

Contract No.:



U S DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

EASTERN FEDERAL LANDS HIGHWAY DIVISION

**BIG CYPRESS NATIONAL PRESERVE
PROJECT PLH-BICY 104(1)**

SOLICITATION

IFB NO: DTFH71-08-R-00013

**This Contract Cites
Standard Specifications FP-03
U.S. Customary Units**

**CONTRACTOR:
ADDRESS:**

STATE: Florida

COUNTY: Collier County

PARK / REFUGE / NF: Big Cypress National Preserve

ROADWAYS:	STATIONS	FEET
US 41 (SR 90)	14+40 to 27+43	1,303.0
Sea Grape Drive	--	285.0

PROJECT LENGTH TOTAL: 0.30 mile

TYPE OF IMPROVEMENT:

Comfort station and visitor center, parking area, grading and paving for turn lane, site utility, and miscellaneous work.

TABLE OF CONTENTS

	<u>Page</u>
Notice to Offerors	1 through 2
Checklist for Proposal Submission	1 through 2
*New Questionnaire Form on Calendar Days	1 Page
*SF-1442 Solicitation, Offer, and Award	A-1 through A-2
Continuation of SF 1442	A-3 through A-5
Bid Schedule Instructions	1 through 3
*Bid Schedule	B-1 through B-9
*SF-24 Bid Bond	C-1 through C-2

FEDERAL ACQUISITION REGULATION & TRANSPORTATION ACQUISITION REGULATION SOLICITATION PROVISIONS & CONTRACT CLAUSES

Index to Federal and Transportation Acquisition Regulations	1 through 6
Representations and Certifications (OCRA online)	D-1
Instructions to Bidders	E-1
*Socioeconomic Program Requirements	F-1 through F-8
Minimum Wage Schedule	F-9 through F-15
*General Contract Requirements	G-1 through G-4
Construction Contract Requirements	H-1

SPECIFICATIONS

Special Contract Requirements	J-1 through J-378
Permits Obtained for this Project	1 through 68
Plans	1 through 69
Geotechnical Report	1 through 31

***BOLD FACED ITEMS ARE TO BE INCLUDED WITH THE BID SUBMITTAL PACKAGE**

NOTICE TO OFFERORS

CONTRACT FORMAT: Offerors should note that the format of this contract is in accordance with Federal Acquisition Regulations (FAR), promulgated by the General Services Administration (GSA), effective April 1, 1984, including all applicable revisions. Applicable FAR provisions and clauses are incorporated in this contract by reference or full text as indicated in the INDEX before the D-page in this booklet. FAR provisions and clauses incorporated by reference can be accessed on the Internet on the GSA website at www.arnet.gov/far/. Offerors are encouraged to review the documents thoroughly before submitting proposal.

PROPOSAL BOOKLET AND OFFER SUBMITTAL:

It is the responsibility of the Offeror to verify that this proposal is complete as listed in the Table of Contents. The Offeror is responsible for submitting all required forms and documents with the offer. Offerors should use the Checklist for Offer Submittal included in this booklet to check that their proposals are complete. **New Questionnaire Form on Calendar Days with required signature.**

CONSTRUCTION CONTRACTS:

As stated in FAR Clause 52.236-1, the **Contractor shall perform on the site, and with its own organization, work equivalent to at least 50%**. Additional guidance is given in FAR Subpart 35.005 where the majority of the project work is complex and specialized such as restoration work, bridge painting, and proprietary construction techniques (i.e. proprietary Cintec arch strengthening.) There are exceptions and they will be reviewed on a case-by-case basis.

HAZARDOUS MATERIALS IDENTIFICATION AND MATERIAL SAFETY DATA:

As required by FAR Clause 52.223-3, Hazardous Materials Identification and Safety Data, the apparent low Offeror must submit prior to award a Material Safety Data Sheet (MSDS's) for all hazardous materials that the Offeror identifies in paragraph (b) of this clause in the D-pages of this booklet. Failure to submit MSDS's may render the Offeror ineligible for award of contract.

ATTENTION LARGE BUSINESSES - UTILIZATION OF SMALL BUSINESS CONCERNS:

Large business Offerors should note their responsibilities in the awarding of subcontracts in accordance with FAR Clause 52.219-8, Utilization of Small Business Concerns. The offeror, if a large business concern, should note its responsibility to establish and conduct a Subcontracting Plan in accordance with FAR Clause 52.219-9, Alternate I, Small Business Subcontracting Plan. If the apparent Low Offeror is a LARGE BUSINESS it will be required to submit a Subcontracting Plan within 2 weeks of receipt of request from the Contracting Officer. If the apparent low offeror fails to submit a subcontracting plan acceptable to the Contracting Officer within the allowable time, the offeror may be ineligible for award of the contract. PLEASE NOTE: A sample plan is included in this solicitation package for your use.

FINANCING ASSISTANCE: Minority, Women-owned, and Disadvantaged Business Enterprises (DBE's). The Department of Transportation (DOT) offers working capital financing assistance for transportation related contracts. DOT's Short-Term Lending Program (STLP) offers lines of credit to finance accounts receivable. Maximum line of credit is \$750,000 with interest at the prime rate. For further information, call (800) 532-1169. Internet address: <http://osdbuweb.dot.gov>.

INTERNET BASED DATA BASES - REQUIRED INPUT: According to the FAR Subpart 4.1102 contractors **MUST** be registered in Central Contractor Registration (CCR) **prior** to the award of any contract. Access the following web site to register: www.ccr.gov

According to the FAR Subpart 4.1201 contractors **MUST** complete their Online Annual Representations and Certifications Application (ORCA) **prior** to the closing date of the RFP on line at <http://orca.bpn.gov/>.

According to the FAR Subpart 22.1302 (b) contractors and sub-contractors **MUST** complete the required Annual Vets-100 Form in order to be eligible for a contract award. It can be completed on-line at <http://vets100.cudenver.edu/>.

NOTICE TO OFFERORS - (CONT'D.)

This should be completed before submitting a bid package.

PAYMENT:

Offerors are advised to review the Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP), subsection 109.05, concerning **direct** and **indirect** payment included under a pay item in the bid schedule.

PROGRESS PAYMENTS:

ALL payments will be made via Electronic Funds Transfer (EFT) as such; the payment information in the CCR must be accurate in order for contractors' invoices to be considered proper invoices for the purpose of prompt payment under DOT contracts. Contractors must input and maintain (update as necessary) their EFT information in the CCR database. Offerors are advised that under FAR Clause 52.232-5, Payments Under Fixed Price Construction Contracts, upon request, progress payments will include premiums paid by the Contractor to obtain performance and payment bonds as required under this contract. These payments shall not be made in addition to the contract price. As specified in the FP, "Section 151 - MOBILIZATION", payments for performance and payment bond premiums shall be included in mobilization.

WELFARE-TO-WORK INITIATIVE:

The President's Welfare Reform Bill was initiated to assist welfare recipients and hopefully aid welfare recipients to find gainful employment. In support of this bill, Contractors are encouraged to hire welfare recipients whenever possible and to use welfare recipients in performance of duties on Government contracts.

INCREASING SEAT BELT USE IN THE UNITED STATES:

The President's Executive Order 13043 dated April 16, 1997, was issued to increase the use of seat belts in the United States. In support of this Order, contractors and subcontractors are encouraged to adopt and enforce on-the-job seat belt policies for their employees when operating company-owned, rented, or personally owned vehicles.

OBTAINING PROPOSAL DOCUMENTS:

RFP documents **will not be** mailed. All documents are available for direct download from the Federal Business Opportunities (FBO) website:

<https://www.fbo.gov/index?s=opportunity&mode=list&tab=list&cck=1&au=&ck=>

Type DTFH71 in Keywords/Sol. # Block then click on GO, or the Eastern Federal Lands Highway Division website: <http://www.efl.fhwa.dot.gov/contracting/Documents.aspx>

Contractors are encouraged to register on the FBO website (for this specific project) in order to receive Email Notifications automatically when a document is added or updated for this specific project. All questions about this construction project must be emailed to the following address:

eflhd.contracts@fhwa.dot.gov.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR MONITORING THE WEB PAGES NOTED ABOVE FOR ALL CHANGES TO THE SOLICITATION AND ACTING ON SAID CHANGES.

CHECKLIST FOR BID SUBMISSION

1. Bid Envelope:

- a. Addressed as shown in Block 8 of Page A-1
- b. In lower left corner, indicate Solicitation No., Project Name & Number, time for Receipt of Offers and send to Room 105.

2. Standard Form 1442: Solicitation, Offer and Award (Pages A-1 and A-2)

- a. Block 14: Name and Address of Offeror.
- b. Block 15: Telephone Number of Offeror.
- c. Block 16: Remittance Address if different from Block 14.
- d. Block 19: **All** Amendments Acknowledged, with dates of Amendments.
- e. Block 20: Bid is signed and dated.

3. Bid Schedule - (Pages B-1 through B-9)

- a. Unit proposal price and proposal amount provided for each pay item in numbers.
- b. Corrections initialed.
- c. Price Evaluation eligibility is indicated on the Proposal Summary page.

4. Standard Form 24, Bid Bond (Pages C-1 through C-2) (Required if bid guarantee is bid bond)

- a. Date executed
- b. Legal name and address of Offeror.
- c. Type of organization.
- d. State of incorporation (if applicable).
- e. Name and business address of Treasury approved surety.
- f. Penal sum of bond (not less than 20% of proposal total).
- g. Proposal identification.
- h. Signature of Offeror
- i. Seal, if corporation
- j. Signature of Surety
- k. Seal, if corporation

PROPOSALS RECEIVED WITHOUT A VALID BID BOND WILL BE REJECTED.

5. Power of Attorney.

- a. Dated on or before execution date of bond
- b. Power has original signature of surety, or is embossed with surety's seal in the certification section

PROPOSALS RECEIVED WITHOUT A VALID POWER OF ATTORNEY WILL BE REJECTED.

6. Fill In's. The following full text Clauses and/or Provision numbers shall be checked or filled in and return with the proposal package:

- a. 52.219-4 – HubZone ONLY - See Section F, Clause 52-219-4, paragraph "C",

CHECKLIST FOR BID SUBMISSION

check block if wavier is applicable.

7. Offeror's Qualifications form (provided separately as part of the proposal Documents Package). Form completed, signed and submitted with proposal

8. Offeror's Questionnaire on Calendar Days signature required (if not completed proposal shall be found non-responsive).

9. Sub-Contracting Plan - Large Businesses Only: Submittal with the proposal is not mandatory, **but it is encouraged**, as it will speed up the award process should your firm be the apparent low proposal.

THE FOLLOWING THREE ITEMS ARE NOT TO BE SUBMITTED WITH THE BID; BUT FAILURE TO COMPLETE THE REQUIREMENTS WILL BE CAUSE TO REJECT THE PROPOSAL.

10. Central Contractor Registration (CCR): The Contractor is currently registered in the Internet-Based CCR database at <http://www.ccr.gov>.

11. Online Representations and Certifications Application (ORCA): The Contractor's Representations and Certifications have been input online via the Internet-Based ORCA electronic database at <http://orca.bpn.gov>.

12. Vets100 Reporting: The Contractor has completed the annual Internet-Based reporting requirement online at <http://vets100>.

NOTE: THE CONTRACTOR IS FULLY RESPONSIBLE TO VERIFY THAT ALL DATA IN THE THREE DATABASES IS CORRECT EACH TIME A PROPOSAL PACKAGE IS SUBMITTED. FAILURE PROPERLY INPUT AND/OR UPDATE YOUR DATA MAY CAUSE THE PROPOSAL TO BE REJECTED.

Offerors Qualification questionnaire regarding the preparation of the proposal for time:

- 1) Does the proposal for time include the impact of normal weather conditions on the work of the Contract?
- 2) Does the proposal for time include the impact of the terms of the Contract Specifications regarding work restrictions - including all identified delays, suspensions, and shut-downs?
- 3) Does the proposal for time include sufficient time to allow that all contract work can be completed within contract time without the imposition of liquidated damages?
- 4) Does the proposal for time include time for the review and approval process for all submittals required by the Contract?
- 5) Does the proposal for time include time for the review and approval process for required drawings submitted under Subsection 104.03 of the Specifications?
- 6) Does the proposal for time include the lead time required for the procurement, manufacture, and delivery of materials that are to be incorporated into the Contract work?
- 7) Does the proposal for time include sufficient time to accommodate the fact that the date of Notice to Proceed is conditional upon the Government awarding the contract up to 60 days after the proposal opening?
- 8) Does the proposal for time include the 14 days after the award of the Contract that the Contractor has to provide Performance and Payment bonds?
- 9) Does the proposal for time include sufficient time to accommodate the fact that the Contracting Officer has up to 30 days after receipt of acceptable Performance and Payment bonds to issue the Notice to Proceed?

