordance with ASTM D 1557.

3.3 STRIPPING

The entire area within the construction easement limits shall be stripped to the ground surface.

3.4 DISPOSITION OF CLEARED, GRUBBED, AND STRIPPED MATERIAL

Except as otherwise specified or indicated on the drawings, all materials resulting from clearing and grubbing operations shall, at the Contractor's option, be disposed of either by burning, removal from the site, or a combination thereof. In no case shall any material resulting from clearing and grubbing operations be buried or permanently placed within the levee foundation or any structural foundation. The Contractor shall make a reasonable effort to channel merchantable material into the commercial market and to make beneficial use of the materials resulting from clearing and grubbing.

3.4.1 Burning

Subject to applicable Federal, State and local burning restrictions, the

Contractor may burn material within the contract rights-of-way. Burning operations shall be conducted so as to prevent damage to adjacent man-made facilities and natural features. The Contractor shall be responsible for any damage to life and property resulting from fires that are started by the Contractor's employees or as a result of the Contractor's operations. The Contractor shall furnish, at the site of burning operations, adequate fire fighting equipment to properly equip personnel for fighting fires. Fires shall be guarded at all times and shall be under constant surveillance until they have been extinguished. All unburned material (material not reduced to ash) shall be removed from the site.

3.4.2 Removal from Site of Work

The Contractor may elect to remove all or part of the cleared and grubbed materials from the site of the work in accordance with Section 01355 ENVIRONMENTAL PROTECTION. The Contractor shall, at his option, either retain any such materials of value for his own use or dispose of them by sale or otherwise. The Government is not responsible for the protection and safekeeping of any materials retained by the Contractor. Such materials shall be removed from the site of the work before the date of completion of the work.

3.5 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with the typical sections shown and the tolerances specified in paragraph FINISHING. Satisfactory excavated materials shall be transported to and placed in fill or embankment within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times.

3.6 PREPARATION OF FOUNDATION AND PARTIAL FILL SURFACES

After stripping, the sides of stump holes, test pits, and other similar cavities or depressions shall be broken down so as to flatten out the slopes, and the sides of the cut or hole shall be scarified to provide bond between the foundation material and the fill. Unless otherwise directed, each depression shall be filled with the same material type that is to be placed immediately above the foundation. The fill shall be placed in layers, moistened, and compacted in accordance with the applicable provisions of paragraphs PLACEMENT, MOISTURE CONTROL, and COMPACTION. Materials which cannot be compacted by roller equipment because of inadequate clearances shall be compacted with power tampers in accordance with the paragraph COMPACTION for the specific material type. After filling of depressions and immediately prior to placement of compacted fill in any section of the embankment, the foundation of such section shall be loosened thoroughly by scarifying, plowing, discing or harrowing to a minimum depth of 6 inches, and the moisture content shall be adjusted to the amount specified in paragraph MOISTURE CONTROL for the appropriate type of material. Immediately prior to placement of compacted fill on or against the surfaces of any partial fill section, all soft or loose material, all material containing cracks or gullies, and all material that does not conform with the specified zoning of the embankment shall be removed. The remaining surface of the partial fill shall be loosened by scarifying, plowing, discing or harrowing to a minimum depth of 6 inches, and the moisture content shall be adjusted as specified in paragraph

MOISTURE CONTROL for the appropriate type of material. The surface of the partial fill section upon which fill is to be placed shall then be compacted. No separate payment will be made for loosening and rolling the foundation area, the abutment area, or the surfaces of partial fill sections, but the entire cost thereof shall be included in the applicable contract price for fill.

3.7 EMBANKMENTS

Embankments shall be constructed from satisfactory materials. The material shall be placed in successive horizontal layers of loose material not more than 12 inches in depth. Each layer shall be spread uniformly on a surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, each layer shall be plowed, disked, or otherwise broken up; moistened or aerated as necessary; thoroughly mixed; and compacted to at least 95 percent laboratory maximum dry density. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical with those requirements specified in paragraph SUBGRADE PREPARATION. Compaction shall be accomplished by using approved equipment which is suitable for the character of fill used.

3.8 SUBGRADE PREPARATION

3.8.1 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. After rolling, the surface of the subgrade for roadways shall not show deviations greater than 1/2 inch when tested with a 12-foot straightedge applied both parallel and at right angles to the centerline of the area. The elevation of the finish subgrade shall not vary more than 5/8 inch from the established grade and cross section.

3.8.2 Compaction

Compaction shall be accomplished by using approved equipment which is suitable for the character of fill used. Except for paved areas, each layer of the subgrade shall be compacted to at least 95 percent of laboratory maximum dry density.

3.8.2.1 Subgrade for Pavements

Subgrade for pavements shall be compacted to at least 95 percent laboratory maximum dry density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, the top 8 inches of subgrade shall be scarified, windrowed, thoroughly blended, reshaped, and compacted.

3.9 FINISHING

The surface of fills, embankments, and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION. Gutters and ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.

A tolerance of zero feet above and 0.5 feet below the prescribed grade will be allowed for rock excavation.

3.10 MOISTURE CONTROL

3.10.1 General

The materials in each layer of the fill shall contain the amount of moisture, within the limits specified below or as directed by the Contracting Officer, necessary to obtain the required compaction. Material that is not within the specified moisture content limits after compaction shall be reworked to obtain the specified moisture content, regardless of density.

3.10.1.1 Insufficient Moisture for Suitable Bond

If the top or contact surfaces of a partial fill section become too dry to permit suitable bond between these surfaces and the additional fill to be placed thereon, loosen the dried materials by scarifying or discing to such depths as may be directed by the Contracting Officer, dampen the loosened material to an acceptable moisture content, and compact this layer in accordance with the applicable requirements of paragraph COMPACTION below.

3.10.1.2 Excessive Moisture for Suitable Bond

If the top or contact surfaces of a partial fill section become too wet to permit suitable bond between these surfaces and the additional fill to be placed thereon, the wet material shall be scarified and permitted to dry, assisted by discing or harrowing, if necessary, to such depths as may be directed by the contracting officer. The material shall be dried to an acceptable moisture content, and shall be compacted in accordance with the applicable requirements of paragraph COMPACTION.

3.10.1.3 Drying Wet Material

Material that is too wet shall be spread on the embankment and permitted to dry, be assisted by discing or harrowing, if necessary, until the moisture content is reduced to an amount within the specified limits.

3.10.1.4 Increasing Moisture in Dry Material

The moisture content of material that is too dry, will be adjusted on the levee embankment. Add water to the fill material and by harrowing, or other approved methods, work the moisture into the material until a uniform distribution of moisture within the specified limits is obtained. Water applied on a layer of fill on the levee embankment shall be accurately controlled in amount so that free water will not appear on the surface during or subsequent to rolling. Should too much water be added to any part of the embankment, the rolling on that section of the embankment shall be

delayed until the moisture content of the materials is reduced to an amount within the specified limits. If it is impracticable to obtain the specified moisture content by wetting or drying the material on the fill, pre-wet or dry back the material.

3.10.2 Fill

The moisture content after compaction shall be within the limits of 2 percentage points above optimum to 2 percentage points below optimum moisture content as determined by ASTM D 1557, except as otherwise noted on the Drawings.

3.11 COMPACTION

After a layer of material has been dumped and spread, it shall be harrowed to break up and blend the fill materials and to obtain uniform moisture distribution. Harrowing shall be performed with a heavy disk plow, or other approved harrow, to the full depth of the layer. If one pass of the harrow does not accomplish the breaking up and blending of the materials, additional passes of the harrow shall be required, but in no case will more than three passes of the harrow on any one layer be required for this purpose. When the moisture content and the condition of the layer are satisfactory, the lift shall be compacted to a minimum of 95 percent of the maximum dry density as determined by the Contractor in accordance with ASTM D 1557. In areas which are not accessible by roller, the fill shall be placed in layers not more than 6 inches in uncompacted depth and compacted with an approved hand operated compactor to a density equal to that obtained in other areas which are accessible to heavy equipment rollers. Dumping, spreading, sprinkling, and compacting may be performed at the same time at different points along a section when there is sufficient area to permit these operations to proceed simultaneously. Compaction equipment shall be operated such that the strip being traversed by the roller shall overlap the rolled adjacent strip by not less than 3 feet.

3.12 FIELD QUALITY CONTROL

3.12.1 Clearing, Grubbing, and Stripping

Establish and maintain quality control for clearing, grubbing, and stripping operations to assure compliance with contract requirements, and maintain records of the quality control for all construction operations including but not limited to the items indicated below. These records, as well as the records of corrective actions taken, shall be furnished to the Government in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

3.12.1.1 Clearing

Station to station limits, transverse clearing limits from applicable centerline; percentage of area complete; types of materials cleared.

3.12.1.2 Grubbing

Station to station limits, transverse grubbing limits from applicable centerline; percentage of area complete; type of material; filling of grubbed holes.

3.12.1.3 Stripping

Station to station limits, transverse stripping limits from applicable

centerline; percentage of area complete; type of material.

3.12.2 Embankment

3.12.2.1 General

As a part of the Contractor Quality Control (CQC) system required by SECTION 01451 CONTRACTOR QUALITY CONTROL, establish and maintain field quality control for foundation preparation, embankment and fill operations to assure compliance with contract requirements and maintain detailed records of field quality control for all operations including but not limited to the following:

a. Earthwork Equipment

Type, size, number of units and suitability for construction of the prescribed work.

b. Foundation Preparation

Methods of preparing the foundations in advance of embankment and fill construction and methods for providing drainage of the foundation and partially completed fills.

3.12.2.2 Testing

Testing shall be performed by an approved commercial testing laboratory. If the Contractor elects to establish testing facilities, no work requiring testing will be permitted until the Contractor's facilities have been inspected and approved by the Contracting Officer. Field in-place density shall be determined in accordance with ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. When using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017; the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a registered professional civil engineer. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

a. Fill and Backfill Material Gradation. One test per 500 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with ASTM C 136 and ASTM D 1140 as applicable.

b. In-Place Densities.

(1) One test per 3000 square feet, or fraction thereof, of each lift

of fill or backfill areas compacted by other than hand-operated machines.

- (2) One test per 1000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.
- (3) One test per 500 linear feet, or fraction thereof, of each lift of embankment or backfill for roads.

c. Moisture Contents. In the stockpile or excavation, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions shall be performed. During unstable weather, tests shall be made as dictated by local conditions and approved by the Contracting Officer. Perform the tests in accordance with ASTM D 2216. In the placed fill or backfill, perform moisture content tests (following ASTM D 3017) at every density test performed following ASTM D 2922.

d. Optimum Moisture and Laboratory Maximum Density. Tests shall be made for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 500 cubic yards of fill and backfill, or when any change in material occurs.

e. Tolerance Tests for Subgrades. Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.12.2.3 Materials

Suitability of materials for use in embankment and fill.

3.12.2.4 Fill Placement

Layout, maintaining existing drainage, moisture control, thickness of layers, removal of oversized material, spreading and compaction for embankment and fill.

3.12.2.5 Grade and Cross Section

Surveys to verify that the dimensions, slopes, lines and grades conform to those shown on the drawings.

3.12.2.6 Testing by the Government

During the life of this contract, the Government or its contractors will perform quality assurance tests. The contractor shall make available to the government or its contractors the equipment to perform these test.

3.12.2.7 Reporting

On a daily basis, the Contractor shall furnish the inspection records and all material testing results, as well as the records of corrective action taken, in accordance with Section 01451 CONTRACTOR QUALITY CONTROL.

3.13 SUBGRADE AND EMBANKMENT PROTECTION

During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain

effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No subbase, base course, or pavement shall be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, or pavement be placed on a muddy or spongy, subgrade.

3.14 MAINTENANCE OF WORK

3.14.1 Debris Removal

Maintain all ditch and channel excavations free from leaves, brush, sticks, trash, and other debris until final acceptance of all work under the contract at no additional cost to the Government.

3.14.2 Sediment Removal

Prior to final acceptance of all work under this contract, the removal of sediments from ditch or channel excavations shall be required to restore design grade and section at no additional cost to the Government.

-- End of Section --

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SECTION 08810

GLASS AND GLAZING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1 (1984; R 1994) Safety Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 920 (2002) Elastomeric Joint Sealants
ASTM C 1036 (1991; R 1997) Flat Glass
ASTM C 1048 (1997b) Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass
ASTM C 1172 (1996e1) Laminated Architectural Flat Glass
ASTM D 395 (1998) Rubber Property - Compression Set
ASTM E 1300 (2000) Determining the Minimum Thickness and Type of Glass Required to Resist a Specific Load
ASTM F 1233 (1998) Standard Test Method for Security Glazing Materials and Systems

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201 Safety Standard for Architectural Glazing Materials

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual (1997) Glazing Manual
GANA Standards Manual (1995) Engineering Standards Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1999) Fire Doors and Fire Windows

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation; G|ED

Drawings showing complete details of the proposed setting methods, mullion details, edge blocking, size of openings, frame details, materials, and types and thickness of glass.

SD-03 Product Data

Insulating Glass; G|ED
Glazing Accessories; G|ED
Plastic Glazing; G|ED

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-07 Certificates

Insulating Glass; G|ED

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

1.3 SYSTEM DESCRIPTION

Glazing systems shall be fabricated and installed watertight and airtight to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, and defects in the work. Glazed panels shall comply with the safety standards, as indicated in accordance with ANSI Z97.1. Glazed panels shall comply with indicated wind loading in accordance with ASTM E 1300.

1.4 DELIVERY, STORAGE AND HANDLING

Glazing compounds shall be delivered to the site in the manufacturer's unopened containers. Glass shall be stored indoors in a safe, well ventilated dry location in accordance with manufacturer's instructions, and shall not be unpacked until needed for installation. Glass shall not be stored on site over 1 month.

1.5 PROJECT/SITE CONDITIONS

Glazing work shall not be started until outdoor temperature is above 40 degrees F and rising, unless procedures recommended by glass manufacturer and approved by Contracting Officer are made to warm the glass and rabbet surfaces. Ventilation shall be provided to prevent condensation of moisture on glazing work during installation. Glazing work shall not be performed during damp or raining weather.

PART 2 PRODUCTS

2.1 HEAT-TREATED GLASS

Heat-treated glass shall conform to the following requirements.

2.1.1 Tempered Glass

Tempered glass shall be provided in insulated unit and shall be kind FT fully tempered transparent flat type, Class 1-clear, Condition A uncoated surface, Quality q3 - glazing select, conforming to ASTM C 1048 and GANA Standards Manual. Color shall be clear. Label to appear permanently on each lite.

2.2 LAMINATED GLAZINGS

2.2.1 Laminated Glass

Laminated glass shall consist of two layers of Type I transparent float glass, Class 1-clear Quality q3 - glazing select, conforming to ASTM C 1036. Glass shall be bonded together with 0.030 inchthick PVB interlayer under pressure, or alternatives such as resin laminates, conforming to requirements of 16 CFR 1201 and ASTM C 1172. Color shall be clear.

2.3 PLASTIC GLAZING

Plastic glazing, 4-ply polycarbonate to comply with ASTM F 1233 and ANSI Z97.1.

2.4 GLAZING ACCESSORIES

2.4.1 Preformed Tape

Preformed tape shall be elastomeric rubber extruded into a ribbon of a width and thickness suitable for specific application. Tape shall be of type which will remain resilient, have excellent adhesion, and be chemically compatible to glass, metal, or wood.