I hereby certify that the answer to each and every one of the questions listed above is yes.

Signature of Authorized Representative

Title

Date

Note: If the questionnaire is not signed the proposal shall be found non-responsive and rejected.

SOLICITATION, OFFER, AND AWARD <i>(Construction, Alteration, or Repair)</i>	1. Solicitation No. DTFH71-08-R-00013	2. Type of Solicitation <input type="checkbox"/> Sealed Bid (<i>IFB</i>) <input checked="" type="checkbox"/> Negotiated (<i>RFP</i>)	3. Date Issued 07/22/08	Page of Pages 1 OF 5
	IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.			

4. Contract No.	5. Requisition/Purchase Request No.	6. Project No. PLH-BICY 104(1)
-----------------	-------------------------------------	--

7. Issued By: Federal Highway Administration Eastern Federal Lands Highway Division Loudoun Tech Center, Room 105 21400 Ridgetop Circle Sterling, Virginia 20166-6511	CODE: N/A:	8. Address Offer To: See Block 7
---	------------	--

9. FOR INFORMATION See Blocks 9A & 9B	A. Name: Peggy Schaad	B. Telephone No. (Include area code) (NO COLLECT CALLS) Email All Questions/Inquiries To: eflhd.contracts@fhwa.dot.gov
--	---------------------------------	--

See Continuation of SF 1442

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder"

10. The Government requires performance of the work described in these documents (title, identifying no., date): This Invitation for Bids is for the Big Cypress National Preserve, Tamiami Trail Welcome Center, located in Collier County, Florida in strict accordance with the Solicitation/Contract instructions, notices, clauses, provisions, *items listed below, and for the quantities of work actually performed at the unit prices as bid in the Bid Schedule, including all applicable Federal, State, and local taxes.

- * FP - Standard Specification for Construction of Roads & Bridges on Federal Highway Projects.
- * Bid Schedule, Section B - pages B-1 through B-9.
- * Special Contract Requirements, Section J - pages J-1 through J-378.
- * Plans (Drawings), Sheets 1 through 69.
- * Geotechnical Report, Pages 1 through 31.
- * Permits, Pages 1 through 68.

11. The Contractor shall begin performance within **10** calendar days and complete it within calendar days after receiving
 Award, Notice to Proceed. This performance period is mandatory, negotiable. (See *Continuation Sheet)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? (If "YES," indicate within how many calendar days after award in Item 12B.) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO SEE SUBSECTION 102.06 OF FP.	12B. CALENDAR DAYS Within 14 calendar days after Notice of Award
---	--

13. ADDITIONAL SOLICITATION REQUIREMENTS:

- a. Offers in original and **0** copies to perform the work required are due at the place specified in Item 8 by **2:00 PM** local time **08/22/08**. If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.
- b. An offer guarantee is, is not required.
- c. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.
- d. Offers providing less than **60** calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

OFFER (Must be fully completed by offeror)

14. Name and Address of Offeror (Include ZIP code)	15. Telephone No. (Include area code)
	16. Remittance Address (Include only if different than Item 14)
CODE	FACILITY CODE

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation if this offer is accepted by the Government in writing within ___ calendar days after the date offers are due. (Insert any number equal to or greater than the minimum requirement stated in Item 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.

AMOUNTS ➡ See Bid Schedule - Section "B" Pages

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGEMENT OF AMENDMENTS
(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)

AMENDMENT NO.								
DATE								

20a. Name and title of person authorized to sign offer (Type or print)	20B. Signature	20C. Offer Date
--	----------------	-----------------

AWARD (To be completed by Government)

21. Items Accepted:

22. Amount	23. Accounting and appropriation data
------------	---------------------------------------

24. SUBMIT INVOICES TO ADDRESS SHOWN IN (4 copies unless otherwise specified)	ITEM See Block 26	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO <input type="checkbox"/> 15 USC 637(a)) <input type="checkbox"/> 41 USC 253(c) ()
---	-----------------------------	---

26. ADMINISTERED BY Federal Highway Administration Eastern Federal Lands Highway Division 21400 Ridgetop Circle Sterling, Virginia 20166-6511	27. PAYMENT WILL BE MADE BY: Federal Highway Administration Eastern Federal Lands Highway Division Finance Division, Room 357 21400 Ridgetop Circle Sterling, Virginia 20166-6511
---	--

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

<input type="checkbox"/> 28. NEGOTIATED AGREEMENT (Contractor is required to sign this document and return ___ copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications incorporated by reference in or attached to this contract.	<input type="checkbox"/> 29. AWARD (Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.
---	---

30a. Name and Title of Contractor or Person Authorized to Sign (Type or print)	31a. Name of Contracting Officer (Type or print)
30b. Signature	31b. United States of America BY
30C. Date	31C. Date

CONTINUATION OF SF 1442

Block 2:

This project is **UN-RESTRICTED** - Offers will be accepted from **ALL** eligible business concerns.

This procurement is made pursuant to Public Law 100-656 Title VII, which established the Small Business Competitiveness Demonstration Program. This procurement falls under North American Industry Classification System (NAICS) code 237310 - Highway, Street, and Bridge Construction (see FAR Subpart 19.10)

The award of this project is subject to a 10% price evaluation preference for eligible HubZone Small Business Concerns (must be on the SBA listing) (see FAR Clause 52.219-4).

Facsimile and electronic proposals will not be accepted.

PHYSICAL DATA AVAILABLE FOR REVIEW

1. Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition, published by the Federal Highway Administration. <http://mutcd.fhwa.dot.gov>.
2. National Park Service Sign Manual, revised - January 1988, United States Department of the Interior. <http://www.nps.gov/npsigns>.
3. Geotechnical Report
4. Permits

Block 9:

In accordance with FAR Provision 52.236-27, Site Visit, a Government representative can be available to show the project to prospective bidders. **All requests** for site visits see Section E of the solicitation and e-mail all questions concerning this construction project to the following e-mail address eflhd.contracts@fhwa.dot.gov. Interested parties must provide the Solicitation Number and the relevant project name with all requests and questions.

*Block 11:

The maximum time for Schedule A, Option 1, Option 2, Option 3, and Option 4 shall not exceed **337** Calendar days for total contract.

The maximum time to complete each schedule is as follows:

Schedule A = 300 calendar days

Schedule B (Option 1) = 7 calendar days

Schedule C (Option 2) = 30 calendar days

Schedules D and E (Options 3 and 4) to be constructed concurrently

The completion time for the contract will be the time offered by the successful bidder, **not to exceed** the maximum time above.

Notice to Proceed, or date specified in the Notice to Proceed will be issued within 30 days following receipt of acceptable performance and payment bonds.

CONTINUATION OF SF 1442

Block 12A:

Furnish performance and payment bonds in accordance with FAR Clause 52.228-15.

Block 13:

A bid guarantee in the amount of not less than 20 percent of the bid price or \$3 million, whichever is less, is required with this bid. If the bidder fails to provide the required bid guarantee, such failure may require rejection of the bid. Reference FAR Provision 52.228-1, Bid Guarantee.

Other:

The estimated price is expected to fall within the price range of **\$1,000, 000 to \$2,000,000**.

Technical Factors: The technical capability of the offeror will be evaluated using the following factors:

1. Criterion 1 – Past Performance: The past performance of the PROJECT TEAM on COMPARABLE CONTRACTS, either solely or as a team, will be evaluated in the areas of quality, timeliness, and business relations. Offerors demonstrating a higher level of successful past performance in the evaluated areas will be more favorably rated. In the case of an offeror without a record of relevant past performance or for whom information on past performance is not available, the offeror will be evaluated neither favorably nor unfavorably. The specific scope of work that the offeror proposes to complete using each specific project team member will be considered and should be identified in the offeror's proposal.
2. Criterion 2 – Experience and Technical Proficiency: The offeror will be evaluated on the basis of the extent of recent experience in construction of facilities on federally owned lands that included protection of environmental resources, meeting permit requirements and level of technical proficiency of the KEY PERSONNEL and PROJECT TEAM. Offerors with a higher level of experience on COMPARABLE CONTRACTS and/or a higher level of technical proficiency will be more favorably rated.
 - a. Subfactor 2.a – Experience and Technical Proficiency of the KEY PERSONNEL.
 - b. Subfactor 2.b – Experience and Technical Proficiency of the PROJECT TEAM
3. Criterion 3 – Project Management and Operating Procedures: The offeror will be evaluated on the basis of scheduling, communication, coordination, tracking, safety, and cost control. Offerors must submit a draft proposed project schedule. Offerors demonstrating effective and efficient project management and operating procedures will be more favorably rated.

Responsibility of offerors shall be evaluated in accordance with the information provided on the Bidder's Qualification Form, which can be downloaded from FHWA web site. FP-96 or FP-03 versions can be downloaded at the FHWA web site. FHWA web site is

CONTINUATION OF SF 1442

<http://www.epl.fhwa.dot.gov/contracting/Documents.aspx>.

Subcontracting Goals

Required from all other than Small business when the requirement is expected to exceed \$500,000 [FAR 19.702]. The Contracting Officer, along review and advisory comments from the Office of Small Disadvantaged Business Utilization (OSDBU), is responsible for approving a reasonable and realistic plan [FAR 19.705-4] [TAM 1219.201(e)(6)]. The legislated subcontracting goals are as shown below. A copy of each subcontracting plan (or contractor statement that no subcontracts are to be awarded) must be provided to OSDBU prior to close of negotiations [TAM 1219.705-5 and - 6].

Legislated subcontracting goals: (15 USC 644 (g)(1))

- 5% Small Disadvantaged Businesses (SDB)
- 5% Small Woman Owned Business Entities (SWBE)
- 3% Service-Disabled Veteran-Owned Small Businesses (SDVOSB)

BID SCHEDULE INSTRUCTIONS

PROJECT: PLH-BICY 104(1)

BIDDERS PLEASE NOTE: Before preparing the bid, carefully read the Instructions to Bidders. While preparing the bid, comply with the following:

COMPLETING THE BID SCHEDULE

Complete the Bid Schedule(s) by handwriting in ink or typing. Specify a Unit Bid Price, in figures with cents to only two decimal places, for each pay item in the Unit Bid Price column for which a quantity is given. Do not enter or tender a Unit Bid Price for any pay item for which no estimated quantity appears in the Bid Schedule. Determine the products of the respective unit prices and quantities, and show them, in figures, in the Amount Bid column. If a Unit Bid Price and Amount Bid have been inserted by the Government for a pay item, do not change the Unit Bid Price and Amount Bid for the pay item. Determine the Bid Total by adding the amounts of the several items, and show in the block provided on **Page B-3 for Schedule A, Page B-4 for Schedule B, Page B-5 for Schedule C, Page B-6 for Schedule D, and Page B-7 for Schedule E**. In case of multiplication errors, the Amount Bid for the item will be based on the Unit Bid Price.

To be eligible for award, bidders must submit prices for each pay item.

Review Subsection 109.05 of the FP regarding scope of payment for direct and indirect payment work.

SCHEDULES OF WORK

The Bid Schedule is comprised of the following separate schedules and options of work:

- Schedule A (Base Contract)** – **Construction of the Tamiami Trail Welcome Center and Comfort Station, with parking area (except asphalt pavement and striping), sidewalks, site utilities, stormwater management facilities, and turn lane on U.S. Highway 41.**
- Schedule B (Government Option 1)** – **Construction of the asphalt pavement and striping for the parking area.**
- Schedule C (Government Option 2)** – **Construction of the Multipurpose Building.**
- Schedule D (Government Option 3)** – **Construction of the Outside Pavilion.**
- Schedule E (Government Option 4)** – **Construction of the landscaping.**

The Government will award the project as a Base Contract (Schedule A) with the option to award any, all, or no combinations of the Government Option(s) (Schedules B, C, D, and E); see FAR Clauses 52.217-4 and 52.217-5.