2.4.2 Sealant

Sealant shall be elastomeric conforming to ASTM C 920, Type S or M, Grade NS, Class 12.5, Use G, of type chemically compatible with setting blocks, preformed sealing tape and sealants used in manufacturing insulating glass. Color of sealant shall be as selected, grey.

2.4.3 Glazing Gaskets

Glazing gaskets shall be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening shall be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets shall be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Glazing gasket profiles shall be as indicated on drawings.

2.4.4 Setting and Edge Blocking

Neoprene setting blocks shall be dense extruded type conforming to ASTM D 395, Method B, Shore A durometer between 70 and 90. Edge blocking shall be Shore A durometer of 50 (+ or - 5). Silicone setting blocks shall be required when blocks are in contact with silicone sealant. Profiles, lengths and locations shall be as required and recommended in writing by glass manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

Openings and framing systems scheduled to receive glass shall be examined for compliance with approved shop drawings, GANA Glazing Manual and glass manufacturer's recommendations including size, squareness, offsets at corners, presence and function of weep system, face and edge clearance requirements and effective sealing between joints of glass-framing members. Detrimental materials shall be removed from glazing rabbet and glass surfaces and wiped dry with solvent. Glazing surfaces shall be dry and free of frost.

3.2 INSTALLATION

Glass and glazing work shall be performed in accordance with approved shop drawings, GANA Glazing Manual, glass manufacturer's instructions and warranty requirements. Glass shall be installed with factory labels intact and removed only when instructed. Wired glass and fire/safety rated glass shall be installed in accordance with NFPA 80. Edges and corners shall not be ground, nipped or cut after leaving factory. Springing, forcing or twisting of units during installation will not be permitted.

3.3 CLEANING

Upon completion of project, outside surfaces of glass shall be washed clean and the inside surfaces of glass shall be washed and polished in accordance with glass manufacturer's recommendations.

3.4 PROTECTION

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Reflective glass shall be protected with a protective material to eliminate any contamination of the reflective coating. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units at no additional cost to the Government.

-- End of Section --

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SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values (1999) Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices

ACGIH TLV-DOC Documentation of Threshold Limit Values and Biological Exposure Indices

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A13.1 (1996; R 2002) Scheme for Identification of Piping Systems

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 523 (1999) Standard Test Method for Specular Gloss

ASTM D 2092 (1995) Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting

ASTM D 4263 (1983; R 1999) Indicating Moisture in Concrete by the Plastic Sheet Method

ASTM D 4444 (1998) Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters

ASTM F 1869 (1998) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000 Air Contaminants

FEDERAL STANDARDS (FED-STD)

FED-STD-313 (Rev. C) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

MASTER PAINTERS INSTITUTE (MPI)

MPI 4	(2001) Interior/Exterior Latex Block Filler
MPI 9	(May 2002) Exterior Alkyd Enamel
MPI 10	(2001) Exterior Latex, Flat
MPI 23	(2001) Surface Tolerant Metal Primer
MPI 26	(2001) Cementitious Galvanized Metal Primer
MPI 47	(May 2002) Interior Alkyd, Semi-Gloss
MPI 50	(May 2002) Interior Latex Primer Sealer
MPI 54	(May 2002) Interior Latex, Semi-Gloss
MPI 79	(2001) Marine Alkyd Metal Primer
MPI 107	(2001) Rust Inhibitive Primer (Water-Based)
MPI 113	(2001) Elastomeric Coating
MPI 141	(2001) High Performance Semigloss Latex, White and Tints - Gloss Level 5

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS-EPP-SP01-01	(2001) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints
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STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC PA 1	(2000) Shop, Field, and Maintenance Painting
SSPC PA 3	(1995) Safety in Paint Application
SSPC VIS 1	(1989) Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs)
SSPC VIS 3	(1993) Visual Standard for Power- and Hand-Tool Cleaned Steel (Standard Reference Photographs)
SSPC VIS 4	(2001) Guide and Reference Photographs for Steel Surfaces Prepared by Waterjetting
SSPC SP 1	(1982; R 2000) Solvent Cleaning
SSPC SP 2	(1995) Hand Tool Cleaning
SSPC SP 3	(1995) Power Tool Cleaning
SSPC SP 6	(2000) Commercial Blast Cleaning

SSPC SP 7	(2000) Brush-Off Blast Cleaning
SSPC SP 10	(1994; R 1995) Near-White Blast Cleaning
SSPC SP 12	(1995) Surface Preparation and Cleaning of Steel and Other Hard Materials by High-and Ultra high-Pressure Water Jetting Prior to Recoating

1.2 SUBMITTALS

Submit the following in accordance with Section 01330, "Submittal Procedures."

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI Approved Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS-EPP-SP01-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-02 Shop Drawings

Piping identification

Submit color stencil codes

SD-03 Product Data

Coating; G|ED

Manufacturer's Technical Data Sheets

Manufactured labels for piping identification

Submit information on piping identification labels if used.

Piping Legend

Valve Identification List

SD-04 Samples

Color; G|ED

Submit manufacturer's samples of paint colors.

SD-07 Certificates

Applicator's qualifications

Qualification Testing laboratory for coatings G|ED

SD-08 Manufacturer's Instructions

Application instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, potlife, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-10 Operation and Maintenance Data

Coatings: G|ED

Preprinted cleaning and maintenance instructions for all coating systems shall be provided.

1.3 APPLICATOR'S QUALIFICATIONS

1.3.1 Contractor Qualification

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

Position or responsibility

Employer (if other than the Contractor)

Name of facility owner

Mailing address, telephone number, and telex number (if non-US) of facility owner

Name of individual in facility owner's organization who can be contacted as a reference

Location, size and description of structure

Dates work was carried out

Description of work carried out on structure

1.3.2 SSPC Certification

All contractors and subcontractors that perform surface preparation or coating application shall be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) prior to contract award, and shall remain certified while accomplishing any surface preparation or coating application. The painting contractors and painting subcontractors must remain so certified for the duration of the project. If a contractor's or subcontractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered and liquidated damages will apply. Notify the Contracting Officer of any change in contractor certification status.

1.4 REGULATORY REQUIREMENTS

1.4.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.4.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.4.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.4.4 Asbestos Content

Materials shall not contain asbestos.

1.4.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.4.6 Silica

Abrasive blast media shall not contain free crystalline silica.

1.4.7 Human Carcinogens

Materials shall not contain ACGIH Limit Values and ACGIH TLV-DOC confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.5 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented

paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F.

1.6 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01525, "Safety Requirements" and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC PA 3.

1.6.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

- a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.
- b. 29 CFR 1910.1000.
- c. ACGIH Limit Values, threshold limit values.

1.7 ENVIRONMENTAL CONDITIONS

1.7.1 Coatings

Do not apply coating when air or substrate conditions are:

- a. Less than 5 degrees F above dew point;
- b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.8 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color, texture, and pattern of wall coating systems shall be in accordance with Section 09915 COLOR SCHEDULE.

1.9 LOCATION AND SURFACE TYPE TO BE PAINTED

1.9.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

- a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.
- b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.
- c. Existing coated surfaces that are damaged during performance of the work.

1.9.1.1 Exterior Painting

Includes new surfaces of the building and appurtenances as indicated. Also included are existing coated surfaces made bare by cleaning operations.

1.9.1.2 Interior Painting

Includes new surfaces of the building and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

- a. Other contiguous surfaces.

1.9.2 Painting Excluded

Do not paint the following unless indicated otherwise.

- a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.
- b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.
- c. Steel to be embedded in concrete.
- d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.
- e. Hardware, fittings, and other factory finished items.

1.9.3 Mechanical and Electrical Painting

Includes field coating of new surfaces.

- a. Where a space or surface is indicated to be painted, include the

following items unless indicated otherwise.

- (1) Exposed piping and ductwork;
- (2) Supports, hangers, air grilles, and registers;
- (3) Miscellaneous metalwork and insulation coverings.

1.9.4 Exterior Painting of Site Work Items

See Section 09965 PAINTING: HYDRAULIC STRUCTURES FOR REQUIREMENTS AND LOCATIONS.

1.9.5 Definitions and Abbreviations

1.9.5.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.9.5.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.9.5.3 Coating

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendaring, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.9.5.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.9.5.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.9.5.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.9.5.7 EXT

MPI short term designation for an exterior coating system.

1.9.5.8 INT

MPI short term designation for an interior coating system.

1.9.5.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.9.5.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.9.5.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.9.5.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with ASTM D 523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.9.5.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.9.5.14 Paint

See Coating definition.

1.9.5.15 REX

MPI short term designation for an exterior coating system used in repainting projects or over existing coating systems.

1.9.5.16 RIN

MPI short term designation for an interior coating system used in repainting projects or over existing coating systems.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property, and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.3 PREPARATION OF METAL SURFACES

3.3.1 New Ferrous Surfaces

- a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.
- b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/SSPC SP 12 WJ-3

3.3.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7, SSPC SP 6, and SSPC SP 10. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

For waterjet cleaned surfaces, the requirements are stated in SSPC SP 12. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 4.

3.3.3 Galvanized Surfaces

- a. New or Existing Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D 2092, Appendix X2, and remove by one of the methods described therein.

3.3.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

- a. Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

3.4 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.4.1 Concrete and Masonry

- a. Curing: Concrete, stucco and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.
- b. Surface Cleaning: Remove the following deleterious substances.
 - (1) Dirt, Chalking, Grease, and Oil: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. For large areas, water blasting may be used.
 - (2) Fungus and Mold: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.
 - (3) Paint and Loose Particles: Remove by wire brushing.
 - (4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of

hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

- c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.
- d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D 4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F 1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.4.2 Gypsum Board, Plaster, and Stucco

- a. Surface Cleaning: Plaster and stucco shall be clean and free from loose matter; gypsum board shall be dry. Remove loose dirt and dust by brushing with a soft brush, rubbing with a dry cloth, or vacuum-cleaning prior to application of the first coat material. A damp cloth or sponge may be used if paint will be water-based.
- b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.
- c. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D 4263. New plaster to be coated shall have a maximum moisture content of 8 percent, when measured in accordance with ASTM D 4444, Method A, unless otherwise authorized. In addition to moisture content requirements, allow new plaster to age a minimum of 30 days before preparation for painting.

3.5 APPLICATION

3.5.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

3.5.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 1 pint of suitable thinner per gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.5.3 Coating Systems

- a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 3. Exterior Concrete Paint Table
Division 4. Exterior Concrete Masonry Units Paint Table
Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table

Division 3. Interior Concrete Paint Table
Division 4. Interior Concrete Masonry Units Paint Table
Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table

Division 9: Interior Plaster, Gypsum Board, Textured Surfaces
Paint Table

- b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.
- c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.
- d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with

the following:

- (1) One coat of primer.
- (2) One coat of undercoat or intermediate coat.
- (3) One topcoat to match adjacent surfaces.

3.6 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

- a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.
- b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.
- c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.
- d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.
- e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.
- f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.7 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

3.8 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Color code marking shall be of the color listed in Table I and the size listed in Table II. Provide in accordance with ANSI A13.1. Use either manufactured labels or stenciling. If manufactured labels are used, they shall be specifically designed and manufactured for the application. Labels printed by the Contractor shall not be allowed. Place piping identifications in clearly visible locations. On piping not covered by ANSI A13.1, provide labels or stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Provide arrow-shaped markings on piping to indicate direction of flow using black stencil paint or manufactured labels.

TABLE I. COLOR CODES FOR MARKING PIPE

Material	Band	Letter & Arrow	Legend
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TABLE I. COLOR CODES FOR MARKING PIPE

Cold water (domestic)	Green	White	POTABLE WATER
Hot water (domestic)	Green	White	H.W.
Well water	Green	White	WELL WATER
Engine Coolant supply	Yellow	Black	ENG COOL SUP
Engine coolant return	Yellow	Black	ENG COOL RET
Storm water	Green	White	STORM WATER
Chemical feed	Yellow	Black	CH. FEED
Refrigerants	Blue	White	REFRIGERANT
Fuel oil supply	Yellow	Black	FUEL OIL
Fuel oil return	Yellow	Black	FUEL OIL RET
Fuel oil vent	Yellow	Black	FUEL OIL VENT

TABLE II. COLOR CODE MARKING SIZES

Outside Diameter of Pipe Covering (Inches)	Length of Color Band (Inches)	Arrow Length x Width (Inches)	Size of Legend Letters & Numerals (Inches)
Less than 1-1/2	8	8 x 2-1/4	1/2
Over 1-1/2	12	8 x 2-1/4	1-1/4

3.9 PIPING LEGEND

Provide a piping legend that clearly describes the types of pipes, color schemes, identification markings, etc., that facilitates the identification of all piping systems. The legend shall be a minimum of 17" X 11", and shall be laminated. Hang the legend on a wall in the pump station in a location as directed by the Contracting Officer.

3.10 VALVE IDENTIFICATION LIST

Provide a list of all of the valves to be used in the station and outside of the station (e.g., at the tank farm). The list shall include the location of each valve, the valve number, the make and model, and in which system the valve is used.

3.11 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.12 PAINT TABLES

All DFT's are minimum values.

3.12.1 EXTERIOR PAINT TABLES

DIVISION 3: EXTERIOR CONCRETE PAINT TABLE

A. New concrete, elastomeric System; vertical surfaces:

1. Elastomeric Coating

New; MPI EXT 3.1F /	Existing; MPI REX 3.1F	
Primer:	Intermediate:	Topcoat:
Per Manufacturer	MPI 113	MPI 113

DIVISION 3: EXTERIOR CONCRETE PAINT TABLE

System DFT: 16 mils

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and number of coats in accordance with manufacturer's instructions.

NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils.

DIVISION 4: EXTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New concrete masonry, elastomeric system; on uncoated surface:

1. Elastomeric Coating

New; MPI EXT 4.2D / Existing; MPI REX 4.2D

Primer: Intermediate: Topcoat:

Per Manufacturer MPI 113 MPI 113

System DFT: 16 mils

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and number of coats in accordance with manufacturer's instructions.

NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils.

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. Alkyd

New; MPI EXT 5.1Q-G6 (Gloss) / Existing; MPI REX 5.1D-G6

Primer: Intermediate: Topcoat:

MPI 23 MPI 9 MPI 9

System DFT: 5.25 mils

EXTERIOR GALVANIZED SURFACES

B. New Galvanized surfaces:

1. Cementitious primer / Latex

MPI EXT 5.3A-G1 (Flat)

Primer: Intermediate: Topcoat:

MPI 26 MPI 10 MPI 10

System DFT: 4.5 mils

DIVISION 9: EXTERIOR STUCCO PAINT TABLE

A. New stucco, elastomeric system:

1. Elastomeric Coating

DIVISION 9: EXTERIOR STUCCO PAINT TABLE

New; MPI EXT 9.1C / Existing; MPI REX 9.1C
Primer: Intermediate: Topcoat:
N/A MPI 113 MPI 113
System DFT: 16 mils

Primer as recommended by manufacturer. Topcoat: Coating to match adjacent surfaces. Surface preparation and # of coats in accordance with manufacturer's instructions).

NOTE: Apply sufficient coats of MPI 113 to achieve a minimum dry film thickness of 16 mils .