The purpose of the multiple schedules and options is to give the Government maximum flexibility in completing the project in a timely manner and at a cost-effective price, by proper utilization of available funds and upon receipt of all required funding. **If complete funding is in place at the time of award of the Base Contract (Schedule A), the Government may award all or any combination of the Government Option(s) (Schedules B, C, D, and E) at that time. If funding for the Government Option(s) is received after award of the Base Contract, the Government has the right to exercise the Government Option(s) at the unit prices bid no later than 120 calendar days from the Notice To Proceed of the Base Contract.**

BIDDING OF CALENDAR DAYS

For each schedule or option of work shown on the **Bid Summary** page(s), determine the number of calendar days necessary to complete that schedule or option of work from Notice To Proceed of that schedule or option of work to the completion of that schedule or option of work. **Specify the number of calendar days (NOT to exceed the maximum number of calendar days shown in Block 11 of the SF-1442) in the space provided on the Bid Summary page(s).** Failure to specify a number of calendar days for contract completion indicates the bidder accepts the maximum contract time provided in Block 11 of the SF-1442.

In developing a construction schedule to determine the number of calendar days included in their bid, bidders should include the work limitations shown in the Special Contract Requirements (SCR's). Specific work limitations may be (but are not limited to): holidays, weekends; rush hours; night work; no work periods; work or traffic control phasing. Bidders are advised to consider those work items that are weather sensitive and when those work items will be performed. Specific work items are (but not limited to): those that require a minimum ambient air temperature (asphalt paving and surface treatment, pavement striping, stone masonry); those that require maintaining a minimum surface temperature (concrete pavement, structural concrete, painting); and those that have specific planting seasons (turf establishment, sod, trees and plants). Bidders are also advised to consider time required for preparing material and drawing submittals, and the allowable Government review times for those submittals (Subsection 104.03 of the FP and SCR's). The total calendar days bid should also include any work limitations and any delay days or contractor winter shutdowns required due to weather sensitive work items.

When evaluating the bids, the Government will consider the Contract Administrative Cost for the project to be \$1,100.00 per calendar day bid. The Contract Administrative Cost is only used to determine the Evaluation Total Price of Project.

Add the **Bid Total(s)** and the **Contract Administrative Cost(s)** for each schedule or option of work as directed on the **Bid Summary** page(s). Show the **Evaluation Total Price of Project** in the space provided on the **Bid Summary** page(s).

BASIS FOR AWARD

The contract will be awarded to the responsive, responsible bidder with the lowest **Evaluation Total Price of Project**, which is defined as:

**Bid Total of Base Contract (Schedule A) +
Contract Administrative Cost of Base Contract (Schedule A) +
Bid Total of Government Option 1 (Schedule B) +
Contract Administrative Cost of Government Option 1 (Schedule B) +
Bid Total of Government Option 2 (Schedule C) +
Contract Administrative Cost of Government Option 2 (Schedule C) +
Bid Total of Government Option 3 (Schedule D) +
Bid Total of Government Option 4 (Schedule E).**

The number of calendar days specified by the successful bidder for the completion of the awarded combination of Base Contract and Government Option(s) will become the performance period for the contract.

If the Government Option(s) are exercised after the award of the Base Contract, the number of calendar days specified by the successful bidder for that Government Option(s) will become the performance period for that Government Option(s).

NOTE: Contract Administration Cost is used for evaluation and ranking purposes only.

Bid Schedule

Project: PLH-BICY 104(1)
TAMIAMI TRAIL WELCOME CENTER

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
15101-0000	MOBILIZATION		
	ALL	Lump Sum	\$ _____
15201-0000	CONSTRUCTION SURVEY AND STAKING		
	ALL	Lump Sum	\$ _____
15401-0000	CONTRACTOR TESTING		
	ALL	Lump Sum	\$ _____
15705-0100	SOIL EROSION CONTROL, SILT FENCE		
	4,648		
	LNFT	\$ _____	\$ _____
15706-0100	SOIL EROSION CONTROL, STRAW BALE		
	12		
	EACH	\$ _____	\$ _____
20103-0000	CLEARING AND GRUBBING		
	15,000		
	SQYD	\$ _____	\$ _____
20401-0000	ROADWAY EXCAVATION		
	599		
	CUYD	\$ _____	\$ _____
20403-0000	UNCLASSIFIED BORROW		
	713		
	CUYD	\$ _____	\$ _____
20420-0000	EMBANKMENT CONSTRUCTION (MATERIAL PROVIDED ON-SITE)		
	3,100		
	CUYD	\$ _____	\$ _____
21301-0000	SUBGRADE STABILIZATION (12" DEPTH)		
	5,000		
	SQYD	\$ _____	\$ _____
30101-0000	AGGREGATE BASE (LIMEROCK)		
	1,110		
	TON	\$ _____	\$ _____

Bid Schedule A

Project: PLH-BICY 104(1)
TAMIAMI TRAIL WELCOME CENTER

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
40101-0700	SUPERPAVE PAVEMENT, 1/2-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 3 TO <30 MILLION ESAL , TYPE V PAVEMENT SMOOTHNESS		
	260 TON	\$ _____	\$ _____
40101-1100	SUPERPAVE PAVEMENT, 3/4-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 3 TO <30 MILLION ESAL		
	248 TON	\$ _____	\$ _____
41301-0200	ASPHALT PAVEMENT MILLING, 1-INCH DEPTH		
	4,733 SQYD	\$ _____	\$ _____
60201-0200	6-INCH PIPE CULVERT		
	40 LNFT	\$ _____	\$ _____
60210-0200	END SECTION FOR 6-INCH PIPE CULVERT (MITERED)		
	1 EACH	\$ _____	\$ _____
60403-0000	INLET (PRECAST SKIMMER)		
	1 EACH	\$ _____	\$ _____
60902-1000	CURB AND GUTTER, CONCRETE, 12-INCH DEPTH		
	384 LNFT	\$ _____	\$ _____
60915-1000	WHEELSTOP, CONCRETE		
	15 EACH	\$ _____	\$ _____
61501-0100	SIDEWALK, CONCRETE		
	540 SQYD	\$ _____	\$ _____
62403-0000	FURNISHING AND PLACING TOPSOIL		
	1,967 CUYD	\$ _____	\$ _____
62502-0000	TURF ESTABLISHMENT		
	6,400 SQYD	\$ _____	\$ _____

Bid Schedule A

Project: PLH-BICY 104(1)

TAMIAMI TRAIL WELCOME CENTER

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
62701-0000	SOD, SOLID 7,984 SQYD	\$ _____	\$ _____
63301-0000	SIGN SYSTEM 6 EACH	\$ _____	\$ _____
63316-1000	REMOVE AND RESET SIGN 1 EACH	\$ _____	\$ _____
63401-1500	PAVEMENT MARKINGS, TYPE H, SOLID 11,569 LNFT	\$ _____	\$ _____
63405-2900	PAVEMENT MARKINGS, TYPE H, TURN ARROW 3 EACH	\$ _____	\$ _____
63406-0000	RAISED PAVEMENT MARKER 230 EACH	\$ _____	\$ _____
63501-0000	TEMPORARY TRAFFIC CONTROL ALL	Lump Sum	\$ _____
64602-2000	BUILDING, SUPPORT BUILDING (VISITOR CENTER) ALL	Lump Sum	\$ _____
64602-2000	BUILDING, SUPPORT BUILDING (SITE UTILITIES) ALL	Lump Sum	\$ _____
64603-0600	FIXTURE, FLAG POLE 1 EACH	\$ _____	\$ _____

TOTAL \$ _____

Submitted by: _____
Name of Bidder

Bid Schedule A

Project: PLH-BICY 104(1)
TAMIAMI TRAIL WELCOME CENTER

Bid Schedule

Project: PLH-BICY 104(1) - OPTION 1
TAMIAMI TRAIL WELCOME CENTER

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
15101-0000	MOBILIZATION ALL	Lump Sum	\$ _____
15201-0000	CONSTRUCTION SURVEY AND STAKING ALL	Lump Sum	\$ _____
15401-0000	CONTRACTOR TESTING ALL	Lump Sum	\$ _____
40101-0600	SUPERPAVE PAVEMENT, 1/2-INCH NOMINAL MAXIMUM SIZE AGGREGATE, 0.3 TO <3 MILLION ESAL , TYPE V PAVEMENT SMOOTHNESS 280 TON	\$ _____	\$ _____
63401-1500	PAVEMENT MARKINGS, TYPE H, SOLID 860 LNFT	\$ _____	\$ _____
63405-2900	PAVEMENT MARKINGS, TYPE H, TURN ARROW 5 EACH	\$ _____	\$ _____
63405-3250	PAVEMENT MARKINGS, TYPE H, ACCESSIBILITY SYMBOL 2 EACH	\$ _____	\$ _____

TOTAL \$ _____

Submitted by: _____
Name of Bidder

Bid Schedule

Project: PLH-BICY 104(1) - OPTION 2
TAMIAMI TRAIL WELCOME CENTER

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
15101-0000	MOBILIZATION ALL	Lump Sum	\$ _____
15201-0000	CONSTRUCTION SURVEY AND STAKING ALL	Lump Sum	\$ _____
15401-0000	CONTRACTOR TESTING ALL	Lump Sum	\$ _____
64602-2000	BUILDING, SUPPORT BUILDING (MULTIPURPOSE CENTER) ALL	Lump Sum	\$ _____

TOTAL \$ _____

Submitted by: _____
Name of Bidder

Bid Schedule

Project: PLH-BICY 104(1) - OPTION 3
TAMIAMI TRAIL WELCOME CENTER

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
15101-0000	MOBILIZATION ALL	Lump Sum	\$ _____
15201-0000	CONSTRUCTION SURVEY AND STAKING ALL	Lump Sum	\$ _____
15401-0000	CONTRACTOR TESTING ALL	Lump Sum	\$ _____
64605-1000	FIXTURE, KIOSK (PAVILION) ALL	Lump Sum	\$ _____

TOTAL \$ _____

Submitted by: _____
Name of Bidder

Bid Schedule

Project: PLH-BICY 104(1) - OPTION 4
TAMIAMI TRAIL WELCOME CENTER

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
15101-0000	MOBILIZATION		
	ALL	Lump Sum	\$ _____
62632-0000	PLANTINGS		
	ALL	Lump Sum	\$ _____
TOTAL			\$ _____

Submitted by: _____
Name of Bidder

BID SUMMARY

Project **PLH-BICY 104(1)**
(Complete for Pages B-1 through B-7)

(1) Base Contract (Schedule A) Bid Total (from Page B-3) \$ _____

Contract Administrative Cost for Base Contract (Schedule A)*

Number of calendar days necessary to complete all Base Contract (Schedule A) work from Notice to Proceed (or date specified in the Notice to Proceed) to completion of Schedule A.

(2) _____ calendar days x \$1,100.00 per calendar day = \$ _____

(3) Government Option 1 (Schedule B) Bid Total (from Page B-4) \$ _____

Contract Administrative Cost for Gov't Option 1 (Schedule B)*

Number of calendar days necessary to complete all Gov't Option 1 (Schedule B) work from Notice to Proceed for Schedule B (or date specified in the Notice to Proceed) to completion of Schedule B.

(4) _____ calendar days x \$1,100.00 per calendar day = \$ _____

(5) Government Option 2 (Schedule C) Bid Total (from Page B-5) \$ _____

Contract Administrative Cost for Gov't Option 2 (Schedule C)*

Number of calendar days necessary to complete all Gov't Option 2 (Schedule C) work from Notice to Proceed for Schedule C (or date specified in the Notice to Proceed) to completion of Schedule C.

(6) _____ calendar days x \$1,100.00 per calendar day = \$ _____

(7) Government Option 3 (Schedule D) Bid Total (from Page B-6) \$ _____

(8) Government Option 4 (Schedule E) Bid Total (from Page B-7) \$ _____

* The Government Options 3 and 4 (Schedules D and E) are considered to be constructed concurrently with the Base Contract (Schedule A), as well as Government Options 1 and 2 (Schedules B and C), if and/or when awarded.

(continued)

BID SUMMARY
Project **PLH-BICY 104(1)**
(Complete for Pages B-1 through B-7)

Total Price of Project (for evaluation purposes only)

(1) Bid Total for Base Contract (Schedule A) (1)	\$ _____
+ (2) Contract Administrative Cost for Base Contract (Schedule A) . . . (2)	\$ _____
+ (3) Bid Total for Gov't Option 1 (Schedule B) (3)	\$ _____
+ (4) Contract Administrative Cost for Gov't Option 1 (Schedule B) . . . (4)	\$ _____
+ (5) Bid Total for Gov't Option 2 (Schedule C) (5)	\$ _____
+ (6) Contract Administrative Cost for Gov't Option 2 (Schedule C) . . . (6)	\$ _____
+ (7) Bid Total for Gov't Option 3 (Schedule D) (7)	\$ _____
+ (8) Bid Total for Gov't Option 4 (Schedule E) (8)	\$ _____
= EVALUATION TOTAL PRICE OF PROJECT	\$ _____

Does the Bidder claim the Price Evaluation Preference for HUBZone Small Business Concerns as defined in FAR Clause 52.219-4?

Yes

No

BID BOND <i>(See instruction on reverse)</i>	DATE BOND EXECUTED <i>(Must not be later than bid opening date)</i>	OMB NO.: 9000-0045
--	---	--------------------

Public reporting burden for this collection of information is estimated to average 25 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (MVR), Federal Acquisition Policy Division, GSA, Washington, DC 20405.

PRINCIPAL <i>(Legal name and business address)</i>	TYPE OF ORGANIZATION <i>("X" one)</i> <input type="checkbox"/> INDIVIDUAL <input type="checkbox"/> PARTNERSHIP <input type="checkbox"/> JOINT VENTURE <input type="checkbox"/> CORPORATION STATE OF INCORPORATION
--	--

SURETY(IES) *(Name and business address)*

PENAL SUM OF BOND					BID IDENTIFICATION	
PERCENT OF BID PRICE	AMOUNT NOT TO EXCEED				BID DATE	INVITATION NO.
	MILLION(S)	THOUSAND(S)	HUNDRED(S)	CENTS		
					FOR <i>(Construction, Supplies, or Services)</i>	

OBLIGATION:

We, the Principal and Surety(ies) are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS:

The Principal has submitted the bid identified above.

THEREFORE:

The above obligation is void if the Principal - (a) upon acceptance by the Government of the bid identified above, within the period specified therein for acceptance (sixty (60) days if no period is specified), executes the further contractual documents and gives the bond(s) required by the terms of the bid as accepted within the time specified (ten (10) days if no period is specified) after receipt of the forms by the principal; or (b) in the event of failure to execute such further contractual documents and give such bonds, pays the Government for any cost of procuring the work which exceeds the amount of the bid.

Each Surety executing this instrument agrees that its obligation is not impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the Government. Notice to the surety(ies) of extension(s) are waived. However, waiver of the notice applies only to extensions aggregating not more than sixty (60) calendar days in addition to the period originally allowed for acceptance of the bid.

WITNESS:

The Principal and Surety(ies) executed this bid bond and affixed their seals on the above date.

PRINCIPAL				
SIGNATURE(S)	1.	2.	3.	<i>Corporate Seal</i>
	<i>(Seal)</i>	<i>(Seal)</i>	<i>(Seal)</i>	
NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.	3.	

INDIVIDUAL SURETY(IES)		
SIGNATURE(S)	1.	2.
	<i>(Seal)</i>	<i>(Seal)</i>
NAME(S) <i>(Typed)</i>	1.	2.

CORPORATE SURETY(IES)			
SURETY A	NAME & ADDRESS	STATE OF INC.	LIABILITY LIMIT (\$)
	SIGNATURE(S)	1.	2.
	NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.

Corporate Seal

SURETY B	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT (\$)	<i>Corporate Seal</i>
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.		
SURETY C	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT (\$)	<i>Corporate Seal</i>
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.		
SURETY D	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT (\$)	<i>Corporate Seal</i>
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.		
SURETY E	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT (\$)	<i>Corporate Seal</i>
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.		
SURETY F	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT (\$)	<i>Corporate Seal</i>
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.		
SURETY G	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT (\$)	<i>Corporate Seal</i>
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) <i>(Typed)</i>	1.	2.		

INSTRUCTIONS

1. This form is authorized for use when a bid guaranty is required. Any deviation from this form will require the written approval of the Administrator of General Services.
2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.
3. The bond may express penal sum as a percentage of the bid price. In these cases, the bond may state a maximum dollar limitation (e.g., (e.g., 20% of the bid price but the amount not to exceed _____ dollars).
4. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designed "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual surety (Standard Form 28), for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning its financial capability.
5. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal"; and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.
6. Type the name and title of each person signing this bond in the space provided.
7. In its application to negotiated contracts, the terms "bid" and "bidder" shall include "proposal" and "offeror."

CONTRACT CLAUSES INDEX

FEDERAL ACQUISITION REGULATION (FAR) & TRANSPORTATION ACQUISITION REGULATION (TAR)

(Updated thru FAC 2005-26 on 06/12/2008)

52.252-2 Clauses Incorporated By Reference (Feb 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this address: www.arnet.gov/far/

(End of Clause)

FAR & TAR CLAUSES INCORPORATED BY REFERENCE

CLAUSE	TITLE	DATE	REMARKS
52.202-01	DEFINITIONS	Jul-04	
52.203-03	GRATUITIES	Apr-84	
52.203-05	COVENANT AGAINST CONTINGENT FEES	Apr-84	
52.203-07	ANTI-KICKBACK PROCEDURES	Jul-95	
52.203-8	CANCEL. & RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY	Jan-97	
52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY	Jan-97	
52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS	Sep-05	
52.204-02, ALT II	SECURITY REQUIREMENTS (ALT II, APR-84)	AUG-96	
52.204-04	PRINTING/COPYING DOUBLE-SIDED ON RECYCLED PAPER	Aug-00	
52.204-07	CENTRAL CONTRACTOR REGISTRATION	Aug-08	Contractor Mandatory Internet Data Input
52.209-06	PROTECTING GOV. INTEREST WHEN SUBCONTRACTING W/ CONT. DEB. SUSP. OR PROP. FOR DEB.	SEP-06	
52.215-08	ORDER OF PRECEDENCE UNIFORM CONTRACT FORMAT	Oct-97	FOR CONTRACTS > \$500,000
52.219-08	UTILIZATION OF SMALL BUSINESS CONCERNS	May-04	
52.219-09 ALT 1	SMALL BUSINESS SUBCONTRACTING PLAN (ALT 1 - (Oct 01))	Apr-08	Large Business Mandatory Submittal Requirement
52.219-14	LIMITATIONS ON SUBCONTRACTING	Dec-96	
52.219-16	LIQUIDATED DAMAGES - SUBCONTRACTING PLAN	Jan-99	
52.222-03	CONVICT LABOR	Jun-03	
52.222-04	CONTRACT WORK HOURS AND SAFETY STANDARDS ACT--OVERTIME COMPENSATION	Jul-05	
52.222-06	DAVIS-BACON ACT	Jul-05	Contractor Mandatory Wage Rates Posting
52.222-07	WITHHOLDING OF FUNDS	Feb-88	
52.222-08	PAYROLLS AND BASIC RECORDS	Feb-88	Contractor Weekly Payroll Submittals
52.222-09	APPRENTICES AND TRAINEES	Jul-05	
52.222-10	COMPLIANCE WITH COPELAND ACT REQUIREMENTS	Feb-88	
52.222-11	SUBCONTRACTS (LABOR STANDARDS)	Jul-05	
52.222-12	CONTRACT TERMINATION--DEBARMENT	Feb-88	
52.222-13	COMPLIANCE WITH DAVIS-BACON AND RELATED ACT REGULATIONS	Feb-88	
52.222-14	DISPUTES CONCERNING LABOR STANDARDS	Feb-88	
52.222-15	CERTIFICATION OF ELIGIBILITY	Feb-88	
52.222-21	PROHIBITION OF SEGREGATED FACILITIES	Feb-99	
52.222-26	EQUAL OPPORTUNITY	Mar-07	
52.222-27	AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION	Feb-99	
52.222-35	EQUAL OPPORTUNITY FOR SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, & OTHER ELIGIBLE VETERANS.	SEP-06	
52.222-36	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES	Jun-98	
52.222-37	EMPLOYMENT. REPORTS ON SPECIAL DISABLED VETS, VETS OF THE VIETNAM ERA, ETAL.	SEP-06	Contractor Annual Mandatory Reporting Requirement

CONTRACT CLAUSES INDEX

FEDERAL ACQUISITION REGULATION (FAR) & TRANSPORTATION ACQUISITION REGULATION (TAR)

(Updated thru FAC 2005-26 on 06/12/2008)

FAR & TAR CLAUSES INCORPORATED BY REFERENCE

CLAUSE	TITLE	DATE	REMARKS
52.222-39	NOTIFICATION OF EMPLOYEE RIGHTS CONCERNING PAYMENT OF UNION DUES OR FEES	Dec-04	Contractor Mandatory Postings
52.223-06	DRUG-FREE WORKPLACE	May-01	
52.223-14	TOXIC CHEMICAL RELEASE REPORTING	Aug-03	Contractor Annual Contractor Reporting Requirement
52.225-13	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES	Jun-08	
52.227-01	AUTHORIZATION AND CONSENT	Dec-07	
52.227-02	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT	Dec-07	
52.227-04	PATENT INDEMNITY-CONSTRUCTION CONTRACTS	Dec-07	
52.228-02	ADDITIONAL BOND SECURITY	Oct-97	
52.228-5	INSURANCE - WORK ON A GOVERNMENT INSTALLATION	Jan-97	Contractor Submittal Requirement
52.228-11	PLEDGES OF ASSETS	Feb-92	
52.228-12	PROSPECTIVE SUBCONTRACTOR REQUESTS FOR BONDS	Oct-95	
52.228-14	IRREVOCABLE LETTER OF CREDIT	Dec-99	
52.228-15	PERFORMANCE AND PAYMENT BONDS - CONSTRUCTION	NOV-06	Contractor Submittal Requirement
52.229-03	FEDERAL, STATE, AND LOCAL TAXES	Apr-03	
52.232-05	PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS	Sep-02	Contractor Submittal Requirement
52.232-17	INTEREST	Jun-96	
52.232-23	ASSIGNMENT OF CLAIMS	Jan-86	
52.232-27	PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS	Sep-05	
52.232.33	PAYMENT BY ELECTRONIC FUNDS TRANSFER - CENTRAL CONTRACTOR REGISTRATION	Oct-03	
52.233-01 ALT I	DISPUTES (Alt-I, Dec-91)	Jul-02	
52.233-03	PROTEST AFTER AWARD	Aug-96	
52.233-04	APPLICABLE LAW FOR BREACH OF CONTRACT CLAIM	Oct-04	
52.236-02	DIFFERING SITE CONDITIONS	Apr-84	
52.236-03	SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK	Apr-84	
52.236-05	MATERIAL AND WORKMANSHIP	Apr-84	
52.236-06	SUPERINTENDENCE BY THE CONTRACTOR	Apr-84	
52.236-07	PERMITS AND RESPONSIBILITIES	Nov-91	
52.236-08	OTHER CONTRACTS	Apr-84	
52.236-09	PROTECTION OF EXIST. VEGETATION., STRUCTURES., EQUIPMENT., UTILITIES, & IMPROVEMENTS	Apr-84	
52.236-10	OPERATIONS AND STORAGE AREAS	Apr-84	
52.236-11	USE AND POSSESSION PRIOR TO COMPLETION	Apr-84	
52.236-12	CLEANING UP	Apr-84	
52.236-13	ACCIDENT PREVENTION	Nov-91	

CONTRACT CLAUSES INDEX
FEDERAL ACQUISITION REGULATION (FAR) & TRANSPORTATION ACQUISITION REGULATION (TAR)
(Updated thru FAC 2005-26 on 06/12/2008)

FAR & TAR CLAUSES INCORPORATED BY REFERENCE

CLAUSE	TITLE	DATE	REMARKS
52.236-15	SCHEDULES FOR CONSTRUCTION CONTRACTS	Apr-84	Contractor Submittal Requirement
52.236-17	LAYOUT OF WORK	Apr-84	
52.236-21	SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION	Feb-97	
52.236-26	PRECONSTRUCTION CONFERENCE	Feb-95	
52.242-13	BANKRUPTCY	Jul-95	
52.242-14	SUSPENSION OF WORK	Apr-84	
52.243-04	CHANGES	Aug-87	
52.244-06	SUBCONTRACTS FOR COMMERCIAL ITEMS	SEP-06	
52.245-02	GOVERNMENT PROPERTY (FIXED-PRICE CONTRACTS)	Jun-07	
52.246-12	INSPECTION OF CONSTRUCTION	Aug-96	
52.247-64	PERFORMANCE FOR PRIVATELY OWNED U.S.-FLAG COMMERCIAL VESSELS	FEB-06	
52.248-03 ALT 1	VALUE ENGINEERING-CONSTRUCTION (Alt-I, Apr-84)	SEP-06	
52.249-01	TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED PRICE) (SHORT FORM)	APR-84	
52.249-02 ALT I	TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED PRICE) (Alt-I, Sep-96)	May-04	
52.249-10	DEFAULT (FIXED PRICE CONSTRUCTION)	Apr-84	
52.253-01	COMPUTER GENERATED FORMS	Jan-91	