3.12.2 INTERIOR PAINT TABLES

DIVISION 3: INTERIOR CONCRETE PAINT TABLE

A. New Concrete, vertical surfaces, not specified otherwise:

1. Latex
2. High Performance Architectural Latex

New; MPI INT 3.1C-G5 (Semigloss) / Existing; MPI RIN 3.1J-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 50 MPI 141 MPI 141
System DFT: 4 mils

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New Concrete masonry:

1. High Performance Architectural Latex

MPI INT 4.2D-G5 (Semigloss)
Filler Primer: Intermediate: Topcoat:
MPI 4 N/A MPI 141 MPI 141
System DFT: 11 mils

Fill all holes in masonry surface

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

MPI INT 5.1E-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 79 MPI 47 MPI 47
System DFT: 5.25 mils

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

A. New Wallboard not otherwise specified:

Modified Water Deliveries to ENP
8.5 Square Mile Area

W912EP-04-R-0006

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE
New; MPI INT 9.2A-G5 (Semigloss) / Existing; RIN 9.2A-G5 (Semigloss)
Primer: Intermediate: Topcoat:
MPI 50 MPI 54 MPI 54
System DFT: 4 mils

-- End of Section --

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DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13850

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SECTION 13850

FIRE DETECTION AND ALARM SYSTEM, DIRECT CURRENT LOOP

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S3.41 (1990; R 1996) Audible Emergency
Evacuation Signal

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.41 (1991; R 1995) Surge Voltages in
Low-Voltage AC Power Circuits

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10 (2002) Portable Fire Extinguishers

NFPA 70 (1999) National Electrical Code

NFPA 72 (1999) National Fire Alarm Code

NFPA 90A (1999) Installation of Air Conditioning
and Ventilating Systems

UNDERWRITERS LABORATORIES (UL)

UL 1242 (1996; Rev Mar 1998) Intermediate Metal
Conduit

UL 1971 (1995; Rev thru Apr 1999) Signaling
Devices for the Hearing Impaired

UL 268 (1996; Rev thru Jan 1999) Smoke Detectors
for Fire Protective Signaling Systems

UL 268A (1998) Smoke Detectors for Duct Application

UL 38 (1999) Manually Actuated Signaling Boxes
for Use with Fire-Protective Signaling
Systems

UL 464 (1996; Rev thru May 1999) Audible Signal
Appliances

UL 521 (1999) Heat Detectors for Fire Protective
Signaling Systems

UL 6	(1997) Rigid Metal Conduit
UL 797	(1993; Rev thru Mar 1997) Electrical Metallic Tubing
UL 864	(1996; Rev thru Mar 1999) Control Units for Fire Protective Signaling Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fire Alarm Reporting System; G|ED

Detail drawings, prepared and signed by a Registered Professional Engineer or a NICET Level 4 Fire Alarm Technician, consisting of a complete list of equipment and material, including manufacturer's descriptive and technical literature, catalog cuts, and installation instructions. Note that the contract drawings show layouts based on typical detectors. The Contractor shall check the layout based on the actual detectors to be installed and make any necessary revisions in the detail drawings. The detail drawings shall also contain complete wiring and schematic diagrams for the equipment furnished, equipment layout, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Detailed point-to-point wiring diagram shall be prepared and signed by a Registered Professional Engineer or a NICET Level 4 Fire Alarm Technician showing points of connection. Diagram shall include connections between system devices, appliances, control panels, supervised devices, and equipment that is activated or controlled by the panel.

SD-03 Product Data

Storage Batteries; G|ED

Substantiating battery calculations for supervisory and alarm power requirements. Ampere-hour requirements for each system component and each panel component, and the battery recharging period shall be included.

Voltage Drop; G|ED

Voltage drop calculations for notification appliance circuits to indicate that sufficient voltage is available for proper appliance operation.

Spare Parts; G|ED

Spare parts data for each different item of material and equipment specified, not later than 3 months prior to the date of

beneficial occupancy. Data shall include a complete list of parts and supplies with the current unit prices and source of supply and a list of the parts recommended by the manufacturer to be replaced after 1 year of service.

Technical Data and Computer Software; G|ED

Technical data which relates to computer software.

Training; G|ED

Lesson plans, operating instructions, maintenance procedures, and training data, furnished in manual format, for the training courses. The operations training shall familiarize designated government personnel with proper operation of the fire alarm system. The maintenance training course shall provide the designated government personnel adequate knowledge required to diagnose, repair, maintain, and expand functions inherent to the system.

Testing; G|ED

Detailed test procedures, prepared and signed by a Registered Professional Engineer or a NICET Level 4 Fire Alarm Technician, for the fire detection and alarm system 60 days prior to performing system tests.

SD-06 Test Reports

Testing; G|ED

Test reports, in booklet form, showing field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall document readings, test results and indicate the final position of controls. The Contractor shall include the NFPA 72 Certificate of Completion and NFPA 72 Inspection and Testing Form, with the appropriate test reports.

SD-07 Certificates

Equipment; G|ED

Certified copies of current approvals or listings issued by an independent test lab if not listed by UL, FM or other nationally recognized testing laboratory, showing compliance with specified NFPA standards.

Qualifications; G|ED

Proof of qualifications for required personnel. The installer shall submit proof of experience for the Professional Engineer, fire alarm technician, and the installing company.

SD-10 Operation and Maintenance Data

Technical Data and Computer Software; G|ED

Six copies of operating instructions outlining step-by-step

procedures required for system startup, operation, and shutdown. The instructions shall include the manufacturer's name, model number, service manual, parts list, and complete description of equipment and their basic operating features. Six copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The instructions shall include conduit layout, equipment layout and simplified wiring, and control diagrams of the system as installed. The instructions shall include the information provided in paragraph TECHNICAL DATA AND COMPUTER SOFTWARE. The instructions shall include complete procedures for system revision and expansion, detailing both equipment and software requirements. Original and backup copies of all software delivered for this project shall be provided, on each type of media utilized. Instructions shall be approved prior to training.

1.3 GENERAL REQUIREMENTS

1.3.1 Standard Products

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that can provide service within 24 hours of notification.

1.3.2 Nameplates

Major components of equipment shall have the manufacturer's name, address, type or style, voltage and current rating, and catalog number on a noncorrosive and nonheat-sensitive plate which is securely attached to the equipment.

1.3.3 Keys and Locks

Locks shall be keyed alike. Four keys for the system shall be provided.

1.4.4 Tags

Tags with stamped identification number shall be furnished for keys and locks.

1.3.5 Verification of Dimensions

After becoming familiar with details of the work, the Contractor shall verify dimensions in the field and shall advise the Contracting Officer of any discrepancy before performing the work.

1.3.6 Compliance

The fire detection and alarm system and the central reporting system shall be configured in accordance with NFPA 72; exceptions are acceptable as directed by the Contracting Officer. The equipment furnished shall be compatible and be UL listed, FM approved, or approved or listed by a nationally recognized testing laboratory in accordance with the applicable NFPA standards.

1.3.7 Qualifications

1.3.7.1 Engineer and Technician

a. Registered Professional Engineer with verification of experience and at least 4 years of current experience in the design of the fire protection and detection systems.

b. National Institute for Certification in Engineering Technologies (NICET) qualifications as an engineering technician in fire alarm systems program with verification of experience and current NICET certificate.

c. The Registered Professional Engineer may perform all required items under this specification. The NICET Fire Alarm Technician shall perform only the items allowed by the specific category of certification held.

1.3.7.2 Installer

The installing Contractor shall provide the following: NICET Fire Alarm Technicians to perform the installation of the system. A NICET Level 4 Fire Alarm Technician shall supervise the installation of the fire alarm system. NICET Level 2 or higher Fire Alarm Technician shall install and terminate fire alarm devices, cabinets and panels. An electrician or NICET Level 1 Fire Alarm Technician shall install conduit for the fire alarm system. The Fire Alarm technicians installing the equipment shall be factory trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

1.3.7.3 Design Services

Installations requiring designs or modifications of fire detection, fire alarm, or fire suppression systems shall require the services and review of a qualified fire protection engineer. For the purposes of meeting this requirement, a qualified fire protection engineer is defined as an individual meeting one of the following conditions:

- a. An engineer having a Bachelor of Science or Masters of Science Degree in Fire Protection Engineering from an accredited university engineering program, plus a minimum of 2 years' work experience in fire protection engineering.
- b. A registered professional engineer (P.E.) in fire protection engineering.
- c. A registered PE in a related engineering discipline and member grade status in the National Society of Fire Protection Engineers.
- d. An engineer with a minimum of 10 years' experience in fire protection engineering and member grade status in the National Society of Fire Protection Engineers

1.4 SYSTEM DESIGN

1.4.1 Operation

The fire alarm and detection system shall be a complete, supervised fire alarm reporting system. The system shall be activated into the alarm mode by actuation of any alarm initiating device. The system shall remain in

the alarm mode until the initiating device is reset and the fire alarm control panel is reset and restored to normal. Alarm initiating devices shall be connected to initiating device circuits (IDC), Style D, in accordance with NFPA 72. Alarm notification appliances shall be connected to notification appliance circuits (NAC), Style Z in accordance with NFPA 72.

A looped conduit system shall be provided so that if the conduit and all conductors within are severed at any point, all IDC, or NAC will remain functional. The conduit loop requirement is not applicable to the signal transmission link from the local panels (at the protected premises) to the Supervising Station (fire station, fire alarm central communication center). Textual, audible, and visual appliances and systems shall comply with NFPA 72. Fire alarm system components requiring power, except for the control panel power supply, shall operate on 24 Volts dc.

1.4.2 Operational Features

The system shall have the following operating features:

- a. Monitor electrical supervision of alarm IDC and NAC. Smoke detectors shall not have combined alarm initiating and power circuits.
- b. Monitor electrical supervision of the primary power (ac) supply, battery voltage, placement of alarm zone module (card, PC board) within the control panel, and transmitter tripping circuit integrity.
- c. A trouble buzzer and trouble light emitting diode (LED) to activate upon a single break, open, or ground fault condition which prevents the required normal operation of the system. The trouble signal shall also operate upon loss of primary power (ac) supply, low battery voltage, removal of alarm zone module (card, PC board), and disconnection of the circuit used for transmitting alarm signals off-premises. A trouble alarm silence switch shall be provided which will silence the trouble buzzer, but will not extinguish the trouble indicator LED. Subsequent trouble and supervisory alarms shall sound the trouble signal until silenced. After the system returns to normal operating conditions, the trouble buzzer shall again sound until the silencing switch returns to normal position, unless automatic trouble reset is provided.
- d. A one person test mode. Activating an initiating device in this mode will activate an alarm for a short period of time, then automatically reset the alarm, without activating the transmitter during the entire process.
- e. Evacuation alarm silencing switch which, when activated, will silence alarm devices, but will not affect the zone indicating LED/LCD nor the operation of the transmitter. This switch shall be over-riden upon activation of a subsequent alarm from an unalarmed zone and the NAC devices will be activated.
- f. Confirmation or verification modules for smoke detection initiating circuits. The modules shall interrupt the transmission of an alarm signal to the system control panel for a factory preset period. This interruption period shall be adjustable from 1 to 60 seconds and be factory set at 20 seconds. Immediately following the interruption period, a confirmation period shall be

in effect during which time an alarm signal, if present, will be sent immediately to the control panel. Fire alarm devices, other than smoke detectors, will be prohibited on circuits controlled by confirmation or verification modules.

- g. The fire alarm control panel shall provide supervised relays for HVAC shutdown. An override at the HVAC panel shall not be provided.
- h. Zones for alarm IDC and NAC shall be arranged as indicated on the contract drawings.
- i. The fire alarm control panel shall be readily capable of future expansion and modification by qualified technicians. Examples of required changes are: adding or deleting devices or zones; changing system responses to particular input signals; programming certain input signals to activate auxiliary devices.

1.4.3 Alarm Functions

An alarm condition on a circuit shall automatically initiate the following functions:

- a. Transmission of a signal to the Moscad PLC. The signals shall be different for each zone.
- b. Visual indications of the alarmed zones on the fire alarm control panel annunciator.
- c. Continuous sounding or operation of alarm notification appliances throughout the building as required by ANSI S3.41.
- d. Deactivation of the air handling units throughout the building.

1.4.4 Primary Power

Operating power shall be provided as required by paragraph Power Supply for the System. Transfer from normal to emergency power or restoration from emergency to normal power shall be fully automatic and not cause transmission of a false alarm. Loss of ac power shall not prevent transmission of a signal via the fire reporting system upon operation of any initiating circuit.

1.4.5 Battery Backup Power

Battery backup power shall be through use of rechargeable, sealed-type storage batteries and battery charger.

1.4.6 Interface With Other Equipment

Interfacing components shall be furnished as required to connect to subsystems or devices which interact with the fire alarm system, such as supervisory or alarm contacts in suppression systems, operating interfaces for smoke control systems, door releases, etc.

1.5 TECHNICAL DATA AND COMPUTER SOFTWARE

Technical data and computer software (meaning technical data which relates to computer software) which is specifically identified in this project, and

which may be defined/required in other specifications, shall be delivered in accordance with the CONTRACT CLAUSES, and in accordance with the Contract Data Requirements List, DD Form 1423. Data delivered shall be identified by reference to the particular specification paragraph against which it is furnished. Data to be submitted shall include complete system, equipment, and software descriptions. Descriptions shall show how the equipment will operate as a system to meet the performance requirements of this contract. The data package shall also include the following:

- (1) Identification of programmable portions of system equipment and capabilities.
- (2) Description of system revision and expansion capabilities and methods of implementation detailing both equipment and software requirements.
- (3) Provision of operational software data on all modes of programmable portions of the fire alarm and detection system.
- (4) Description of Fire Alarm Control Panel equipment operation.
- (5) Description of auxiliary and remote equipment operations.
- (6) Library of application software.
- (7) Operation and maintenance manuals described under SD-19 in the SUBMITTALS paragraph.

1.6 DELIVERY AND STORAGE

Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt, dust, and any other contaminants.

PART 2 PRODUCTS

2.1 CONTROL PANEL

The Fire Alarm Control Panel shall be Silent Knight Model 5207. Control panel shall comply with the applicable requirements of UL 864. Panel shall be modular, installed in a surface mounted steel cabinet with hinged door and cylinder lock. Control panel shall be a clean, uncluttered, and orderly assembled panel containing components and equipment required to provide the specified operating and supervisory functions of the system. The panel shall have prominent rigid plastic, phenolic or metal identification plates for LEDs, zones, controls, meters, fuses, and switches. Nameplates for fuses shall also include ampere rating. Separate alarm and trouble LEDs shall be provided for each zone alarm. These LEDs shall be located on the exterior of the cabinet door or be visible through the cabinet door. Control panel switches shall be within the locked cabinet. A suitable means (single operation) shall be provided for testing the control panel visual indicating devices (meters or LEDs). Meters and LEDs shall be plainly visible when the cabinet door is closed. Signals and LEDs shall be provided to indicate by zone any alarm, supervisory or trouble condition on the system. Each IDC shall be powered and supervised so that a signal on one zone does not prevent the receipt of signals from other zones. Loss of power, including batteries, shall not require the reloading of a program. Upon restoration of power, startup shall be automatic, and shall not require any manual operation. The loss of primary

power or the sequence of applying primary or emergency power shall not affect the transmission of alarm, supervisory or trouble signals. Visual annunciators shall be provided for each active zone and spare zone. Spare zones shall be provided as shown on the drawing. Each LED shall provide specific identification of the zone by means of a permanently attached rigid plastic, phenolic, or metal sign with either raised or engraved letters. Zone identification shall consist of a word description of the zone. Cabinets shall be provided with ample gutter space to allow proper clearance between the cabinet and live parts of the panel equipment. If more than one modular unit is required to form a control panel, the units shall be installed in a single cabinet large enough to accommodate units. Cabinets shall be painted red.

2.1.1 Remote System Trouble Audible/Visual Appliance

Audible appliance shall have a minimum sound level output rating of 85 dBA at 10 feet and operate in conjunction with the panel's integral trouble signal. The audible device shall be silenced by the system trouble silence switch located at the remote location, but shall not extinguish the visual indicator. A rigid plastic, phenolic or metal identification sign which reads "Fire Alarm System Trouble" shall be provided at the audible appliance. The visual appliance located with the audible appliance shall not be extinguished until the trouble has been cleared.

2.1.2 Circuit Connections

Circuit conductors entering or leaving the panel shall be connected to screw-type terminals with each conductor and terminal marked for identification.

2.1.3 System Expansion and Modification Capabilities

Any equipment and software needed by qualified technicians to implement future changes to the fire alarm system shall be provided as part of this contract.

2.2 STORAGE BATTERIES

Storage batteries shall be provided and shall be 24 Vdc sealed, lead-calcium type requiring no additional water. The batteries shall have ample capacity, with primary power disconnected, to operate the fire alarm system for a period of 72 hours. Following this period of battery operation, the batteries shall have ample capacity to operate all components of the system, including all alarm signaling devices in the total alarm mode for a minimum period of 15 minutes. Batteries shall be located at the bottom of the panel. Batteries shall be provided with overcurrent protection in accordance with NFPA 72. Separate battery cabinets shall have a lockable, hinged cover similar to the fire alarm panel. The lock shall be keyed the same as the fire alarm control panel.

2.3 BATTERY CHARGER

Battery charger shall be completely automatic, 24 Vdc with high/low charging rate, capable of restoring the batteries from full discharge (18 Volts dc) to full charge within 48 hours. A pilot light indicating when batteries are manually placed on a high rate of charge shall be provided as part of the unit assembly, if a high rate switch is provided. Charger shall be located in control panel cabinet or in a separate battery cabinet.

2.4 MANUAL FIRE ALARM STATIONS

Manual fire alarm stations shall conform to the applicable requirements of UL 38. Manual stations shall be connected into signal line circuits. Stations shall be installed on surface mounted outlet boxes. Manual stations shall be mounted at 48 inches. Stations shall be double action type. Stations shall be finished in red, with raised letter operating instructions of contrasting color. Stations requiring the breaking of glass or plastic panels for operation are not acceptable. Stations employing glass rods are not acceptable. The use of a key or wrench shall be required to reset the station. Gravity or mercury switches are not acceptable. Switches and contacts shall be rated for the voltage and current upon which they operate. Stations shall have a separate screw terminal for each conductor. Surface mounted boxes shall be matched and painted the same color as the fire alarm manual stations.

2.5 FIRE DETECTING DEVICES

Fire detecting devices shall comply with the applicable requirements of NFPA 72, NFPA 90A, UL 268, UL 268A, and UL 521. The detectors shall be provided as indicated. Detector base shall have screw terminals for making connections. No solder connections will be allowed. Detectors located in concealed locations (above ceiling, raised floors, etc.) shall have a remote visible indicator LED/LCD. Installed devices shall conform to the NFPA 70 hazard classification of the area where devices are to be installed.

2.5.1 Smoke Detectors

Smoke detectors shall be designed for detection of abnormal smoke densities. Smoke detectors shall be photoelectric or projected beam type. Detectors shall contain a visible indicator LED that shows when the unit is in alarm condition. Detectors shall not be adversely affected by vibration or pressure. Detectors shall be the plug-in type in which the detector base contains terminals for making wiring connections. Detectors that are to be installed in concealed (above false ceilings, etc.) locations shall be provided with a remote indicator LED suitable for mounting in a finished, visible location.

2.5.1.1 Photoelectric Detectors

Detectors shall operate on a light scattering concept using an LED light source. Failure of the LED shall not cause an alarm condition. Detectors shall be factory set for sensitivity and shall require no field adjustments of any kind. Detectors shall have an obscuration rating in accordance with UL 268.

2.5.1.2 Projected Beam Smoke Detectors

Detectors shall be designed for detection of abnormal smoke densities. Detectors shall consist of separate transmitter and receiver units. The transmitter unit shall emit an infrared beam to the receiver unit. When the signal at the receiver falls below a preset sensitivity, the detector shall initiate an alarm. The receiver shall contain an LED which is powered upon an alarm condition. Long-term changes to the received signal caused by environmental variations shall be automatically compensated. Detectors shall incorporate features to assure that they are operational; a trouble signal shall be initiated if the beam is obstructed, the limits of the compensation circuit are reached, or the housing cover is removed. Detectors shall have multiple sensitivity settings in order to meet UL

listings for the different distances covered by the beam. In the event of beam interference for more than three seconds a trouble alarm shall be transmitted.

2.6 NOTIFICATION APPLIANCES

Audible appliances shall conform to the applicable requirements of UL 464. Devices shall be connected into notification appliance circuits. Devices shall have a separate screw terminal for each conductor. Audible appliances shall generate a unique audible sound from other devices provided in the building and surrounding area. Surface mounted audible appliances shall be painted red. Recessed audible appliances shall be installed with a grill that is painted red.

2.6.1 Alarm Horns

Horns shall be surface mounted, with the matching mounting back box surface mounted double projector, grille and vibrating type suitable for use in an electrically supervised circuit. Horns shall produce a sound rating of at least 85 dBA at 10 feet. Horns used in exterior locations shall be specifically listed or approved for outdoor use and be provided with metal housing and protective grilles.

2.6.2 Visual Notification Appliances

Visual notification appliances shall conform to the applicable requirements of UL 1971. Appliances shall have clear high intensity optic lens, xenon flash tubes, and output white light. Strobe flash rate shall be between 1 to 3 flashes per second and a minimum of 75 candela. Strobe shall be surface mounted.

2.6.3 Combination Audible/Visual Notification Appliances

Combination audible/visual notification appliances shall provide the same requirements as individual units, except that they shall mount as a unit in standard backboxes. Units shall be factory assembled. Any other audible notification appliance employed in the fire alarm systems shall be approved by the Contracting Officer.

2.7 FIRE DETECTION AND ALARM SYSTEM PERIPHERAL EQUIPMENT

2.7.1 Conduit

Conduit and fittings shall comply with UL 6, UL 1242 and UL 797.

2.7.2 Wiring

Wiring shall conform to NFPA 70. Wiring for 120 Vac power shall be No. 12 AWG minimum. Wiring for Fire Alarm circuits shall be No. 14 AWG minimum. Voltages shall not be mixed in any junction box, housing, or device, except those containing power supplies and control relays. Wiring shall conform to NFPA 70. System field wiring shall be solid copper and installed in metallic conduit or electrical metallic tubing, except rigid plastic conduit may be used under slab-on-grade. Conductors shall be color coded. Conductors used for the same functions shall be similarly color coded. Wiring code color shall remain uniform throughout the circuit. Pigtail or T-tap connections to initiating device circuits, supervisory alarm circuits, and notification appliance circuits are prohibited.

2.7.3 Special Tools and Spare Parts

Software, connecting cables and proprietary equipment, necessary for the maintenance, testing, and reprogramming of the equipment shall be furnished to the Contracting Officer. Two spare fuses of each type and size required shall be furnished. Two percent of the total number of each different type of detector, but no less than two each, shall be furnished. Spare fuses shall be mounted in the fire alarm panel.

2.8 FIRE EXTINGUISHERS

Fire extinguishers shall be 10 LB, multipurpose, dry chemical, and comply with NFPA 10.

PART 3 EXECUTION

3.1 INSTALLATION

All work shall be installed as shown, and in accordance with NFPA 70 and NFPA 72, and in accordance with the manufacturer's diagrams and recommendations, unless otherwise specified. Smoke detectors shall not be installed until construction is essentially complete and the building has been thoroughly cleaned.

3.1.1 Power Supply for the System

A single dedicated circuit connection for supplying power from a branch circuit to each building fire alarm system shall be provided. The power shall be supplied as shown on the drawings. The power supply shall be equipped with a locking mechanism and marked in red with the words "FIRE ALARM CIRCUIT CONTROL".

3.1.2 Wiring

Conduit size for wiring shall be in accordance with NFPA 70. Wiring for the fire alarm system shall not be installed in conduits, junction boxes, or outlet boxes with conductors of lighting and power systems. Not more than two conductors shall be installed under any device screw terminal. The wires under the screw terminal shall be straight when placed under the terminal then clamped in place under the screw terminal. The wires shall be broken and not twisted around the terminal. Circuit conductors entering or leaving any mounting box, outlet box enclosure, or cabinet shall be connected to screw terminals with each terminal and conductor marked in accordance with the wiring diagram. Connections and splices shall be made using screw terminal blocks. The use of wire nut type connectors in the system is prohibited. Wiring within any control equipment shall be readily accessible without removing any component parts. The fire alarm equipment manufacturer's representative shall be present for the connection of wiring to the control panel.

3.1.3 Control Panel

The control panel and its assorted components shall be mounted so that no part of the enclosing cabinet is less than 12 inches nor more than 78 inches above the finished floor. Manually operable controls shall be between 36 and 42 inches above the finished floor. Panel shall be installed to comply with the requirements of UL 864.

3.1.4 Detectors

Detectors shall be located and installed in accordance with NFPA 72. Detectors shall be connected into signal line circuits or initiating device circuits as indicated on the drawings. Detectors shall be at least 12 inches from any part of any lighting fixture. Detectors shall be located at least 3 feet from diffusers of air handling systems. Each detector shall be provided with appropriate mounting hardware as required by its mounting location. Detectors which mount in open space shall be mounted directly to the end of the stubbed down rigid conduit drop. Conduit drops shall be firmly secured to minimize detector sway. Where length of conduit drop from ceiling or wall surface exceeds 3 feet, sway bracing shall be provided. Detectors installed in concealed locations (above ceiling, raised floors, etc.) shall have a remote visible indicator LED/LCD in a finished, visible location.

3.1.5 Notification Appliances

Notification appliances shall be mounted 80 inches above the finished floor or 6 inches below the ceiling, whichever is lower.

3.1.6 Annunciator Equipment

Annunciator equipment shall be mounted where indicated on the drawings.

3.2 OVERVOLTAGE AND SURGE PROTECTION

3.2.1 Power Line Surge Protection

All equipment connected to alternating current circuits shall be protected from surges per IEEE C62.41 B3 combination waveform and NFPA 70. Fuses shall not be used for surge protection. The surge protector shall be rated for a maximum let thru voltage of 350 Volts ac (line-to-neutral) and 350 Volt ac (neutral-to-ground).

3.2.2 Low Voltage DC Circuits Surge Protection

All IDC, NAC, and communication cables/conductors, except fiber optics, shall have surge protection installed at each point where it exits or enters a building. Equipment shall be protected from surges per IEEE C62.41 B3 combination waveform and NFPA 70. The surge protector shall be rated to protect the 24 Volt dc equipment. The maximum dc clamping voltages shall be 36 V (line-to-ground) and 72 Volt dc (line-to-line).

3.3 GROUNDING

Grounding shall be provided by connecting to building ground system.

3.4 TESTING

The Contractor shall notify the Contracting Officer at least 10 days before the preliminary and acceptance tests are to be conducted. The tests shall be performed in accordance with the approved test procedures in the presence of the Contracting Officer. The control panel manufacturer's representative shall be present to supervise tests. The Contractor shall furnish instruments and personnel required for the tests.

3.4.1 Preliminary Tests

Upon completion of the installation, the system shall be subjected to functional and operational performance tests including tests of each installed initiating and notification appliance, when required. Tests shall include the meggering of system conductors to determine that the system is free from grounded, shorted, or open circuits. The megger test shall be conducted prior to the installation of fire alarm equipment. If deficiencies are found, corrections shall be made and the system shall be retested to assure that it is functional. After completing the preliminary testing the Contractor shall complete and submit the NFPA 72, Certificate of Completion.

3.4.2 Acceptance Test

Acceptance testing shall not be performed until the Contractor has completed and submitted the Certificate of Completion. Testing shall be in accordance with NFPA 72. The recommended tests in NFPA 72 shall be considered mandatory and shall verify that previous deficiencies have been corrected. The Contractor shall complete and submit the NFPA 72, Inspection and Testing Form. The test shall include all requirements of NFPA 72 and the following:

- a. Test of each function of the control panel.
- b. Test of each circuit in both trouble and normal modes.
- c. Tests of each alarm initiating devices in both normal and trouble conditions.
- d. Tests of each control circuit and device.
- e. Tests of each alarm notification appliance.
- f. Tests of the battery charger and batteries.
- g. Complete operational tests under emergency power supply.
- h. Visual inspection of wiring connections.
- i. Opening the circuit at each alarm initiating device and notification appliance to test the wiring supervisory feature.
- j. Ground fault.
- k. Short circuit faults.
- l. Stray voltage.
- m. Loop resistance.

3.5 TRAINING

Training course shall be provided for the operations and maintenance staff. The course shall be conducted in the building where the system is installed or as designated by the Contracting Officer. The training period for systems operation shall consist of 1 training day (8 hours per day) and shall start after the system is functionally completed but prior to final acceptance tests. The training period for systems maintenance shall

consist of 1 training day (8 hours per day) and shall start after the system is functionally completed but prior to final acceptance tests. The instructions shall cover items contained in the operating and maintenance instructions.