TAR CLAUSES INCORPORATED BY REFERENCE

CLAUSE	TITLE	DATE	REMARKS
1252.211-71	INDEX FOR SPECIFICATIONS	Apr-05	
1252.242-73	CONTRACTING OFFICERS TECHNICAL REPRESENTATIVE	Oct-94	

CONTRACT CLAUSES INDEX

FEDERAL ACQUISITION REGULATION (FAR) & TRANSPORTATION ACQUISITION REGULATION (TAR)

(Updated thru FAC 2005-26 on 06/12/2008)

FAR & TAR PROVISIONS INCORPORATED BY REFERENCE

PROVISION	TITLE	DATE	REMARKS
52.217-03	EVALUATION EXCLUSIVE OF OPTION	Apr-84	
52.217-04	EVALUATION OF OPTIONS EXERCISED AT TIME OF CONTRACT AWARD	Jun-88	
52.217-05	EVALUATION OF OPTIONS	Mar-89	

FAR & TAR CLAUSES INCORPORATED BY FULL TEXT

CLAUSE	TITLE	DATE	SECTION	SECTION TYPE	REMARKS
52.211-10	COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK	Apr-84	H	CONSTR. CONTRACT REQS.	Government Fill In
52.211-12	LIQUIDATED DAMAGES-CONSTRUCTION	Sep-00	H	CONSTR. CONTRACT REQS.	Government Fill In
52.211-18	VARIATION IN ESTIMATED QUANTITY	Apr-84	H	CONSTR. CONTRACT REQS	
52.219-4	NOTICE OF PRICE EVALUATION. PREFERENCE FOR HUBZONE SB CONCERNS	Jul-05	F	SOCIOECON PROG REQS	Contractor Fill-In
52.222-23	NOTICE OF REQ. FOR AFFIRMATIVE ACTION TO ENSURE E.E.O.	Feb-99	F	SOCIOECON PROG REQS	Contractor Reporting Requirements
52.223-03 ALT I	HAZARDOUS MAT. IDENT. & MATERIAL SAFETY DATA (Alt-I, Jul-95)	Jan-97	G	GEN'L CONTRACT REQS.	Contractor Submittal Requirements
52.223-09	EST. OF % OF REC. MAT. CONTENT FOR EPA DESIGN. PRODUCTS	May-08	G	GEN'L CONTRACT REQS	Contractor Reporting Requirement
52.225-09	BUY AMERICAN ACT-CONSTRUCTION MATERIALS	Jan-05	F	SOCIOECON PROG REQS	Government & Contractor Fill In's
52-236-01	PERFORMANCE OF WORK BY THE CONTRACTOR	Apr -84	H	CONSTR. CONTRACT REQS	Government Fill In
52.236-04	PHYSICAL DATA	Apr-84	H	CONSTR. CONTRACT REQS.	Government Fill In

TAR CLAUSES INCORPORATED BY FULL TEXT

CLAUSE	TITLE	DATE	SECTION	SECTION TYPE	REMARKS
FAR PT 22.9	GOV. NONDISCRIMINATION BECAUSE OF AGE POLICY	Feb-64	F	SOCIOECON PROG REQS	Policy Statement - Not A Clause

(End of Clauses Index)

CONTRACT PROVISIONS INDEX
FEDERAL ACQUISITION REGULATION (FAR) & TRANSPORTATION ACQUISITION REGULATION (TAR)
(Updated thru FAC 2005-26 on 06/12/2008)

52.252-1 Solicitation Provisions Incorporated by Reference
(Feb 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this address: www.arnet.gov/far/

(End of Clause)

FAR & TAR PROVISIONS INCORPORATED BY REFERENCE

PROVISION	TITLE	DATE	REMARKS
52.211-06	BRAND NAME OR EQUAL	AUG-99	USE IF BRAND NAME OR EQUAL INCLUDED
52.215-01	INSTRUCTION TO OFFERORS – COMPETITIVE ACQUISITION	JAN-04	
52.215-01 ALT 1	INSTRUCTION TO OFFERORS – COMPETITIVE ACQUISITION	OCT-97	
52.215-11	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA-MODIFICATIONS	OCT-97	
52.215-13	SUBCONTRACTOR COST OR PRICING DATA-MODIFICATIONS	OCT-97	
52.222-23	NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE E.E.O.	FEB-99	
52.222-38	COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQMTS.	DEC-01	
52.228-01	BID GUARANTEE	SEP-96	

TAR PROVISIONS INCORPORATED BY REFERENCE

PROVISION	TITLE	DATE	REMARKS
1252.211-70	BRAND NAME OR EQUAL	OCT-96	USE IF BRAND NAME OR EQUAL INCLUDED

CONTRACT PROVISIONS INDEX
FEDERAL ACQUISITION REGULATION (FAR) & TRANSPORTATION ACQUISITION REGULATION (TAR)
(Updated thru FAC 2005-26 on 06/12/2008)

FAR PROVISIONS INCORPORATED BY FULL TEXT

PROVISION	TITLE	DATE	SECTION	SECTION TYPE	REMARKS
52.204-08	ANNUAL REPRESENTATIONS AND CERTIFICATIONS	JAN 06	D	REPS. & CERTIFICATIONS	Mandatory Contractor On-Line Input
52.211-04	AVAILABILITY FOR EXAM. OF SPECS NOT LISTED IN GSA INDEX OF FED SPECS/STANDARDS & COM. ITEM DESCRIPTION	JUN-88	E	INSTRUCTIONS TO BIDDERS	Government Fill In.
52.216-01	TYPE OF CONTRACT	APR-84	E	INSTRUCTIONS TO BIDDERS	Government Fill In.
52.225-09	BUY AMERICAN ACT-BAL. OF PAYMTS. – CONST MATERIALS	AUG-00	F	SOCIOECON PROG REQS	FOR CONTRACTS < \$6,806,000
52.225-10	NOT. OF BUY AM. ACT/BAL. OF PAY.-CONST. MATLS	MAY-02	F	SOCIOECON PROG REQS	FOR CONTRACTS > \$6,806,000
52.225-12 ALT 1	NOT. OF BUY AM. ACT/BAL. OF PAY.-CONST. MATLS-TRADE (ALT 1, NOV-06)	JAN-05			\$6,806,000 ,CONTR,\$7,068,419
52.233-02	SERVICE OF PROTEST	SEP-96	E	INSTRUCTIONS TO BIDDERS	Contractor Submittal Requirement
52.236-27	SITE VISIT (CONSTRUCTION)	FEB-95	H	CONSTR. CONTRAC REQS.	
52.252-05	AUTHORIZED DEVIATIONS IN PROVISIONS	APR-84	G	GEN'L CONTRACT REQS.	

OTHER PROVISIONS INCORPORATED BY FULL TEXT

PROVISION	TITLE	DATE	SECTION	SECTION TYPE	REMARKS
FAR PT 22.9	NONDISCRIMINATION BECAUSE OF AGE	FEB-64	F	SOCIOECON PROG REQS	
-----	SELECTION OF LABOR	--	F	SOCIOECON PROG REQS	FOR VI CONTRACTS ONLY
-----	RECORD OF MATERIAL, SUPPLIES, AND LABOR	--	H	CONSTR. CONTRAC REQS.	FOR VI CONTRACTS ONLY

(End of Provisions Index)

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION PROVISIONS

REPRESENTATIONS AND CERTIFICATIONS

Annual Representations and Certifications. Prospective contractors shall complete electronic annual representations and certifications on-line at this web address: <http://orca.bpn.gov> (See FAR 4.1201) in conjunction with required registration in the Central Contractor Registration (CCR) database (see FAR 4.1102).

Vets100 Form must also be filled-in online at <http://vets100.cudenver.edu/> in accordance with FAR Clause 52.222-37.

Contractors are not eligible for award without completing these requirements.

4.1201); except for the changes identified below [*offeror to insert changes, identifying change by clause number, title, date*]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR Clause	Title	Date	Change

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on ORCA.
(End of Provision)

52.204-8

52.204-8 – Annual Representations and Certifications.

As prescribed in 4.1202, insert the following provision:
Annual Representations and Certifications (Jan 2006)

- (a)
 - (1) The North American Industry classification System (NAICS) code for this acquisition is 237310.
 - (2) The small business size standard is **\$31,000,000**.
 - (3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.
- (b)
 - (1) If the clause at 52.204-7, Central Contractor Registration, is included in this solicitation, paragraph (c) of this provision applies.
 - (2) If the clause at 52.204-7 is not included in this solicitation, and the offeror is currently registered in CCR, and has completed the ORCA electronically, the offeror may choose to use paragraph (c) of this provision instead of completing the corresponding individual representations and certification in the solicitation. The offeror shall indicate which option applies by checking one of the following boxes:
 - (i) Paragraph (c) applies.
 - (ii) Paragraph (c) does not apply and the offeror has completed the individual representations and certifications in the solicitation.
- (c) The offeror has completed the annual representations and certifications electronically via the Online Representations and Certifications Application (ORCA) website at <http://orca.bpn.gov> . After reviewing the ORCA database information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR

(End of Section D)

FEDERAL ACQUISITION REGULATION & TRANSPORTATION ACQUISITION REGULATION PROVISIONS

INSTRUCTIONS TO BIDDERS

52.211-4

AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (JUN 1988)

The specifications cited in this solicitation are not available for distribution. However, they may be examined at the following location(s):

**FEDERAL HIGHWAY ADMINISTRATION
EASTERN FEDERAL LANDS HIGHWAY DIVISION
21400 RIDGETOP CIRCLE
STERLING, VIRGINIA 20166-6511**

Send an email to the following address to make an appointment: eflhd.contracts@fhwa.dot.gov

TIME(S) FOR VIEWING: 8 A.M. TO 4 P.M.

All documents are available for direct download from the following website:
www.efl.fhwa.dot.gov/procurement/procurement.htm

(End of Provision)

52.236-27

Site Visit (Construction). (Feb 1995)

(a) The clauses at 52.236-2, Differing Site Conditions, and 52.236-3, Site Investigations and Conditions Affecting the Work, will be included in any contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

(b) Site visits may be arranged during normal duty hours by contacting:

1. Name: Ms. Karen Gustin, Superintendent, National Park Service
2. Address: 33100 Tamiami Trail, East Ochopee, FL 34141
3. Telephone: 239-695-1103, Karen.Gustin@nps.gov.

(End of Provision)

(End of Section E)

52.216-1

TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a **firm-fixed-price** contract resulting from this solicitation.

(End of Provision)

52.233-2

SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from

**FEDERAL HIGHWAY ADMINISTRATION
EASTERN FEDERAL LANDS HIGHWAY DIVISION
21400 RIDGETOP CIRCLE
STERLING, VIRGINIA 20166-6511**

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

(End of Provision)

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

SOCIOECONOMIC PROGRAM REQUIREMENTS

52.219-4

Notice of Price Evaluation Preference for HUBZone Small Business Concerns.

(Oct 2004)

(a) *Definition.* HUBZone small business concern, as used in this clause, means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration.

(b) *Evaluation preference.*

(1) Offers will be evaluated by adding a factor of 10 percent to the price of all offers, except—

(i) Offers from HUBZone small business concerns that have not waived the evaluation preference;

(ii) Otherwise successful offers from small business concerns;

(iii) Otherwise successful offers of eligible products under the Trade Agreements Act when the dollar threshold for application of the Act is exceeded (see 25.402 of the Federal Acquisition Regulation (FAR)); and

(iv) Otherwise successful offers where application of the factor would be inconsistent with a Memorandum of Understanding or other international agreement with a foreign government.

(2) The factor of 10 percent shall be applied on a line item basis or to any group of items on which award may be made. Other evaluation factors described in the solicitation shall be applied before application of the factor.

(3) A concern that is both a HUBZone small business concern and a small disadvantaged business concern will receive the benefit of both the HUBZone small business price evaluation preference and the small disadvantaged business price evaluation adjustment (see FAR clause 52.219-23). Each applicable price evaluation preference or adjustment shall be calculated independently against an offeror's base offer. These individual preference amounts shall be added together to arrive at the total evaluated price for that offer.

(c) *Waiver of evaluation preference.* A HUBZone small business concern may elect to waive the evaluation preference, in which case the factor will be added to its offer for evaluation purposes. The agreements in paragraph (d) of this clause do not apply if the offeror has waived the evaluation preference.

Offer elects to waive the evaluation preference.