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SECTION 16415

ELECTRICAL WORK, INTERIOR

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- | | |
|------------|---|
| ANSI C39.1 | (1981; R 1992) Requirements for Electrical Analog Indicating Instruments |
| ANSI C78.1 | (1991; C78.1a; R 1996) Fluorescent Lamps - Rapid-Start Types - Dimensional and Electrical Characteristics |
| ANSI C82.1 | (1997) Specifications for Fluorescent Lamp Ballasts |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- | | |
|-------------|---|
| ASTM D 709 | (2001) Laminated Thermosetting Materials |
| ASTM D 4059 | (2000) Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography. |

CODE OF FEDERAL REGULATIONS (CFR)

- | | |
|-----------|---|
| 47 CFR 18 | Industrial, Scientific, and Medical Equipment |
|-----------|---|

U.S. ARMY CORPS OF ENGINEERS (USACE)

- | | |
|-------------------------|--|
| <u>Details 40-06-04</u> | <u>(1997) USACE Standard Details 40-06-04, Selected Sheets Posted as D40-06-04.pdf</u> |
|-------------------------|--|

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

- | | |
|-------------|--|
| IEEE C57.13 | (1993) Instrument Transformers |
| IEEE C62.41 | (1991; R 1995) Surge Voltages in Low-Voltage AC Power Circuits |
| IEEE Std 81 | (1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1) |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 volts Maximum)
NEMA FU 1	(2002) Low Voltage Cartridge Fuses
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems, Enclosures
NEMA LE 4	(1987) Recessed Luminaires, Ceiling Compatibility
NEMA MG 1	(1998; Rev. 2002) Motors and Generators
NEMA MG 10	(2001) Energy Management Guide for Selection and Use of Fixed Medium AC Squirrel Cage Polyphase Induction Motors
NEMA OS 1	(1996) Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
NEMA OS 2	(1998) Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
NEMA ST 20	(1992; R 1997) Dry-Type Transformers for General Applications
NEMA TC 2	(1998) Electrical Polyvinyl Chloride (PVC) Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA WD 1	(1999) General Requirements for Wiring Devices
NEMA WD 6	(2002) Wiring Devices - Dimensional Specifications

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
NFPA 101	(2000) Life Safety Code

UNDERWRITERS LABORATORIES (UL)

UL 1	(2000) Flexible Metal Conduit
UL 6	(2000; Bul. 2001, 2002) Rigid Metal Conduit
UL 20	(2000; R 2002, Bul. 2002) General-Use Snap Switches
UL 50	(1995; R 1999, Bul. 2001) Enclosures for Electrical Equipment
UL 98	(1994; R thru Jun 1998) Enclosed and Dead-Front Switches

UL 198B	(1995) Class H Fuses
UL 198C	(1986; Rev thru Feb 1998) High-Interrupting-Capacity Fuses, Current-Limiting Types
UL 198D	(1995) Class K Fuses
UL 198E	(1988; Rev Jul 1988) Class R Fuses
UL 198G	(1988; Rev May 1988) Fuses for Supplementary Overcurrent Protection
UL 198H	(1988; Rev thru Nov 1993) Class T Fuses
UL 360	(1996; R 2001, Bul. 2002) Liquid-Tight Flexible Steel Conduit
UL 467	(1993; Rev thru Feb 2001) Grounding and Bonding Equipment
UL 486A	(1997; R 2001, Bul. 2002, 2003) Wire Connectors and Soldering Lugs for Use with Copper Conductors
UL 486C	(2000; R 2002) Splicing Wire Connectors
UL 489	(2002; R 2002, Bul. 2003) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 498	(2001; R 2002) Attachment Plugs and Receptacles
UL 506	(2000; Bul. 2002, 2003) Specialty Transformers
UL 508	(1999; R 2002, Bul. 2001, 2002, 2003) Industrial Control Equipment
UL 510	(1994; Rev thru Apr 1998) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
UL 512	(1993; Rev thru Mar 1999) Fuseholders
UL 514A	(1996; R 2001, Bul. 2000, 2001, 2002) Metallic Outlet Boxes
UL 514B	(1997; R 2002, Bul. 2001, 2002) Fittings for Conduit and Outlet Boxes
UL 514C	(1996; R 2002) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 542	(1999) Lampholders, Starters, and Starter Holders for Fluorescent Lamps
UL 651	(1995; R 2002) Schedule 40 and 80 Rigid

PVC Conduit

UL 651A	(1995; Rev thru Apr 1998) Type EB and A Rigid PVC Conduit and HDPE Conduit
UL 869A	(1998; Bul. 2002) Reference Standard for Service Equipment
UL 924	(1995; R 2001, Bul. 2001 and 2002) Emergency Lighting and Power Equipment
UL 935	(2001; Bul. 2001) Fluorescent-Lamp Ballasts
UL 943	(1993; Rev thru May 1998) Ground-Fault Circuit-Interrupters
UL 1004	(1994; Rev thru Nov 1999) Electric Motors
UL 1570	(1995; Rev thru Nov 1999) Fluorescent Lighting Fixtures
UL 1572	(1995; Rev thru Nov 1999) High Intensity Discharge Lighting Fixtures
UL 1660	(2000; R 2002, Bul. 2002) Liquid-Tight Flexible Nonmetallic Conduit
UL Elec Const Dir	(2001) Electrical Construction Equipment Directory

1.2 GENERAL

1.2.1 Rules

The installation shall conform to the requirements of NFPA 70 and NFPA 101, unless more stringent requirements are indicated or shown.

1.2.2 Coordination

The drawings indicate the extent and the general location and arrangement of equipment, conduit, and wiring. The Contractor shall become familiar with all details of the work and verify all dimensions in the field so that the outlets and equipment shall be properly located and readily accessible. Lighting fixtures, outlets, and other equipment and materials shall be carefully coordinated with mechanical or structural features prior to installation and positioned according to architectural reflected ceiling plans; otherwise, lighting fixtures shall be symmetrically located according to the room arrangement when uniform illumination is required, or asymmetrically located to suit conditions fixed by design and shown. Raceways, junction and outlet boxes, and lighting fixtures shall not be supported from sheet metal roof decks. If any conflicts occur necessitating departures from the drawings, details of and reasons for departures shall be submitted and approved prior to implementing any change. The Contractor shall coordinate the electrical requirements of the mechanical work and provide all power related circuits, wiring, hardware and structural support, even if not shown on the drawings.

1.2.3 Special Environments

1.2.3.1 Weatherproof Locations

Wiring, Fixtures, and equipment in designated locations shall conform to NFPA 70 requirements for installation in damp or wet locations.

1.2.4 Standard Products

Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

1.2.5 Nameplates

1.2.5.1 Identification Nameplates

Major items of electrical equipment and major components shall be permanently marked with an identification name to identify the equipment by type or function and specific unit number as indicated. Designation of motors shall coincide with their designation in the motor control center or panel. Unless otherwise specified, identification nameplates shall be made of laminated plastic in accordance with ASTM D 709 with black outer layers and a white core. Edges shall be chamfered. Plates shall be fastened with black-finished round-head drive screws, except motors, or approved nonadhesive metal fasteners. When the nameplate is to be installed on an irregular-shaped object, the Contractor shall devise an approved support suitable for the application and ensure the proper installation of the supports and nameplates. In all instances, the nameplate shall be installed in a conspicuous location. At the option of the Contractor, the equipment manufacturer's standard embossed nameplate material with black paint-filled letters may be furnished in lieu of laminated plastic. The front of each panelboard and motor controller shall have a nameplate to indicate the phase letter, corresponding color and arrangement of the phase conductors. The following equipment, as a minimum, shall be provided with identification nameplates:

Minimum 1/4 inch
High Letters

Minimum 1/8 inch
High Letters

Panelboards
Starters
Safety Switches
Motor Controller
Transformers
Equipment Enclosures
Motors

Control Devices

1.2.6 As-Built Drawings

Following the project completion or turnover, within 30 days the Contractor shall furnish 2 sets of as-built drawings to the Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office

that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Interior Electrical Equipment; G|ED

Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams, and other information necessary to define the installation. Detail drawings shall show the rating of items and systems and how the components of an item and system are assembled, function together, and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the same equipment or system are not acceptable except where prior approval has been obtained from the Contracting Officer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall show physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. Optional items shall be clearly identified as included or excluded. Detail drawings shall as a minimum include:

- a. Transformers.
- b. Motors and rotating machinery.
- c. Motor controllers.
- d. Single line electrical diagrams including primary, metering, sensing and relaying, control wiring, and control logic.

Structural drawings showing the structural or physical features of major equipment items, components, assemblies, and structures, including foundations or other types of supports for equipment and conductors. These drawings shall include accurately scaled or dimensioned outline and arrangement or layout drawings to show the physical size of equipment and components and the relative arrangement and physical connection of related components. Weights of equipment, components and assemblies shall be provided when required to verify the adequacy of design and proposed construction of foundations or other types of supports. Dynamic forces shall be stated for switching devices when such forces must be considered in the design of support structures. The appropriate detail drawings shall show the provisions for leveling, anchoring, and connecting all items during installation, and shall include any recommendations made by the manufacturer.

Electrical drawings including single-line diagrams, and schematics or elementary diagrams of each electrical system; internal wiring and field connection diagrams of each electrical device when published by the manufacturer; wiring diagrams of cabinets, panels, units, or separate mountings; interconnection diagrams that show the wiring between separate components of

assemblies; field connection diagrams that show the termination of wiring routed between separate items of equipment; internal wiring diagrams of equipment showing wiring as actually provided for this project. Field wiring connections shall be clearly identified.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures, including changes in related portions of the project and the reasons why, shall be submitted with the detail drawings. Approved departures shall be made at no additional cost to the Government.

SD-03 Product Data

Manufacturer's Catalog; G|ED

Data composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents.

Material, Equipment, and Fixture Lists; G|ED

A complete itemized listing of equipment and materials proposed for incorporation into the work. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each item.

Installation Procedures; G|ED

Installation procedures for rotating equipment, transformers, switchgear, battery systems, voltage regulators, and grounding resistors. Procedures shall include diagrams, instructions, and precautions required to install, adjust, calibrate, and test devices and equipment.

As-Built Drawings; G|ED

The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings, deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full-sized set of prints marked to reflect all deviations, changes, and modifications. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. Additional sheets may be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor.

Onsite Tests; G|ED

A detailed description of the Contractor's proposed procedures for on-site tests.

SD-06 Test Reports

Factory Test Reports; G|ED

Six copies of the information described below in 8 1/2 x 11 inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

- a. A list of equipment used, with calibration certifications.
- b. A copy of measurements taken.
- c. The dates of testing.
- d. The equipment and values to be verified.
- e. The conditions specified for the test.
- f. The test results, signed and dated.
- g. A description of adjustments made.

Field Test Plan; G|ED

A detailed description of the Contractor's proposed procedures for onsite test submitted 30 days prior to testing the installed system. No field test will be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

Field Test Reports; G|ED

Six copies of the information described below in 8 1/2 x 11 inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

- a. A list of equipment used, with calibration certifications.
- b. A copy of measurements taken.
- c. The dates of testing.
- d. The equipment and values to be verified.
- e. The conditions specified for the test.
- f. The test results, signed and dated.
- g. A description of adjustments made.

h. Final position of controls and device settings.

SD-07 Certificates

Materials and Equipment; G|ED

The label or listing of the Underwriters Laboratories, Inc., will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this label or listing, a statement from a nationally recognized, adequately equipped testing agency indicating that the items have been tested in accordance with required procedures and that the materials and equipment comply with all contract requirements will be accepted. However, materials and equipment installed in hazardous locations must bear the UL label unless the data submitted from other testing agency is specifically approved in writing by the Contracting Officer. Items which are required to be listed and labeled in accordance with Underwriters Laboratories must be affixed with a UL label that states that it is UL listed. No exceptions or waivers will be granted to this requirement. Materials and equipment will be approved based on the manufacturer's published data.

For other than equipment and materials specified to conform to UL publications, a manufacturer's statement indicating complete compliance with the applicable standard of the American Society for Testing and Materials, National Electrical Manufacturers Association, or other commercial standard, is acceptable.

1.4 WORKMANSHIP

Materials and equipment shall be installed in accordance with NFPA 70, recommendations of the manufacturer, and as shown.

PART 2 PRODUCTS

Products shall conform to the respective publications and other requirements specified below. Materials and equipment not listed below shall be as specified elsewhere in this section. Items of the same classification shall be identical including equipment, assemblies, parts, and components.

2.1 MOTOR SHORT-CIRCUIT PROTECTOR (MSCP)

Motor short-circuit protectors shall conform to UL 508 and shall be provided as shown. Protectors shall be used only as part of a combination motor controller which provides coordinated motor branch-circuit overload and short-circuit protection, and shall be rated in accordance with the requirements of NFPA 70.

2.1.1 Construction

Motor short-circuit protector bodies shall be constructed of high temperature, dimensionally stable, long life, nonhygroscopic materials. Protectors shall fit special MSCP mounting clips and shall not be interchangeable with any commercially available fuses. Protectors shall have 100 percent one-way interchangeability within the A-Y letter designations. All ratings shall be clearly visible.

2.1.2 Ratings

Voltage ratings shall be not less than the applicable circuit voltage. Letter designations shall be A through Y for motor controller Sizes 0, 1, 2, 3, 4, and 5, with 100,000 amperes interrupting capacity rating. Letter designations shall correspond to controller sizes as follows:

CONTROLLER SIZE	MSCP DESIGNATION
NEMA 0	A-N
NEMA 1	A-P
NEMA 2	A-S
NEMA 3	A-U
NEMA 4	A-W
NEMA 5	A-Y

2.2 CONDUIT AND TUBING

Conduit shall be rigid steel except at motor connections where Flexible Liquid Tight conduit shall be used.

2.2.1 Flexible Conduit, Steel and Plastic

General-purpose type, UL 1; liquid tight, UL 360, and UL 1660.

2.2.2 Rigid Metal Conduit

UL 6.

2.2.3 Rigid Plastic Conduit

NEMA TC 2, UL 651 and UL 651A. Below grade conduit shall be Schedule 80.

2.3 CONDUIT AND DEVICE BOXES AND FITTINGS

2.3.1 Boxes, Metallic Outlet

NEMA OS 1 and UL 514A.

2.3.2 Boxes, Nonmetallic, Outlet and Flush-Device Boxes and Covers

NEMA OS 2 and UL 514C.

2.3.3 Boxes, Switch (Enclosed), Surface-Mounted

UL 98.

2.3.4 Fittings for Conduit and Outlet Boxes

UL 514B.

2.3.5 Fittings, PVC, for Use with Rigid PVC Conduit and Tubing

UL 514B.

2.4 CONNECTORS, WIRE PRESSURE

2.4.1 For Use With Copper Conductors

UL 486A.

2.5 ELECTRICAL GROUNDING AND BONDING EQUIPMENT

UL 467.

2.6 ENCLOSURES

NEMA ICS 6 or NEMA 250, unless otherwise specified.

2.6.1 Cabinets and Boxes

Cabinets and boxes with volume greater than 100 cubic inches shall be in accordance with UL 50, hot-dip, zinc-coated, if sheet steel.

2.6.2 Circuit Breaker Enclosures

UL 489.

2.7 LIGHTING FIXTURES, LAMPS, BALLASTS, EMERGENCY EQUIPMENT, CONTROLS AND ACCESSORIES

Standard Corps of Engineers Drawing 04-06-04 sheets for Types EH5, EH9, PF6, PH8, RF9, ~~WF7~~ WF6, X11, X12, XF1, and XL1, ~~referenced hereinafter and enclosed as an integral part of these specifications in the paragraph~~ REFERENCES above as Details 40-06-04, provide a general description of the light fixtures. Options and deviations from the standard sheets of Drawing No. 40-06-04 are indicated in the Lighting Fixture Schedule on the construction drawings. Fixtures, accessories, and components, including ballasts, lampholders, lamps, starters, and starter holders, shall conform to industry standards specified below.

2.7.1 Fixture, Auxiliary, or Emergency

UL 924. Emergency fixtures with self-contained battery back-up shall operate for a minimum of 90 minutes upon loss of normal power.

2.7.2 Lamps

Lamps shall be constructed to operate in the specified fixture, and shall function without derating life or output as listed in published data. Lamps shall meet the requirements of the Energy Policy Act of 1992.

- a. Fluorescent lamps shall have color temperature of 3,500 degrees Kelvin. They shall be designed to operate with the ballasts and circuitry of the fixtures in which they will be used. Fluorescent lamps, including spares, shall be manufactured by one manufacturer to provide for color and performance consistency. Fluorescent lamps shall comply with ANSI C78.1. Fluorescent tube lamp efficiencies shall meet or exceed the following requirements.

T8, 32 watts	(4' lamp)	2800 lumens
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(1) Linear fluorescent lamps, unless otherwise indicated, shall

be 32 watt T8, 265 mA, with minimum CRI of 75. Lamps shall deliver rated life when operated on rapid start ballasts.

(2) Small compact fluorescent lamps shall be triple tube configuration as shown with four-pin snap-in base and shall have minimum CRI of 85. They shall deliver rated life when operated on ballasts as shown. Minimum starting temperature shall be 32 degrees F.

2.7.3 Ballasts

Ballasts or transformers shall be designed to operate the designated lamps within their optimum specifications, without derating the lamps. Lamp and ballast combinations shall be certified as acceptable by the lamp manufacturer.

- a. Fluorescent ballasts shall comply with ANSI C82.1 and shall be mounted integrally within fluorescent fixture housing unless otherwise shown. Ballasts shall have a Class A sound rating and shall be rated Class P. Unless otherwise indicated, the minimum number of ballasts shall be used to serve each individual fixture.

(1) Compact fluorescent ballasts shall comply with IEEE C62.41 Category A transient voltage variation requirements and shall be mounted integrally within compact fluorescent fixture housing unless otherwise shown. Ballasts shall have minimum ballast factor of 0.95; maximum current crest factor of 1.6; high power factor; maximum operating case temperature of 77 degrees F above ambient; shall be rated Class P; and shall have a sound rating of Class A. Ballasts shall meet FCC Class A specifications for EMI/RFI emissions. Ballasts shall operate from nominal line voltage of 120 volts at 60 Hz and maintain constant light output over a line voltage variation of $\pm 10\%$. Ballasts shall have an end-of-lamp-life detection and shut-down circuit. Ballasts shall be UL listed and shall contain no PCBs. Ballasts shall contain potting to secure PC board, provide lead strain relief, and provide a moisture barrier.

(2) Electronic fluorescent ballasts shall comply with 47 CFR 18 for electromagnetic interference. Ballasts shall withstand line transients per IEEE C62.41, Category A. Ballasts shall comply with the minimum Ballast Efficacy Factors shown in the table below.

ELECTRONIC FLUORESCENT BALLAST EFFICACY FACTORS

LAMP TYPE	TYPE OF STARTER & LAMP	NOMINAL OPERATIONAL VOLTAGE
32W T8	rapid start linear	120

A single balast may be used to serve multiple fixtures if they are continuous mounted, factory manufactured for that installation with an integral wireway, and are identically controlled.

- a. Light output regulation shall be +/- 10%.
- b. Voltage input regulation shall be +/- 10%.
- c. Lamp current crest factor shall be no more than 1.6.
- d. Ballast factor shall be not less than 85% nor more than 100%, unless otherwise indicated.
- e. A 60 Hz filter shall be provided. Flicker shall be no more than 10% with any lamp suitable for the ballast.
- f. Ballast case temperature shall not exceed 25 degrees celsius rise above 40 degrees celsius ambient, when tested in accordance with UL 935
- g. Total harmonic distortion shall be no greater than 10%.
- h. Power factor shall not be less than 0.95.
- i. Ballasts shall operate at a frequency of 20 kHz or more.
- j. Operating filament voltage shall be 2.5 to 4.5 volts.
- k. Warranty. Three year full warranty, including a \$10 labor allowance.

2.7.4 Fixtures

Fixtures shall be in accordance with the size, shape, appearance, finish, and performance shown. Unless otherwise indicated, lighting fixtures shall be provided with housings, junction boxes, wiring, lampholders, mounting supports, trim, hardware and accessories for a complete and operable installation. Recessed housings shall be minimum 20 gauge cold rolled or galvanized steel as shown. Extruded aluminum fixtures shall have minimum wall thickness of 0.125 inches. Plastic lenses shall be 100% virgin acrylic or as shown. Glass lenses shall be tempered. Heat resistant glass shall be borosilicate type. Conoid recessed reflector cones shall be Alzak with clear specular low iridescent finish.

- a. Fluorescent fixtures shall comply with UL 1570. Recessed ceiling fixtures shall comply with NEMA LE 4. Fixtures shall be plainly marked for proper lamp and ballast type to identify lamp diameter, wattage, color and start type. Marking shall be readily visible to service personnel, but not visible from normal viewing angles. Fluorescent fixture lens frames on recessed and surface mounted troffers shall be one assembly with mitered corners. Integral ballast and wireway compartments shall be easily accessible without the use of special tools. Housings shall be constructed to include grounding necessary to start the lamps. Open fixtures shall be equipped with a sleeve, wire guard, or other positive means to prevent lamps from falling. Medium bi-pin lampholders shall be twist-in type with positive locking position. Long compact fluorescent fixtures shall have clamps or secondary lampholders to support the free ends of the lamps.
- b. High intensity discharge fixture shall comply with UL 1572. Reflectors shall be anodized aluminum. Fixtures for horizontal lamps shall have position oriented lampholders. Lampholders shall be pulse-rated to 5,000 volts. Fixtures indicated as classified

or rated for special service shall be designed and independently tested for the environment in which they are installed. Ballasts shall be integral to fixtures and shall be accessible without the use of special tools. Remote ballasts shall be encased and potted. Lamps shall be shielded from direct view with a UV absorbing material such as tempered glass, and shall be circuited through a cut-off switch which will shut off the lamp circuit if the lens is not in place.

- c. Emergency lighting fixtures and accessories shall be constructed and independently tested to meet the requirements of applicable codes. Batteries shall be Nicad or equal with no required maintenance, and shall have a minimum life expectancy of five years and warranty period of three years.

- d. Exit Signs

Exit signs shall be ENERGY STAR compliant, thereby meeting the following requirements. Input power shall be less than 5 watts per face. Letter size and spacing shall adhere to NFPA 101. Luminance contrast shall be greater than 0.8. Average luminance shall be greater than 15 cd/m² measured at normal (0 degree) and 45 degree viewing angles. Minimum luminance shall be greater than 8.6 cd/m² measured at normal and 45 degree viewing angles. Maximum to minimum luminance shall be less than 20:1 measured at normal and 45 degree viewing angles. The manufacturer warranty for defective parts shall be at least 5 years.

2.7.5 Lampholders, Starters, and Starter Holders

UL 542

2.8 LOW-VOLTAGE FUSES AND FUSEHOLDERS

2.8.1 Fuses, Low Voltage Cartridge Type

NEMA FU 1.

2.8.2 Fuses, High-Interrupting-Capacity, Current-Limiting Type

Fuses, Class G, J, L and CC shall be in accordance with UL 198C.

2.8.3 Fuses, Class K, High-Interrupting-Capacity Type

UL 198D.

2.8.4 Fuses, Class H

UL 198B.

2.8.5 Fuses, Class R

UL 198E.

2.8.6 Fuses, Class T

UL 198H.

2.8.7 Fuses for Supplementary Overcurrent Protection

UL 198G.

2.8.8 Fuseholders

UL 512.

2.9 INSTRUMENTS, ELECTRICAL INDICATING

ANSI C39.1.

2.10 MOTORS, AC, FRACTIONAL AND INTEGRAL

Motors, ac, fractional and integral horsepower, 500 hp and smaller shall conform to NEMA MG 1 and UL 1004 for motors; NEMA MG 10 for energy management selection of polyphase motors.

2.10.1 Rating

The horsepower rating of motors should be limited to no more than 125 percent of the maximum load being served unless a NEMA standard size does not fall within this range. In this case, the next larger NEMA standard motor size should be used.

2.10.2 Motor Efficiencies

All permanently wired polyphase motors of 1 hp or more shall meet the minimum full-load efficiencies as indicated in the following table, and as specified in this specification. Motors of 1 hp or more with open, drip proof or totally enclosed fan cooled enclosures shall be high efficiency type, unless otherwise indicated. Motors provided as an integral part of motor driven equipment are excluded from this requirement if a minimum seasonal or overall efficiency requirement is indicated for that equipment by the provisions of another section.

MINIMUM NOMINAL MOTOR EFFICIENCIES
 OPEN DRIP PROOF MOTORS

<u>kW</u>	<u>1200 RPM</u>	<u>1800 RPM</u>	<u>3600 RPM</u>
0.746	82.5	85.5	80.0
1.12	86.5	86.5	85.5
1.49	87.5	86.5	86.5
2.24	89.5	89.5	86.5
3.73	89.5	89.5	89.5
5.60	91.7	91.0	89.5
7.46	91.7	91.7	90.2
11.2	92.4	93.0	91.0
14.9	92.4	93.0	92.4
18.7	93.0	93.6	93.0
22.4	93.6	93.6	93.0
29.8	94.1	94.1	93.6
37.3	94.1	94.5	93.6
44.8	95.0	95.0	94.1
56.9	95.0	95.0	94.5
74.6	95.0	95.4	94.5
93.3	95.4	95.4	95.0
112.0	95.8	95.8	95.4

MINIMUM NOMINAL MOTOR EFFICIENCIES

149.0	95.4	95.8	95.4
187.0	95.4	96.2	95.8
224.0	95.4	95.0	95.4
261.0	94.5	95.4	95.0
298.0	94.1	95.8	95.0
336.0	94.5	95.4	95.4
373.0	94.5	94.5	94.5

TOTALLY ENCLOSED FAN-COOLED MOTORS

<u>kW</u>	<u>1200 RPM</u>	<u>1800 RPM</u>	<u>3600 RPM</u>
0.746	82.5	85.5	78.5
1.12	87.5	86.5	85.5
1.49	88.5	86.5	86.5
2.24	89.5	89.5	88.5
3.73	89.5	89.5	89.5
5.60	91.7	91.7	91.0
7.46	91.7	91.7	91.7
11.2	92.4	92.4	91.7
14.9	92.4	93.0	92.4
18.7	93.0	93.6	93.0
22.4	93.6	93.6	93.0
29.8	94.1	94.1	93.6
37.3	94.1	94.5	94.1
44.8	94.5	95.0	94.1
56.9	95.0	95.4	94.5
74.6	95.4	95.4	95.0
93.3	95.4	95.4	95.4
112.0	95.8	95.8	95.4
149.0	95.8	96.2	95.8
187.0	95.6	96.2	95.9
224.0	95.4	96.1	95.8
261.0	94.5	96.2	94.8
298.0	94.5	95.8	94.5
336.0	94.5	94.5	94.5
373.0	94.5	94.5	94.5

MINIMUM NOMINAL MOTOR EFFICIENCIES
OPEN DRIP PROOF MOTORS

<u>HP</u>	<u>1200 RPM</u>	<u>1800 RPM</u>	<u>3600 RPM</u>
1	82.5	85.5	80.0
1.5	86.5	86.5	85.5
2	87.5	86.5	86.5
3	89.5	89.5	86.5
5	89.5	89.5	89.5
7.5	91.7	91.0	89.5
10	91.7	91.7	90.2
15	92.4	93.0	91.0
20	92.4	93.0	92.4
25	93.0	93.6	93.0
30	93.6	93.6	93.0
40	94.1	94.1	93.6
50	94.1	94.5	93.6
60	95.0	95.0	94.1
75	95.0	95.0	94.5

TOTALLY ENCLOSED FAN-COOLED MOTORS			
100	95.0	95.4	94.5
125	95.4	95.4	95.0
150	95.8	95.8	95.4
200	95.4	95.8	95.4
250	95.4	96.2	95.8
300	95.4	95.0	95.4
350	94.5	95.4	95.0
400	94.1	95.8	95.0
450	94.5	95.4	95.4
500	94.5	94.5	94.5

TOTALLY ENCLOSED FAN-COOLED MOTORS			
HP	1200 RPM	1800 RPM	3600 RPM
1	82.5	85.5	78.5
1.5	87.5	86.5	85.5
2	88.5	86.5	86.5
3	89.5	89.5	88.5
5	89.5	89.5	89.5
7.5	91.7	91.7	91.0
10	91.7	91.7	91.7
15	92.4	92.4	91.7
20	92.4	93.0	92.4
25	93.0	93.6	93.0
30	93.6	93.6	93.0
40	94.1	94.1	93.6
50	94.1	94.5	94.1
60	94.5	95.0	94.1
75	95.0	95.4	94.5
100	95.4	95.4	95.0
125	95.4	95.4	95.4
150	95.8	95.8	95.4
200	95.8	96.2	95.8
250	95.6	96.2	95.9
300	95.4	96.1	95.8
350	94.5	96.2	94.8
400	94.5	95.8	94.5
450	94.5	94.5	94.5
500	94.5	94.5	94.5

2.11 RECEPTACLES

2.11.1 Heavy Duty Grade

NEMA WD 1. Devices shall conform to all requirements for heavy duty receptacles.

2.11.2 Standard Grade

UL 498.

2.11.3 Ground Fault Interrupters

UL 943, Class A or B.

2.11.4 NEMA Standard Receptacle Configurations

NEMA WD 6.

- a. Single and Duplex, 15-Ampere and 20-Ampere, 125 Volt

15-ampere, non-locking: NEMA type 5-15R, locking: NEMA type L5-15R,
20-ampere, non-locking: NEMA type 5-20R, locking: NEMA type L5-20R.

- b. 30-Ampere, 480 Volt

Three-pole, 4-wire grounding, locking: NEMA Type L16-30R.

2.12 SERVICE ENTRANCE EQUIPMENT

UL 869A.

2.13 SPLICE, CONDUCTOR

UL 486C.

2.14 SNAP SWITCHES

UL 20.

2.15 TAPES

2.15.1 Plastic Tape

UL 510.

2.15.2 Rubber Tape

UL 510.

2.16 TRANSFORMERS

Single- and three-phase transformers shall have two windings per phase. Full-capacity standard NEMA taps shall be provided in the primary windings of transformers unless otherwise indicated. Three-phase transformers shall be configured with delta-wye windings, except as indicated. "T" connections may be used for transformers rated 15 kVA or below.

2.16.1 Transformers, Dry-Type

Transformers shall have 220 degrees C insulation system for transformers 15 kVA and greater, and shall have 180 degrees C insulation system for transformers rated 10 kVA and less, with temperature rise not exceeding 150 degrees C under full-rated load in maximum ambient temperature of 40 degrees C. Transformer of 150 degrees C temperature rise shall be capable of carrying continuously 100 percent of nameplate kVA without exceeding insulation rating.

- a. 600 Volt or Less Primary:

NEMA ST 20, UL 506, general purpose, dry-type, self-cooled, ventilated. Transformers shall be provided in NEMA 1 enclosure. Transformers shall be quiet type with maximum sound level at least 3 decibels less than NEMA standard level for transformer ratings indicated.

2.16.2 Average Sound Level

The average sound level in decibels (dB) of transformers shall not exceed the following dB level at 12 inches for the applicable kVA rating range listed unless otherwise indicated:

kVA Range	dB Sound Level
1-50	50
51-150	55

2.17 WIRING DEVICES

NEMA WD 1 for wiring devices, and NEMA WD 6 for dimensional requirements of wiring devices.

2.18 Liquid-Dielectrics

Liquid dielectrics for transformers, capacitors, and other liquid-filled electrical equipment shall be non-polychlorinated biphenyl (PCB) mineral oil or less flammable liquid as specified. Nonflammable fluids shall not be used. Tetrachloroethylene (perchloroethylene) and 1, 2, 4 trichlorobenzene fluids shall be certified by the manufacturer as having less than 50 parts per million (ppm) PCB content. In lieu of the manufacturer's certification, the Contractor may submit a test sample of the dielectric in accordance with ASTM D 4059 at a testing facility approved by the Contracting Officer. Equipment with test results indicating PCB level exceeding 50 ppm shall be replaced.

PART 3 EXECUTION

3.1 UTILITY COMPANY COORDINATION

3.1.1 Servicing Utilities

The Contractor shall coordinate all power service work and requirements in advance with Florida Power and Light (FPL), Mr. Bill Garfinkler, (305) 442-5117, 4200 Flager St., Miami Florida 33134. The Contractor shall coordinate all telephone service work and requirements in advance with Bell South, Manny Boliver, (305) 971-9387, 9500 SW 180th Street, Miami, Florida 33157.