(d) *Agreement.* A HUBZone small business concern agrees that in the performance of the contract, in the case of a contract for

(1) Services (except construction), at least 50 percent of the cost of personnel for contract performance will be spent for employees of the concern or employees of other HUBZone small business concerns;

(2) Supplies (other than procurement from a non-manufacturer of such supplies), at least 50 percent of the cost of manufacturing, excluding the cost of materials, will be performed by the concern or other HUBZone small business concerns;

(3) General construction, at least 15 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns; or

(4) Construction by special trade contractors, at least 25 percent of the cost of the contract performance incurred for personnel will be spent on the concern's employees or the employees of other HUBZone small business concerns.

(e) A HUBZone joint venture agrees that in the performance of the contract, the applicable percentage specified in paragraph (d) of this clause will be performed by the HUBZone small business participant or participants;

(f) A HUBZone small business concern non-manufacturer agrees to furnish in performing this contract only end items manufactured or produced by HUBZone small business manufacturer concerns. This paragraph does not apply in connection with construction or service contracts.

(End of clause)

FAR SUBPART 22.9

NONDISCRIMINATION BECAUSE OF AGE (FEB 96)

22.901 Policy. Executive Order 11141, February 12, 1964 (29 CFR 2477), states that the Government policy is as follows:

(a) Contractors and subcontractors shall not, in connection with employment, advancement, or discharge of employees, or the terms, conditions, or privileges of their employment, discriminate against persons because of their age except upon the basis of a bona fide occupational qualification, retirement plan, or statutory requirement.

(b) Contractors and subcontractors, or persons acting on their behalf, shall not specify in solicitations or advertisements for employees to work on Government contracts, a maximum age limit for employment unless the specified maximum age limit is based upon a bona fide occupational qualification, retirement plan, or statutory requirement.

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

SOCIOECONOMIC PROGRAM REQUIREMENTS

(c) Agencies will bring this policy to the attention of contractors. The use of contract clauses is not required.
(End of Policy Statement)

52.222-23

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity for Construction (Feb 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for Minority Participation for Each Trade	Goals for Female Participation for Each Trade
17.1%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the *Federal Register* in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on

(1) its implementation of the Equal Opportunity clause,

(2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and

(3) its efforts to meet the goals.

The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the

Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is as follows:

Collier County, Florida

(End of Provision)

52.225-9

Buy American Act-Construction Materials. (Jan 2005)

(a) *Definitions.* As used in this clause-

"Component" means an article, material, or supply incorporated directly into a construction material.

"Construction material" means an article, material, or supply brought to the construction site by the Contractor or a subcontractor for incorporation into the building or work. The term also includes an item brought to the site pre-assembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

"Cost of components" means-

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

SOCIOECONOMIC PROGRAM REQUIREMENTS

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the construction material.

“Domestic construction material” means-

(1) An un-manufactured construction material mined or produced in the United States; or

(2) A construction material manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind for which non-availability determinations have been made are treated as domestic.

“Foreign construction material” means a construction material other than a domestic construction material.

“United States” means the 50 States, the District of Columbia, and outlying areas.

(b) Domestic preference.

(1) This clause implements the Buy American Act (41 U.S.C. 10a - 10d) by providing a preference for domestic construction material. The Contractor shall use only domestic construction material in performing this contract, except as provided in paragraphs (b)(2) and (b)(3) of this clause.

(2) This requirement does not apply to the construction material or components listed by the Government as follows:

NONE

(3) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(2) of this clause if the Government determines that-

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the requirements of the Buy American Act is unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent;

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act.

(1)

(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(3) of this clause shall include adequate information for Government evaluation of the request, including-

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(3)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American Act applies, use of foreign construction material is noncompliant with the Buy American Act.

(d) *Data*. To permit evaluation of requests under paragraph 2 of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

SOCIOECONOMIC PROGRAM REQUIREMENTS

Foreign and Domestic Construction Materials Price Comparison			
Construction Material Description	Unit of Measure	Quantity	Price (Dollars)*
Item 1:			
Foreign construction material			
Domestic construction material			
Item 2:			
Foreign construction material			
Domestic construction material			
[List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.] [Include other applicable supporting information.] [* Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).]			

(End of Clause)

52.225-10 -- Notice of Buy American Act Requirement— Construction Materials.

As prescribed in [25.1102](#)(b)(1), insert the following provision:

Notice of Buy American Act Requirement--Construction Materials (May 2002)

(a) *Definitions.* “Construction material,” “domestic construction material,” and “foreign construction material,” as used in this provision, are defined in the clause of this solicitation entitled “Buy American Act--Construction Materials” (Federal Acquisition Regulation (FAR) clause 52.225-9).

(b) *Requests for determinations of inapplicability.* An offeror requesting a determination regarding the inapplicability of the Buy American Act should submit the request to the Contracting Officer in time to allow a determination before submission of offers. The offeror shall include the information and applicable supporting data required by paragraphs (c) and (d) of the clause at FAR 52.225-9 in the request. If an offeror has not requested a determination regarding the inapplicability of the Buy American Act before submitting its offer, or has not received a response to a previous request, the offeror shall include the information and supporting data in the offer.

(c) *Evaluation of offers.*

(1) The Government will evaluate an offer requesting exception to the requirements of the Buy American Act, based on claimed unreasonable cost of domestic construction material, by adding to the offered price the appropriate percentage of the cost of such foreign

construction material, as specified in paragraph (b)(3)(i) of the clause at FAR 52.225-9.

(2) If evaluation results in a tie between an offeror that requested the substitution of foreign construction material based on unreasonable cost and an offeror that did not request an exception, the Contracting Officer will award to the offeror that did not request an exception based on unreasonable cost.

(d) *Alternate offers.*

(1) When an offer includes foreign construction material not listed by the Government in this solicitation in paragraph (b)(2) of the clause at FAR 52.225-9, the offeror also may submit an alternate offer based on use of equivalent domestic construction material.

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of the clause at FAR 52.225-9 for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

(3) If the Government determines that a particular exception requested in accordance with paragraph (c) of the clause at FAR 52.225-9 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic construction material, and the offeror shall be required to furnish such domestic construction material. An offer based on use of the foreign construction material for which an exception was requested—

(i) Will be rejected as nonresponsive if this acquisition is conducted by sealed bidding; or

(ii) May be accepted if revised during negotiations.

(End of provision)

Alternate I (May 2002). As prescribed in [25.1102](#)(b)(2), substitute the following paragraph (b) for paragraph (b) of the basic provision:

(b) *Requests for determinations of inapplicability.* An offeror requesting a determination regarding the inapplicability of the Buy American Act shall submit the request with its offer, including the information and applicable supporting data required by paragraphs (c) and (d) of the clause at FAR 52.225-9.

52.225-11

Buy American Act—Construction Materials under Trade Agreements. (Nov 2006)

(a) *Definitions.* As used in this clause--

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

SOCIOECONOMIC PROGRAM REQUIREMENTS

“Caribbean Basin country construction material” means a construction material that--

(1) Is wholly the growth, product, or manufacture of a Caribbean Basin country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a Caribbean Basin country into a new and different construction material distinct from the materials from which it was transformed.

“Component” means an article, material, or supply incorporated directly into a construction material.

“Construction material” means an article, material, or supply brought to the construction site by the Contractor or subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

“Cost of components” means--

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition, plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the construction material.

“Designated country” means any of the following countries:

(1) A World Trade Organization Government Procurement Agreement country (Aruba, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, or United Kingdom);

(2) A Free Trade Agreement country (Australia, Bahrain, Canada, Chile, El Salvador, Guatemala, Honduras, Mexico, Morocco, Nicaragua, or Singapore);

(3) A least developed country (Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, East Timor, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Laos, Lesotho, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Tanzania, Togo, Tuvalu, Uganda, Vanuatu, Yemen, or Zambia); or

(4) A Caribbean Basin country (Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Costa Rica, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Montserrat, Netherlands Antilles, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, or Trinidad and Tobago).

“Designated country construction material” means a construction material that is a WTO GPA country construction material, an FTA country construction material, a least developed country construction material, or a Caribbean Basin country construction material.

“Domestic construction material” means--

(1) An unmanufactured construction material mined or produced in the United States; or

(2) A construction material manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic.

“Free Trade Agreement country construction material means” a construction material that--

(1) Is wholly the growth, product, or manufacture of a Free Trade Agreement (FTA) country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a FTA country into a new and different construction material distinct from the materials from which it was transformed.

“Foreign construction material” means a construction material other than a domestic construction material.

“Least developed country construction material” means a construction material that--

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

SOCIOECONOMIC PROGRAM REQUIREMENTS

(1) Is wholly the growth, product, or manufacture of a least developed country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a least developed country into a new and different construction material distinct from the materials from which it was transformed.

“United States” means the 50 States, the District of Columbia, and outlying areas.

“WTO GPA country construction material” means a construction material that--

(1) Is wholly the growth, product, or manufacture of a WTO GPA country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a WTO GPA country into a new and different construction material distinct from the materials from which it was transformed.

(b) *Construction materials.*

(1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) by providing a preference for domestic construction material. In addition, the Contracting Officer has determined that the WTO GPA and Free Trade Agreements (FTAs) apply to this acquisition. Therefore, the Buy American Act restrictions are waived for designated country construction materials.

(2) The Contractor shall use only domestic or designated country construction material in performing this contract, except as provided in paragraphs (b)(3) and (b)(4) of this clause.

(3) The requirement in paragraph (b)(2) of this clause does not apply to the construction materials or components listed by the Government as follows: **NONE**.

(4) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(3) of this clause if the Government determines that--

(i) The cost of domestic construction material would be unreasonable. The cost of a particular domestic construction material subject to the restrictions of the Buy American Act is unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent;

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient

and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American Act.

(1)

(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(4) of this clause shall include adequate information for Government evaluation of the request, including--

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier;

and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American Act applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(4)(i) of this clause.

**FEDERAL ACQUISITION REGULATION AND
TRANSPORTATION ACQUISITION REGULATION CLAUSES**

SOCIOECONOMIC PROGRAM REQUIREMENTS

(3) Unless the Government determines that an exception to the Buy American Act applies, use of foreign construction material is noncompliant with the Buy American Act.

(d) *Data.* To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) *
<i>Item 1</i>			
Foreign construction material			
Domestic construction material			
<i>Item 2</i>			
Foreign construction material			
Domestic construction material			

[List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.]

[Include other applicable supporting information.]

[* Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).]

(End of clause)

Alternate I (Nov 2006). As prescribed in [25.1102\(c\)\(3\)](#), add the following definitions of “Bahrainian construction material” and “Mexican construction material” to paragraph (a) of the basic clause, and substitute the following paragraphs (b)(1) and (b)(2) for paragraphs (b)(1) and (b)(2) of the basic clause:

“Bahrainian construction material” means a construction material that—

(1) Is wholly the growth, product, or manufacture of Bahrain; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in Bahrain into a new and different construction material distinct from the materials from which it was transformed.

“Mexican construction material” means a construction material that—

(1) Is wholly the growth, product, or manufacture of Mexico; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in Mexico into a new and different construction material distinct from the materials from which it was transformed.

(b) *Construction materials.*

(1) This clause implements the Buy American Act (41 U.S.C. 10a-10d) by providing a preference for domestic construction material. In addition, the Contracting Officer has determined that the WTO GPA and all the Free Trade Agreements except NAFTA apply to this acquisition. Therefore, the Buy American Act restrictions are waived for designated country construction materials other than Bahrainian or Mexican construction materials.

(2) The Contractor shall use only domestic, or designated country construction material other than Bahrainian or Mexican construction material in performing this contract, except as provided in paragraphs (b)(3) and (b)(4) of this clause.

**52.225-12
Notice of Buy American Act Requirement—
Construction Materials Under Trade
Agreements.
(Jan 2005)**

(a) *Definitions.* “Construction material,” “designated country construction material,” “domestic construction material,” and “foreign construction material,” as used in this provision, are defined in the clause of this solicitation entitled “Buy American Act--Construction Materials Under Trade Agreements” (Federal Acquisition Regulation (FAR) clause 52.225-11).

(b) *Requests for determination of inapplicability.* An offeror requesting a determination regarding the inapplicability of the Buy American Act should submit the request to the Contracting Officer in time to allow a determination before submission of offers. The offeror shall include the information and applicable supporting data required by paragraphs (c) and (d) of FAR clause 52.225-11 in the

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

SOCIOECONOMIC PROGRAM REQUIREMENTS

request. If an offeror has not requested a determination regarding the inapplicability of the Buy American Act before submitting its offer, or has not received a response to a previous request, the offeror shall include the information and supporting data in the offer.