3.1.2 Division of Work

FPL shall furnish and install the meter and primary cabling to the pad-mount transformer. Bell South shall furnish and install the primary incoming cabling, backboard/distribution enclosure punchdown block(s), and terminate all cabling at the punchdown block. The Contractor shall be responsible for furnishing and installing the power service to the facility and concrete encased 2 inch conduit for Bell South. The Contractor furnishes the meter base, service entrance, cabling, ground rods, trenching, and backfilling for all secondary cabling. The requirements for the site are, as indicated, within FPL's Electric Service Standards Manual, in this specification and, as shown, on the drawings. Departures from these requirements or discrepancies in the division of work shall be immediately brought to the attention of the Contracting Officer.

3.1.3 Service Charges to be Paid by the Contractor

All service charges, connection fees, and aid-in-construction costs required by the serving utilities shall be paid. Aid-in-construction costs shall be paid in advance and on the date requested by each serving utility.

~~The amount of these charges shall be determined in advance and included with the bid for this project.~~ Monthly electric bills during the construction period shall be paid.

3.2 GROUNDING

Grounding shall be in conformance with NFPA 70, the contract drawings, and the following specifications.

3.2.1 Ground Bus

Ground bus shall be provided in the electrical room, as indicated. Noncurrent-carrying metal parts of transformer neutrals and other electrical equipment shall be effectively grounded by bonding to the ground bus. The ground bus shall be bonded to both the entrance ground, and to a ground rod or rods as specified above having the upper ends terminating approximately 4 inches above the floor. Connections and splices shall be of the brazed, welded, bolted, or pressure-connector type, except that pressure connectors or bolted connections shall be used for connections to removable equipment.

3.2.2 Grounding Conductors

A green equipment grounding conductor, sized in accordance with NFPA 70 shall be provided, regardless of the type of conduit. Equipment grounding bars shall be provided in all panelboards. The equipment grounding conductor shall be carried back to the service entrance grounding connection or separately derived grounding connection. All equipment grounding conductors, including metallic raceway systems used as such, shall be bonded or joined together in each wiring box or equipment enclosure. Metallic raceways and grounding conductors shall be checked to assure that they are wired or bonded into a common junction. Metallic boxes and enclosures, if used, shall also be bonded to these grounding conductors by an approved means per NFPA 70. When switches, or other utilization devices are installed, any designated grounding terminal on these devices shall also be bonded to the equipment grounding conductor junction with a short jumper.

3.3 WIRING METHODS

Wiring shall conform to NFPA 70, the contract drawings, and the following specifications. Unless otherwise indicated, wiring shall consist of insulated conductors installed in rigid zinc-coated steel conduit and rigid plastic conduit. Wire fill in conduits shall be based on NFPA 70 for the type of conduit and wire insulations specified.

3.3.1 Conduit and Tubing Systems

Conduit and tubing systems shall be installed as indicated. Conduit sizes shown are based on use of copper conductors with insulation types as described in Section 16120 INSULATED WIRE AND CABLE. Minimum size of raceways shall be 1/2 inch. Only metal conduits will be permitted when conduits are required for shielding or other special purposes indicated, or

when required by conformance to NFPA 70. Bushings, manufactured fittings or boxes providing equivalent means of protection shall be installed on the ends of all conduits and shall be of the insulating type, where required by NFPA 70. Raceways shall be kept 6 inches away from parallel runs of hot-water pipes. Raceways shall be concealed within finished walls, ceilings, and floors unless otherwise shown. Raceways crossing structural expansion joints shall be provided with suitable expansion fittings or other suitable means to compensate for the building expansion and contraction and to provide for continuity of grounding. Wiring installed in underfloor raceway system shall be suitable for installation in wet locations.

3.3.1.1 Pull Wires

A pull wire shall be inserted in each empty raceway in which wiring is to be installed if the raceway is more than 50 feet in length and contains more than the equivalent of two 90-degree bends, or where the raceway is more than 150 feet in length. The pull wire shall be of No. 14 AWG zinc-coated steel, or of plastic having not less than 200 pounds per square inch tensile strength. Not less than 10 inches of slack shall be left at each end of the pull wire.

3.3.1.2 Conduit Stub-Ups

Where conduits are to be stubbed up through concrete floors, a short elbow shall be installed below grade to transition from the horizontal run of conduit to a vertical run. A conduit coupling fitting, threaded on the inside shall be installed, to allow terminating the conduit flush with the finished floor. Wiring shall be extended in rigid threaded conduit to equipment, except that where required, flexible conduit may be used 6 inches above the floor. Empty or spare conduit stub-ups shall be plugged flush with the finished floor with a threaded, recessed plug.

3.3.1.3 Below Slab-on-Grade or in the Ground

Electrical wiring below slab-on-grade shall be protected by a conduit system. Conduit passing vertically through slabs-on-grade shall be PVC coated rigid steel.

3.3.1.4 Installing in Slabs Including Slabs on Grade

Conduit installed in slabs-on-grade shall be rigid steel or IMC. Conduits shall be installed as close to the middle of concrete slabs as practicable without disturbing the reinforcement. Outside diameter shall not exceed 1/3 of the slab thickness and conduits shall be spaced not closer than 3 diameters on centers except at cabinet locations where the slab thickness shall be increased as approved by the Contracting Officer. Where conduit is run parallel to reinforcing steel, the conduit shall be spaced a minimum of one conduit diameter away but not less than one inch from the reinforcing steel.

3.3.1.5 Changes in Direction of Runs

Changes in direction of runs shall be made with symmetrical bends or cast-metal fittings. Field-made bends and offsets shall be made with an approved hickey or conduit-bending machine. Crushed or deformed raceways shall not be installed. Trapped raceways in damp and wet locations shall be avoided where possible. Lodgment of plaster, dirt, or trash in raceways, boxes, fittings and equipment shall be prevented during the course of

construction. Clogged raceways shall be cleared of obstructions or shall be replaced.

3.3.1.6 Supports

Metallic conduits and tubing, and the support system to which they are attached, shall be securely and rigidly fastened in place to prevent vertical and horizontal movement at intervals of not more than 10 feet and within 3 feet of boxes, cabinets, and fittings, with approved pipe straps, wall brackets, conduit clamps, conduit hangers, threaded C-clamps, beam clamps, or ceiling trapeze. Loads and supports shall be coordinated with supporting structure to prevent damage or deformation to the structure. Loads shall not be applied to joist bridging. Attachment shall be by wood screws or screw-type nails to wood; by toggle bolts on hollow masonry units; by expansion bolts on concrete or brick; by machine screws, welded threaded studs, heat-treated or spring-steel-tension clamps on steel work. Nail-type nylon anchors or threaded studs driven in by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts or machine screws. Raceways or pipe straps shall not be welded to steel structures. Cutting the main reinforcing bars in reinforced concrete beams or joists shall be avoided when drilling holes for support anchors. Holes drilled for support anchors, but not used, shall be filled. In partitions of light steel construction, sheet-metal screws may be used. Raceways shall not be supported using wire or nylon ties. Raceways shall be independently supported from the structure. Upper raceways shall not be used as a means of support for lower raceways. Supporting means shall not be shared between electrical raceways and mechanical piping or ducts. Cables and raceways shall not be supported by ceiling grids. Except where permitted by NFPA 70, wiring shall not be supported by ceiling support systems. Conduits shall be fastened to sheet-metal boxes and cabinets with two locknuts where required by NFPA 70, where insulating bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, a single locknut and bushing may be used. Threadless fittings for electrical metallic tubing shall be of a type approved for the conditions encountered. Additional support for horizontal runs is not required when EMT rests on steel stud cutouts.

3.3.1.7 Exposed Raceways

Exposed raceways shall be installed parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings. Raceways under raised floors and above accessible ceilings shall be considered as exposed installations in accordance with NFPA 70 definitions.

3.3.1.8 Communications Raceways

Communications raceways indicated shall be installed in accordance with the previous requirements for conduit and tubing and with the additional requirement that no length of run shall exceed 50 feet for 1/2 inch and 3/4 inch sizes, and 100 feet for 1 inch or larger sizes, and shall not contain more than two 90-degree bends or the equivalent. Additional pull or junction boxes shall be installed to comply with these limitations whether or not indicated. Inside radii of bends in conduits of 1 inch size or larger shall not be less than ten times the nominal diameter.

3.3.2 Cables and Conductors

Installation shall conform to the requirements of NFPA 70. Covered, bare or insulated conductors of circuits rated over 600 volts shall not occupy

the same equipment wiring enclosure, cable, or raceway with conductors of circuits rated 600 volts or less.

3.3.2.1 Cable Splicing

Splices shall be made in an accessible location. Crimping tools and dies shall be approved by the connector manufacturer for use with the type of connector and conductor.

- a. Copper Conductors, 600 Volt and Under: Splices in conductors No. 10 AWG and smaller diameter shall be made with an insulated, pressure-type connector. Splices in conductors No. 8 AWG and larger diameter shall be made with a solderless connector and insulated with tape or heat-shrink type insulating material equivalent to the conductor insulation.

3.3.2.2 Conductor Identification and Tagging

Power, control, and signal circuit conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Where several feeders pass through a common pull box, the feeders shall be tagged to indicate clearly the electrical characteristics, circuit number, and panel designation. Phase conductors of low voltage power circuits shall be identified by color coding. Phase identification by a particular color shall be maintained continuously for the length of a circuit, including junctions.

- a. Color coding shall be provided for service, feeder, branch, and ground conductors. Color shall be green for grounding conductors and white for neutrals; except where neutrals of more than one system are installed in the same raceway or box, other neutral shall be white with colored (not green) stripe. The color coding for 3-phase and single-phase low voltage systems shall be as follows:

120/208-volt, 3-phase: Black(A), red(B), and blue(C).
277/480-volt, 3-phase: Brown(A), orange(B), and yellow(C).

- b. Conductor phase and voltage identification shall be made by color-coded insulation for all conductors smaller than No. 6 AWG. For conductors No. 6 AWG and larger, identification shall be made by color-coded insulation, or conductors with black insulation may be furnished and identified by the use of half-lapped bands of colored electrical tape wrapped around the insulation for a minimum of 3 inches of length near the end, or other method as submitted by the Contractor and approved by the Contracting Officer.
- c. Control and signal circuit conductor identification shall be made by color-coded insulated conductors, plastic-coated self-sticking printed markers, permanently attached stamped metal foil markers, or equivalent means as approved. Control circuit terminals of equipment shall be properly identified. Terminal and conductor identification shall match that shown on approved detail drawings. Hand lettering or marking is not acceptable.

3.4 BOXES AND SUPPORTS

Boxes shall be provided in the wiring or raceway systems where required by

NFPA 70 for pulling of wires, making connections, and mounting of devices or fixtures. Pull boxes shall be furnished with screw-fastened covers. Indicated elevations are approximate, except where minimum mounting heights for hazardous areas are required by NFPA 70. Unless otherwise indicated, boxes for wall switches shall be mounted 48 inches above finished floors. Switch and outlet boxes located on opposite sides of fire rated walls shall be separated by a minimum horizontal distance of 24 inches. The total combined area of all box openings in fire rated walls shall not exceed 100 square inches per 100 square feet. Maximum box areas for individual boxes in fire rated walls vary with the manufacturer and shall not exceed the maximum specified for that box in UL Elec Const Dir. Only boxes listed in UL Elec Const Dir shall be used in fire rated walls.

3.4.1 Box Applications

Each box shall have not less than the volume required by NFPA 70 for number of conductors enclosed in box. Boxes for metallic raceways shall be listed for the intended use when located in normally wet locations, when flush or surface mounted on outside of exterior surfaces, or when located in hazardous areas. Boxes installed in wet locations and boxes installed flush with the outside of exterior surfaces shall be gasketed. Boxes for mounting lighting fixtures shall be not less than 4 inches square, or octagonal, except smaller boxes may be installed as required by fixture configuration, as approved. Cast-metal boxes with 3/32 inch wall thickness are acceptable. Large size boxes shall be NEMA 1 or as shown. Boxes in other locations shall be sheet steel except that aluminum boxes may be used with aluminum conduit, and nonmetallic boxes may be used with nonmetallic conduit and tubing or nonmetallic sheathed cable system, when permitted by NFPA 70. Boxes for use in masonry-block or tile walls shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers.

3.4.2 Brackets and Fasteners

Boxes and supports shall be fastened to wood with wood screws or screw-type nails of equal holding strength, with bolts and metal expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screw or welded studs on steel work. Threaded studs driven in by powder charge and provided with lockwashers and nuts, or nail-type nylon anchors may be used in lieu of expansion shields, or machine screws. Penetration of more than 1-1/2 inches into reinforced-concrete beams or more than 3/4 inch into reinforced-concrete joists shall avoid cutting any main reinforcing steel. The use of brackets which depend on gypsum wallboard or plasterboard for primary support will not be permitted. In partitions of light steel construction, bar hangers with 1 inch long studs, mounted between metal wall studs or metal box mounting brackets shall be used to secure boxes to the building structure. When metal box mounting brackets are used, additional box support shall be provided on the side of the box opposite the brackets. This additional box support shall consist of a minimum 12 inch long section of wall stud, bracketed to the opposite side of the box and secured by two screws through the wallboard on each side of the stud. Metal screws may be used in lieu of the metal box mounting brackets.

3.4.3 Mounting in Walls, Ceilings, or Recessed Locations

In walls or ceilings of concrete, tile, or other non-combustible material, boxes shall be installed so that the edge of the box is not recessed more than 1/4 inch from the finished surface. Boxes mounted in combustible

walls or ceiling material shall be mounted flush with the finished surface. The use of gypsum or plasterboard as a means of supporting boxes will not be permitted. Boxes installed for concealed wiring shall be provided with suitable extension rings or plaster covers, as required. The bottom of boxes installed in masonry-block walls for concealed wiring shall be mounted flush with the top of a block to minimize cutting of the blocks, and boxes shall be located horizontally to avoid cutting webs of block. Separate boxes shall be provided for flush or recessed fixtures when required by the fixture terminal operating temperature, and fixtures shall be readily removable for access to the boxes unless ceiling access panels are provided.

3.4.4 Installation in Overhead Spaces

In open overhead spaces, cast-metal boxes threaded to raceways need not be separately supported except where used for fixture support; cast-metal boxes having threadless connectors and sheet metal boxes shall be supported directly from the building structure or by bar hangers. Hangers shall not be fastened to or supported from joist bridging. Where bar hangers are used, the bar shall be attached to raceways on opposite sides of the box and the raceway shall be supported with an approved type fastener not more than 24 inches from the box.

3.5 DEVICE PLATES

One-piece type device plates shall be provided for all outlets and fittings. Plates on unfinished walls and on fittings shall be of zinc-coated sheet steel, cast-metal, or impact resistant plastic having rounded or beveled edges. Plates on finished walls shall be of zinc-coated, cast metal steel or impact-resistant plastic. Screws shall be of metal with countersunk heads, in a color to match the finish of the plate. Plates shall be installed with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch. The use of sectional-type device plates will not be permitted. Plates installed in wet locations shall be gasketed and provided with a hinged, gasketed cover, unless otherwise specified.