(c) Evaluation of offers.

(1) The Government will evaluate an offer requesting exception to the requirements of the Buy American Act, based on claimed unreasonable cost of domestic construction materials, by adding to the offered price the appropriate percentage of the cost of such foreign construction material, as specified in paragraph (b)(4)(i) of FAR clause 52.225-11.

(2) If evaluation results in a tie between an offeror that requested the substitution of foreign construction material based on unreasonable cost and an offeror that did not request an exception, the Contracting Officer will award to the offeror that did not request an exception based on unreasonable cost.

(d) Alternate offers.

(1) When an offer includes foreign construction material, other than designated country construction material, that is not listed by the Government in this solicitation in paragraph (b)(3) of FAR clause 52.225-11, the offeror also may submit an alternate offer based on use of equivalent domestic or designated country construction material.

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of FAR clause 52.225-11 for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

(3) If the Government determines that a particular exception requested in accordance with paragraph (c) of FAR clause 52.225-11 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic or designated country construction material, and the offeror shall be required to furnish such domestic or designated country construction material. An offer based on use of the foreign construction material for which an exception was requested--

(i) Will be rejected as nonresponsive if this acquisition is conducted by sealed bidding; or

(ii) May be accepted if revised during negotiations.

(End of provision)

Alternate II (Nov 2006). As prescribed in [25.1102\(d\)\(3\)](#), add the definitions of "Bahrainian construction material" and

"Mexican construction material" to paragraph (a) and substitute the following paragraph (d) for paragraph (d) of the basic provision:

(d) Alternate offers.

(1) When an offer includes foreign construction material, except foreign construction material from a designated country other than Bahrain or Mexico, that is not listed by the Government in this solicitation in paragraph (b)(3) of FAR clause 52.225-11, the offeror also may submit an alternate offer based on use of equivalent domestic or designated country construction material other than Bahrainian or Mexican construction material.

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of FAR clause 52.225-11 for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

(3) If the Government determines that a particular exception requested in accordance with paragraph (c) of FAR clause 52.225-11 does not apply, the Government will evaluate only those offers based on use of the equivalent domestic or designated country construction material other than Bahrainian or Mexican construction material. An offer based on use of the foreign construction material for which an exception was requested--

(i) Will be rejected as nonresponsive if this acquisition is conducted by sealed bidding; or

(ii) May be accepted if revised during negotiations.

(End of Section F)

MINIMUM WAGE SCHEDULE

U.S. Department of Labor
 Employment Standards Administration
 Wage and Hour Division

GENERAL DECISION: FL20080063 02/08/2008 FL63

Date: February 8, 2008
 General Decision Number: **FL20080063** 02/08/2008

Superseded General Decision Number: FL20070066

State: Florida

Construction Type: Building

County: Collier County in Florida.

BUILDING CONSTRUCTION PROJECTS (Does not include residential construction consisting of single family homes and apartments up to and including 4 stories)

Modification Number	Publication Date
0	02/08/2008

* ELEV0071-003 01/01/2005

	Rates	Fringes
Elevator Mechanic.....	\$ 29.805	12.115

FOOTNOTES:

A. Employer contributes 8% of regular hourly rate to vacation pay credit for employee who has worked in business more than 5 years; Employer contributes 6% of regular hourly rate to vacation pay credit for employee who has worked in business less than 5 years.

PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; The Day After Thanksgiving; and Christmas.

 SUFL1994-002 10/05/1994

	Rates	Fringes
Carpenter (including framing, metal framing and drywall hanging).....	\$ 11.52	
Cement Mason/Concrete Finisher..	\$ 13.50	
Electrician.....	\$ 11.50	.96
Glazier.....	\$ 10.92	.47
HVAC Mechanic (duct work only)..	\$ 11.49	.65
HVAC Mechanic (pipe work only)..	\$ 12.25	
Ironworker, Structural.....	\$ 10.00	
Laborer, Unskilled.....	\$ 7.20	

Pipefitter (excluding HVAC Work).....	\$ 10.50	1.00
Plasterer.....	\$ 13.00	
Plumber.....	\$ 11.33	.56
Power equipment operators:		
Crane.....	\$ 12.63	
Tile Setter.....	\$ 12.00	

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: FL20080039 02/08/2008 FL39

Date: February 8, 2008
 General Decision Number: **FL20080039** 02/08/2008

Superseded General Decision Number: FL20070039

State: Florida

Construction Type: Highway

Counties: Brevard, **Collier**, Hernando, Hillsborough, Lee, Manatee, Martin, Orange, Osceola, Pasco, Pinellas, Polk, Sarasota, Seminole and St Lucie Counties in Florida.

EXCLUDING CAPE CANAVERAL AIR FORCE STATION, PATRICK AIR FORCE BASE, KENNEDY SPLACE FLIGHT CENTER AND MELABAR RADAR SITE HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects, & railroad construction; bascule, suspension & spandrel arch bridges; bridges designed for commercial navigation; bridges involving marine construction; & other major bridges.

Modification Number	Publication Date
0	02/08/2008

* SUFL1993-012 08/01/1993

	Rates	Fringes
BRICKLAYER (Manhole).....	\$ 9.02	
CARPENTER.....	\$ 9.71	
Concrete Finisher.....	\$ 8.91	
ELECTRICIAN.....	\$ 13.42	
FENCE ERECTOR.....	\$ 7.75	
Form Setter.....	\$ 7.76	
Guardrail erector.....	\$ 7.95	
Ironworkers:		
Reinforcing.....	\$ 12.37	
Structural.....	\$ 6.60	
Laborers:		
Asphalt Raker.....	\$ 7.23	
Pipelayer.....	\$ 8.01	
Unskilled.....	\$ 6.60	
N/A.....	\$ 7.34	
Painters:		
Blaster.....	\$ 10.72	

Power equipment operators:

Asphalt Distributor.....	\$ 7.39
Asphalt Paving Machine.....	\$ 8.23
Asphalt Plant Operator.....	\$ 6.83
Asphalt Screed.....	\$ 7.68
Backhoe.....	\$ 9.00
Boom-Auger.....	\$ 9.40
Bulldozer.....	\$ 8.42
Concrete Curb Machine.....	\$ 8.50
Concrete Groover/Grinder....	\$ 9.00
Concrete Joint Saw.....	\$ 9.97
Concrete Mixer Operator.....	\$ 6.63
Concrete Paving Finish Machine.....	\$ 8.50
Concrete Pump Op.....	\$ 13.00
Crane, Derrick, or Dragline..	\$ 11.53
Earthmover.....	\$ 7.78
Fork Lift.....	\$ 7.63
Front End Loader.....	\$ 8.00
Gradall.....	\$ 8.76
Grade Checker.....	\$ 6.60
Guardrail Post Driver.....	\$ 10.78
Mechanic.....	\$ 9.52
Milling Machine Grade Checker.....	\$ 7.03
Milling Machine.....	\$ 8.76
Motor Grader.....	\$ 9.54
Mulching Machine.....	\$ 6.70
Oiler, Greaseman.....	\$ 7.21
Pavement Striping Machine...\$	11.04
Paving Striping Machine Nozzleman.....	\$ 7.50
Piledriver Leadsman.....	\$ 9.75
Piledriver Operator.....	\$ 10.82
Power Subgrade Mixer.....	\$ 7.63
Rollers:	
Finish.....	\$ 7.24
Rough.....	\$ 6.70
Self-Prop., Rubber Tire....	\$ 7.01
Scraper.....	\$ 7.33
Sign Erector.....	\$ 13.27
Small tool.....	\$ 7.33
Tractors:	
80 HP or less.....	\$ 6.60
Light.....	\$ 6.76
Over 80 HP.....	\$ 10.62
Trenching Machine.....	\$ 8.00
Widening Spreader Machine...\$	7.52

Traffic Controller

TRAFFIC CONTROL SPECIALIST..\$	7.15
TRAFFIC SIGNALIZATION :	
Installer.....	\$ 9.70
Mechanic.....	\$ 13.25

Truck drivers:

Lowboy.....	\$ 8.02
Multi-Rear Axle.....	\$ 6.97
Single Rear Axle.....	\$ 6.70

 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

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

GENERAL CONTRACT REQUIREMENTS

52.223-3

Hazardous Material Identification and Material Safety Data. (Jan 1997) Alt I (Jul 1995)

(a) "Hazardous material," as used in this clause, includes any material defined as hazardous under the latest version of Federal Standard No. 313 (including revisions adopted during the term of the contract).

(b) The offeror must list any hazardous material, as defined in paragraph (a) of this clause, to be delivered under this contract. The hazardous material shall be properly identified and include any applicable identification number, such as National Stock Number or Special Item Number. This information shall also be included on the Material Safety Data Sheet submitted under this contract.

Material (If none, insert "None")	Identification No.
None	

(c) This list must be updated during performance of the contract whenever the Contractor determines that any other material to be delivered under this contract is hazardous.

(d) The apparently successful offeror agrees to submit, for each item as required prior to award, a Material Safety Data Sheet, meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous material identified in paragraph (b) of this clause. Data shall be submitted in accordance with Federal Standard No. 313, whether or not the apparently successful offeror is the actual manufacturer of these items. Failure to submit the Material Safety Data Sheet prior to award may result in the apparently successful offeror being considered non-responsible and ineligible for award.

(e) If, after award, there is a change in the composition of the item(s) or a revision to Federal Standard No. 313, which renders incomplete or inaccurate the data submitted under paragraph (d) of this clause, the Contractor shall promptly notify the Contracting Officer and resubmit the data.

(f) Neither the requirements of this clause nor any act or failure to act by the Government shall relieve the Contractor of any responsibility or liability for the safety of Government, Contractor, or subcontractor personnel or property.

(g) Nothing contained in this clause shall relieve the Contractor from complying with applicable Federal, State, and local laws, codes, ordinances, and regulations

(including the obtaining of licenses and permits) in connection with hazardous material.

(h) The Government's rights in data furnished under this contract with respect to hazardous material are as follows:

(1) To use, duplicate and disclose any data to which this clause is applicable. The purposes of this right are to-

(i) Apprise personnel of the hazards to which they may be exposed in using, handling, packaging, transporting, or disposing of hazardous materials;

(ii) Obtain medical treatment for those affected by the material; and

(iii) Have others use, duplicate, and disclose the data for the Government for these purposes.

(2) To use, duplicate, and disclose data furnished under this clause, in accordance with paragraph (h)(1) of this clause, in precedence over any other clause of this contract providing for rights in data.

(3) The Government is not precluded from using similar or identical data acquired from other sources.

(i) Except as provided in paragraph (i)(2), the Contractor shall prepare and submit a sufficient number of Material Safety Data Sheets (MSDS's), meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous materials identified in paragraph (b) of this clause.

(1) For items shipped to consignees, the Contractor shall include a copy of the MSDS's with the packing list or other suitable shipping document, which accompanies each shipment. Alternatively, the Contractor is permitted to transmit MSDS's to consignees in advance of receipt of shipments by consignees, if authorized in writing by the Contracting Officer.

(2) For items shipped to consignees identified by mailing address as agency depots, distribution centers or customer supply centers, the Contractor shall provide one copy of the MSDS's in or on each shipping container. If affixed to the outside of each container, the MSDS's must be placed in a weather resistant envelope.

(End of Clause)

52.223-9

**Estimate of Percentage of Recovered Material Content
for EPA-Designated Products.
(MAY 2008)**

(a) *Definitions.* As used in this clause—

“Post consumer material” means a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Post consumer material is a part of the broader category of “recovered material.”

“Recovered material” means waste materials and by-products recovered or diverted from solid waste, but the term does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.

(b) The Contractor, on completion of this contract, shall—

(1) Estimate the percentage of the total recovered material content for EPA-designated item(s) delivered and/or used in contract performance, including, if applicable, the percentage of post consumer material content; and

(2) Submit this estimate to:

**Contracting Officer
Eastern Federal Lands Highway Division
21400 Ridgetop Circle
Sterling, VA 20166.**

(End of Clause)

52.228-15

**Performance and Payment Bonds -- Construction
(Nov 2006)**

(a) *Definitions.* As used in this clause --

“Original contract price” means the award price of the contract; or, for requirements contracts, the price payable for the estimated total quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) *Amount of required bonds.* Unless the resulting contract price is \$100,000 or less, the successful offeror shall furnish performance and payment bonds to the Contracting Officer as follows:

(1) *Performance Bonds (Standard Form 25).* The penal amount of performance bonds at the time of contract award shall be 100 percent of the original contract price.