3.6 RECEPTACLES

3.6.1 Single and Duplex, 15 or 20-ampere, 125 volt

Single and duplex receptacles shall be rated 20 amperes, 125 volts, two-pole, three-wire, grounding type with polarized parallel slots. Bodies shall be as indicated to match color of switch handles in the same room or to harmonize with the color of the respective wall, and supported by mounting strap having plaster ears. Contact arrangement shall be such that contact is made on two sides of an inserted blade. Receptacle shall be side- or back-wired with two screws per terminal. The third grounding pole shall be connected to the metal mounting yoke. Switched receptacles shall be the same as other receptacles specified except that the ungrounded pole of each suitable receptacle shall be provided with a separate terminal. Only the top receptacle of a duplex receptacle shall be wired for switching application. Receptacles with ground fault circuit interrupters shall have the current rating as indicated, and shall be UL Class A type unless otherwise shown. Ground fault circuit protection shall be provided as required by NFPA 70 and as indicated on the drawings.

3.6.2 Weatherproof Applications

Weatherproof receptacles shall be suitable for the environment, damp or wet as applicable, and the housings shall be labeled to identify the allowable use. Receptacles shall be marked in accordance with UL 514A for the type of use indicated; "Damp locations", "Wet Locations", "Wet Location Only When Cover Closed". Assemblies shall be installed in accordance with the manufacturer's recommendations.

3.6.2.1 Damp Locations

Receptacles in damp locations shall be mounted in an outlet box with a gasketed, weatherproof, cast-metal cover plate (device plate, box cover) and a gasketed cap (hood, receptacle cover) over each receptacle opening. The cap shall be either a screw-on type permanently attached to the cover plate by a short length of bead chain or shall be a flap type attached to the cover with a spring loaded hinge.

3.6.2.2 Wet Locations

Receptacles in wet locations shall be installed in an assembly rated for such use whether the plug is inserted or withdrawn, unless otherwise indicated. In a duplex installation, the receptacle cover shall be configured to shield the connections whether one or both receptacles are in use.

3.6.3 Special-Purpose or Heavy-Duty Receptacles

Special-purpose or heavy-duty receptacles shall be of the type and of ratings and number of poles indicated or required for the anticipated purpose. Contact surfaces may be either round or rectangular. One appropriate straight or angle-type plug shall be furnished with each receptacle. Locking type receptacles, rated 30 amperes or less, shall be locked by rotating the plug. Locking type receptacles, rated more than 50 amperes, shall utilize a locking ring.

3.7 WALL SWITCHES

Wall switches shall be of the totally enclosed tumbler type. The wall switch handle and switch plate color shall be as indicated. Wiring terminals shall be of the screw type or of the solderless pressure type having suitable conductor-release arrangement. Not more than one switch shall be installed in a single-gang position. Switches shall be rated 20-ampere 120-volt for use on alternating current only. Pilot lights indicated shall consist of yoke-mounted candelabra-base sockets rated at 75 watts, 125 volts, and fitted with glass or plastic jewels. A clear 6-watt lamp shall be furnished and installed in each pilot switch. Jewels for use with switches controlling motors shall be green, and jewels for other purposes shall be red. Dimming switches shall be solid-state flush mounted, sized for the loads.

3.8 SERVICE EQUIPMENT

Service-disconnecting means shall be of the fusible safety switch type with an external handle for manual operation. When service disconnecting means is a part of an assembly, the assembly shall be listed as suitable for service entrance equipment. Enclosures shall be sheet metal with hinged cover for surface mounting unless otherwise indicated.

3.9 FUSES

Equipment provided under this contract shall be provided with a complete set of properly rated fuses when the equipment manufacturer utilize fuses in the manufacture of the equipment, or if current-limiting fuses are required to be installed to limit the ampere-interrupting capacity of circuit breakers or equipment to less than the maximum available fault current at the location of the equipment to be installed. Fuses shall have a voltage rating of not less than the phase-to-phase circuit voltage, and shall have the time-current characteristics required for effective power system coordination. Time-delay and non-time-delay options shall be as specified.

3.9.1 Cartridge Fuses; Noncurrent-Limiting Type

Cartridge fuses of the noncurrent-limiting type shall be Class H, nonrenewable, dual element, time lag type and shall have interrupting capacity of 10,000 amperes. At 500 percent current, cartridge fuses shall not blow in less than 10 seconds.

3.9.2 Cartridge Fuses; Current-Limiting Type

Cartridge fuses, current-limiting type, Class J shall have tested interrupting capacity not less than 200,000 amperes. Fuse holders shall be the type that will reject all Class H fuses.

3.9.3 Continuous Current Ratings (600 Amperes and Smaller)

Service entrance and feeder circuit fuses (600 amperes and smaller) shall be Class J, current-limiting, with 200,000 amperes interrupting capacity.

3.9.4 Continuous Current Ratings (Greater than 600 Amperes)

Service entrance and feeder circuit fuses (greater than 600 amperes) shall be Class L, current-limiting, with 200,000 amperes interrupting capacity.

3.9.5 Motor and Transformer Circuit Fuses

Motor, motor controller, transformer, and inductive circuit fuses shall be Class RK1 or RK5, current-limiting, time-delay with 200,000 amperes interrupting capacity.

3.10 UNDERGROUND SERVICE

Unless otherwise indicated, interior conduit systems shall be stubbed out 5 feet beyond the building wall and 2 feet below finished grade, for interface with the exterior service lateral conduits and exterior communications conduits. Outside conduit ends shall be bushed when used for direct burial service lateral conductors. Outside conduit ends shall be capped or plugged until connected to exterior conduit systems. Underground service lateral conductors will be extended to building service entrance and terminated in accordance with the requirements of NFPA 70.

3.11 MOTORS

Each motor shall conform to the hp and voltage ratings indicated, and shall have a service factor and other characteristics that are essential to the proper application and performance of the motors under conditions shown or specified. Three-phase motors for use on 3-phase 208-volt systems shall

have a nameplate rating of 200 volts. Unless otherwise specified, all motors shall have open frames, and continuous-duty classification based on a 40 degree C ambient temperature reference. Polyphase motors shall be squirrel-cage type, having normal-starting-torque and low-starting-current characteristics, unless other characteristics are specified in other sections of these specifications or shown on contract drawings. The Contractor shall be responsible for selecting the actual horsepower ratings and other motor requirements necessary for the applications indicated. When electrically driven equipment furnished under other sections of these specifications materially differs from the design, the Contractor shall make the necessary adjustments to the wiring, disconnect devices and branch-circuit protection to accommodate the equipment actually installed.

3.12 MOTOR-DISCONNECT MEANS

Each motor shall be provided with a disconnecting means when required by NFPA 70 even though not indicated. For single-phase motors, a single or double pole toggle switch, rated only for alternating current, will be acceptable for capacities less than 30 amperes, provided the ampere rating of the switch is at least 125 percent of the motor rating. Switches shall disconnect all ungrounded conductors.

3.13 TRANSFORMER INSTALLATION

Three-phase transformers shall be connected only in a delta-wye or wye-delta configuration as indicated. "T" connections may be used for transformers rated at 15 kVA or below. Dry-type transformers shown located within 5 feet of the exterior wall shall be provided in a weatherproof enclosure. Transformers to be located within the building may be provided in the manufacturer's standard, ventilated indoor enclosure designed for use in 40 degrees C ambient temperature, unless otherwise indicated.

3.14 LIGHTING FIXTURES, LAMPS AND BALLASTS

This paragraph shall cover the installation of lamps, lighting fixtures and ballasts in interior or building mounted applications.

3.14.1 Lamps

Lamps of the type, wattage, and voltage rating indicated shall be delivered to the project in the original cartons and installed just prior to project completion. Ten percent spare lamps of each type, from the original manufacturer, shall be provided.

3.14.2 Fixtures

Fixtures shall be, as shown, and shall conform to the following specifications, and shall be, as detailed, on Standard Drawing No. 40-06-04, Sheet Nos. EH5, EH9, PF6, PH8, RF9, WF7, X11, X12, XF1, and XL1, which accompany and form a part of this specification for the types indicated. The standard sheets of Drawing No. 40-06-04 provide only a general description of the light fixtures. Options and deviations from the standard sheets of Drawing No. 40-06-04 are indicated in the Lighting Fixture Schedule on the construction drawings. Illustrations shown on these sheets are indicative of the general type desired and are not intended to restrict selection to fixtures of any particular manufacturer. Fixtures of similar designs and equivalent energy efficiency, light distribution, and brightness characteristics, and of equal finish and quality will be acceptable, if approved. Selected fluorescent fixtures

shall be furnished with self-contained battery packs, as indicated, for use as emergency light fixtures.

3.14.2.1 Accessories

Accessories such as straps, mounting plates, nipples, or brackets shall be provided for proper installation.

3.14.2.2 Ceiling Fixtures

Ceiling fixtures shall be coordinated with and suitable for installation in, on or from the ceiling as shown. Installation and support of fixtures shall be in accordance with NFPA 70 and manufacturer's recommendations. Where seismic requirements are specified herein, fixtures shall be supported as shown or specified. Recessed fixtures shall have adjustable fittings to permit alignment with ceiling panels. Recessed fixtures installed in fire-resistive ceiling construction shall have the same fire rating as the ceiling or shall be provided with fireproofing boxes having materials of the same fire rating as the ceiling, in conformance with UL Elec Const Dir. Surface-mounted fixtures shall be suitable for fastening to the ceiling panel structural supports.

3.14.2.3 Fixtures for Installation in Grid Type Ceilings

Fixtures for installation in grid type ceilings which are smaller than a full tile shall be centered in the tile. 1 by 4 foot fixtures shall be mounted along the grid rail as shown. Work above the ceiling shall be coordinated among the trades to provide the lighting layout shown. Fixtures mounted to the grid shall have trim exactly compatible with the grid. Contractor shall coordinate trims with ceiling trades prior to ordering fixtures. Fixtures shall be mounted using independent supports capable of supporting the entire weight of the fixture. No fixture shall rest solely on the ceiling grid. Recessed fixtures installed in seismic areas should be installed utilizing specially designed seismic clips. Junction boxes shall be supported at four points.

3.14.2.4 Suspended Fixtures

Suspended fixtures shall be provided with swivel hangers or hang-straight so that they hang plumb. Pendants, rods, or chains 4 feet or longer excluding fixture shall be braced to prevent swaying using three cables at 120 degrees of separation. Steel fixtures shall be supported to prevent "oil-canning" effects. Fixture finishes shall be free of scratches, nicks, dents, and warps, and shall match the color and gloss specified. Pendants shall be finished to match fixtures. Aircraft cable shall be stainless steel. Canopies shall be finished to match the ceiling and shall be low profile unless otherwise shown. Maximum distance between suspension points shall be 10 feet or as recommended by the manufacturer, whichever is less.

Suspended fixtures installed in seismic areas shall have 45% swivel hangers and shall be located with no obstructions within the 45% range in all directions. The stem, canopy and fixture shall be capable of 45% swing.

3.14.3 Ballasts

Remote type ballasts or transformers, where indicated, shall be mounted in a well ventilated, easily accessible location, within the maximum operating distance from the lamp as designated by the manufacturer.

3.14.4 Emergency Light Sets

Emergency light sets shall conform to UL 924 with the number of heads as indicated. Sets shall be permanently connected to the wiring system by conductors installed in short lengths of flexible conduit.

3.15 BATTERY CHARGERS

Battery chargers shall be installed in conformance with NFPA 70.

3.16 EQUIPMENT CONNECTIONS

Wiring not furnished and installed under other sections of the specifications for the connection of electrical equipment as indicated on the drawings shall be furnished and installed under this section of the specifications. Connections shall comply with the applicable requirements of paragraph WIRING METHODS. Flexible conduits 6 feet or less in length shall be provided to all electrical equipment subject to periodic removal, vibration, or movement and for all motors. All motors shall be provided with separate grounding conductors. Liquid-tight conduits shall be used in damp or wet locations.

3.16.1 Motors and Motor Controllers

Motors and motor controllers shall be installed in accordance with NFPA 70, the manufacturer's recommendations, and as indicated. Wiring shall be extended to motors, motor controllers, and terminated.

3.17 CIRCUIT PROTECTIVE DEVICES

The Contractor shall calibrate, adjust, set and test each new adjustable circuit protective device to ensure that they will function properly prior to the initial energization of the new power system under actual operating conditions.

3.18 PAINTING AND FINISHING

Field-applied paint on exposed surfaces shall be provided under Section 09900 PAINTING, GENERAL and Section 09965 PAINTING: HYDRAULIC STRUCTURES..

3.19 REPAIR OF EXISTING WORK

The work shall be carefully laid out in advance, and where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceiling, or other surfaces is necessary for the proper installation, support, or anchorage of the conduit, raceways, or other electrical work, this work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Government.

3.20 FIELD TESTING

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 14 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspection recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed,

personnel involved, devices tested, serial number and name of test equipment, and test results. All field test reports will be signed and dated by the Contractor.

3.20.1 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.20.2 Ground-Resistance Tests

The resistance of the grounding grid shall be measured using the fall-of-potential method defined in IEEE Std 81. Soil resistivity in the area of the grid shall be measured concurrently with the grid measurements. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less 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.

- a. Grid electrode - 25 ohms.

3.20.3 Ground-Grid Connection Inspection

All below-grade ground-grid connections will be visually inspected by the Contracting Officer before backfilling. The Contractor shall notify the Contracting Officer 24 hours before the site is ready for inspection.

3.20.4 Motor Tests

- a. Phase rotation test to ensure proper directions.
- b. Operation and sequence of reduced voltage starters.
- c. High potential test on each winding to ground.
- d. Insulation resistance of each winding to ground.
- e. Vibration test.
- f. Dielectric absorption test on motor and starter.

3.20.5 Dry-Type Transformer Tests

The following field tests shall be performed on all dry-type transformers.

- a. Insulation resistance test phase-to-ground, each phase.
- b. Turns ratio test.

3.20.6 Protective Relays

Protective relays shall be visually and mechanically inspected, adjusted, tested, and calibrated in accordance with the manufacturer's published instructions. These tests shall include pick-up, timing, contact action,

restraint, and other aspects necessary to insure proper calibration and operation. Relay settings shall be implemented in accordance with the coordination study. Relay contacts shall be manually or electrically operated to verify that the proper breakers and alarms initiate. Relaying current transformers shall be field tested in accordance with IEEE C57.13.

3.21 OPERATING TESTS

After the installation is completed, and at such time as the Contracting Officer may direct, the Contractor shall conduct operating tests for approval. The equipment shall be demonstrated to operate in accordance with the specified requirements. An operating test report shall be submitted in accordance with paragraph FIELD TEST REPORTS.

3.22 FIELD SERVICE

3.22.1 Onsite Training

The Contractor shall conduct a training course for the operating staff as designated by the Contracting Officer. The training period shall consist of a total of 8 hours of normal working time and shall start after the system is functionally completed but prior to final acceptance tests. The course instruction shall cover pertinent points involved in operating, starting, stopping, servicing the equipment, as well as all major elements of the operation and maintenance manuals. Additionally, the course instructions shall demonstrate all routine maintenance operations. A VHS format video tape of the entire training shall be submitted.

3.22.2 Installation Engineer

After delivery of the equipment, the Contractor shall furnish one or more field engineers, regularly employed by the equipment manufacturer to supervise the installation of equipment, assist in the performance of the onsite tests, oversee initial operations, and instruct personnel as to the operational and maintenance features of the equipment.

3.23 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

3.24 WARRANTY

All interior electrical work described in this section shall be guaranteed for a minimum period of two years from the date of acceptance. A written warranty shall be provided. The warranty shall guarantee protection against defective material, design, and workmanship. Upon receipt of notice from the Government and/or South Florida Water Management District of failure of the systems or components covered in this section during the warranty period, repairs shall be made or new replacement parts shall be furnished and installed promptly at no additional cost to the Government.

-- End of Section --