(2) *Payment Bonds (Standard Form 25-A).* The penal amount of payment bonds at the time of contract award shall be 100 percent of the original contract price.

(3) *Additional bond protection.*

(i) The Government may require additional performance and payment bond protection if the contract price is increased. The increase in protection generally will equal 100 percent of the increase in contract price.

(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) *Furnishing executed bonds.* The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

(d) *Surety or other security for bonds.* The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier’s check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the *Federal Register* or may be obtained from the:

U.S. Department of Treasury
Financial Management Service
Surety Bond Branch
3700 East West Highway, Room 6F01
Hyattsville, MD 20782
Or via the internet at
<http://www.fms.treas.gov/c570/> .

(e) *Notice of subcontractor waiver of protection (40 U.S.C. 3133(c)).* Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

(End of Clause)

52.248-3

**Value Engineering – Construction.
(Feb 2000)**

(a) *General.* The Contractor is encouraged to develop, prepare, and submit value engineering change proposals (VECP’s) voluntarily. The Contractor shall share in any instant contract savings realized from accepted VECP’s, in accordance with paragraph (f) below.

(b) *Definitions.* “Collateral costs,” as used in this clause, means agency costs of operation, maintenance, logistic support, or Government-furnished property.

“Collateral savings,” as used in this clause, means those measurable net reductions resulting from a VECP in the agency’s overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.

“Contractor’s development and implementation costs,” as used in this clause, means those costs the Contractor incurs on a VECP specifically in developing, testing, preparing, and submitting the VECP, as well as those costs the Contractor incurs to make the contractual changes required by Government acceptance of a VECP.

“Government costs,” as used in this clause, means those agency costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistic support. The term does not include the normal administrative costs of processing the VECP.

“Instant contract savings,” as used in this clause, means the estimated reduction in Contractor cost of performance resulting from acceptance of the VECP, minus allowable Contractor’s development and implementation costs, including subcontractors’ development and implementation costs (see paragraph (h) below).

“Value engineering change proposal (VECP)” means a proposal that --

- (1) Requires a change to this, the instant contract, to implement; and
- (2) Results in reducing the contract price or estimated cost without impairing essential functions or characteristics; provided, that it does not involve a change-
 - (i) In deliverable end item quantities only; or
 - (ii) To the contract type only.

(c) *VECP preparation.* As a minimum, the Contractor shall include in each VECP the information described in subparagraphs (c)(1) through (7) below. If the proposed change is affected by contractually required configuration management or similar procedures, the instructions in those procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following:

- (1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item’s function or characteristics are being altered, and the effect of the change on the end item’s performance.
- (2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revisions.
- (3) A separate, detailed cost estimate for

(i) the affected portions of the existing contract requirement and

(ii) the VECP.

The cost reduction associated with the VECP shall take into account the Contractor’s allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (h) below.

(4) A description and estimate of costs the Government may incur in implementing the VECP, such as test and evaluation and operating and support costs.

(5) A prediction of any effects the proposed change would have on collateral costs to the agency.

(6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.

(7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

(d) *Submission.* The Contractor shall submit VECP’s to the Resident Engineer at the worksite, with a copy to the Contracting Officer.

(e) *Government action.*

(1) The Contracting Officer will notify the Contractor of the status of the VECP within 45 calendar days after the contracting office receives it. If additional time is required, the Contracting Officer will notify the Contractor within the 45-day period and provide the reason for the delay and the expected date of the decision. The Government will process VECP’s expeditiously; however, it will not be liable for any delay in acting upon a VECP.

(2) If the VECP is not accepted, the Contracting Officer will notify the Contractor in writing, explaining the reasons for rejection. The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Government. The Contracting Officer may require that the Contractor provide written notification before undertaking significant expenditures for VECP effort.

(3) Any VECP may be accepted, in whole or in part, by the Contracting Officer’s award of a modification to this contract citing this clause. The Contracting Officer may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a contract modification applies a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The decision to accept or reject all or part of any VECP is a unilateral

decision made solely at the discretion of the Contracting Officer.

(f) *Sharing* --

(1) *Rates*. The Government's share of savings is determined by subtracting Government costs from instant contract savings and multiplying the result by --

- (i) 45 percent for fixed-price contracts; or
- (ii) 75 percent for cost-reimbursement contracts.

(2) *Payment*. Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a modification to this contract to --

- (i) Accept the VECP;
- (ii) Reduce the contract price or estimated cost by the amount of instant contract savings; and
- (iii) Provide the Contractor's share of savings by adding the amount calculated to the contract price or fee.

(g) *Collateral savings*. If a VECP is accepted, the Contracting Officer will increase the instant contract amount by 20 percent of any projected collateral savings determined to be realized in a typical year of use after subtracting any Government costs not previously offset. However, the Contractor's share of collateral savings will not exceed the contract's firm-fixed-price or estimated cost, at the time the VECP is accepted, or \$100,000, whichever is greater. The Contracting Officer is the sole determiner of the amount of collateral savings.

(h) *Subcontracts*. The Contractor shall include an appropriate value engineering clause in any subcontract of \$50,000 or more and may include one in subcontracts of lesser value. In computing any adjustment in this contract's price under paragraph (f) above, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Government under this contract, but shall exclude any value engineering incentive payments to a subcontractor. The Contractor may choose any arrangement for subcontractor value engineering incentive payments; *provided*, that these payments shall not reduce the Government's share of the savings resulting from the VECP.

(i) *Data*. The Contractor may restrict the Government's right to use any part of a VECP or the supporting data by marking the following legend on the affected parts:

These data, furnished under the Value Engineering -- Construction clause of contract DTFH71-08-C-000XX, shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a value engineering change proposal submitted under the clause. This restriction does not limit the Government's right to use information

contained in these data if it has been obtained or is otherwise available from the Contractor or from another source without limitations.

(End of Section G)

FEDERAL ACQUISITION REGULATION AND TRANSPORTATION ACQUISITION REGULATION CLAUSES

CONSTRUCTION CONTRACT REQUIREMENTS

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

The Contractor shall be required to (a) commence work under this contract within (**SEE SF 1442, BLOCK 11 FOR NUMBER OF DAYS**) 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 not later than (**THE TIME INDICATED IN THE CONTINUATION OF THE SF 1442, BLOCK 11**). The time stated for completion shall include final cleanup of the premises. **(End of Clause)**.

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEPT 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 (**SEE SUBSECTION 108.04 OF THE FP-96/FP-03 AND/OR SPECIAL CONTRACT REQUIREMENTS FOR AMOUNT**) 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)**

52.211-18 -- Variation in Estimated Quantity.

As prescribed in [11.703\(c\)](#), insert the following clause in solicitations and contracts when a fixed-price construction contract is contemplated that authorizes a variation in the estimated quantity of unit-priced items:

Variation in Estimated Quantity (Apr 1984)

If the quantity of a unit-priced item in this contract is an estimated quantity and the actual quantity of the unit-priced item varies more than 15 percent above or below the estimated quantity, an equitable adjustment in the contract price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contractor may request, in writing, an extension of time, to be received by the Contracting Officer within 10 days from the beginning of the delay, or within such further period as may be granted by the Contracting Officer before the date of final settlement of the contract. Upon the receipt of a written request for an

extension, the Contracting Officer shall ascertain the facts and make an adjustment for extending the completion date as, in the judgement of the Contracting Officer, is justified. **(End of Clause)**

52.236-1 PERFORMANCE OF WORK BY THE CONTRACTOR. (Apr 1984)

The Contractor shall perform on the site, and with its own organization, work equivalent to at least **50** percent of the total amount of work to be performed under the contract. This percentage may be reduced by a supplemental agreement to this contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

(End of Clause)

52.236-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) The indications of physical conditions on the drawings and in the specifications are the result of site investigations (**SEE CONTINUATION OF SF 1442, BLOCK 9**).

(b) Weather conditions: **CONTACT LOCAL OFFICE OF NATIONAL WEATHER SERVICE, U.S. DEPARTMENT OF COMMERCE.**

(c) Transportation facilities: **N/A**

(d) Other Information: **SEE CONTINUATION OF SF 1442, BLOCK 9.**

(End of Clause)

(End of Section H)

FEDERAL HIGHWAY ADMINISTRATION
EASTERN FEDERAL LANDS HIGHWAY DIVISION
SPECIAL CONTRACT REQUIREMENTS
Project **PLH-BICY 104(1)**
Big Cypress National Preserve
PMIS Nos. 61948 and 110159

The following Special Contract Requirements amend and supplement the *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-03) U. S. Customary Units*, U. S. Department of Transportation, Federal Highway Administration.

Section 101.—TERMS, FORMAT, AND DEFINITIONS

101.01. Delete the last paragraph.

Section 102.—BID, AWARD, AND EXECUTION OF CONTRACT

102.04. Add the following:

Furnish documentary evidence as to the ownership and value of the assets pledged in support of the bond and details of the security interest in the assets by the individual sureties for the apparent low bidder within 14 calendar days after the opening of bids. Failure to submit evidence within the time required will be grounds for declaring the surety unacceptable.

In addition, the CO may, after reviewing the Affidavit of Individual Surety and documentary information on the security interest and the assets pledged, by certified mail to the surety's business or residence address (as shown on the bond), request the surety to provide further information and/or documents with respect to any of the documents provided. The CO may require such information to be furnished under oath. Failure of the surety to accept such mail, or failure of the surety to respond with the requested information or documents within 7 business days of receipt of the request, will be cause for rejection of the surety.

These requirements are in addition to the requirements in FAR Subpart 28.203, except where in conflict with the requirements in the FAR, in which case the FAR controls.

102.06. Add the following after the last paragraph:

Submit the documentary evidence for individual sureties at the same time as the Affidavit of Individual Surety and security interest in assets pledged. A Contractor submitting an unacceptable individual surety in satisfaction of a performance or payment bond before the issuance of the Notice to Proceed will be permitted one opportunity to substitute an acceptable surety or sureties within 7 business days of receipt of notification that the surety is unacceptable.

The Government's right to direct the substitution of sureties to ensure the continuing acceptability of the bonds during the performance of the Contract according to FAR Clause 52.228-2, Additional Bond Security, is not restricted.

These requirements are in addition to the requirements in FAR Subpart 28.203, except where in conflict with the requirements in the FAR, in which case the FAR controls.

Section 104.—CONTROL OF WORK

104.03(a). Add the following to the second paragraph:

Include the following information with each copy of the shop drawings:

- (1) Date.
- (2) Revision date(s), where applicable.
- (3) Certification that shop drawing complies with contract documents.
- (4) Proposed materials.
- (5) Identification of specific subcontractor, discipline, or trade responsible for performing each item of work. Do not use the term “by others”.

104.03(a). Add the following to the third paragraph:

Drawings will be reviewed in the order they are received.

104.03(b). Add the following after 104.03(b):

(c) As-built working drawings. Furnish 2 sets of as-built working drawings. The Government will provide 2 sets of contract drawings to be used exclusively for recording the as-built details of the project.

Keep the as-built working drawings current on a weekly basis and have at least 1 set available on the jobsite at all times. Accurately and neatly record changes from the contract plans, which are made in the work, or additional information, which might be uncovered in the course of construction, as they occur by means of details and notes. Maintain a log of all changes made to the as-built working drawings, and monthly, at the estimate cutoff date, make the as-built working drawings and log available for review by the CO.

Note all additions, deletions, or revisions to the location, character, and dimensions of the prescribed work shown on the contract drawings. Record these changes on the as-built working drawings and final as-built drawings in colored pencil or ink. Show additions in red, deletions in green, and special instructions in blue. As a minimum, record the as-built information described below:

- (1) Typical section(s)
 - (a) Revisions in dimensions; and
 - (b) Revisions in materials.

(2) Plan and profile*(a) Plan*

- (1)* Revisions to the alignment;
- (2)* Changes in the construction limits;
- (3)* Revisions in location, type, and grade of road approaches;
- (4)* Location and type of utilities;
- (5)* Location, size, and type of underdrains;
- (6)* Skew of culverts;
- (7)* Channel changes;
- (8)* Location of monuments and permanent references;
- (9)* Elevations for all aerial and underground crossings of utilities;
- (10)* Location, length, and type of fencing; and
- (11)* Additions, deletions, and revisions to any component of the buildings (Visitor Center, Multipurpose Center, and Pavilion).

(b) Profile

- (1)* Revisions to grades, elevations, and stationing of intersection PIs;
- (2)* Equations;
- (3)* Culvert diameter, length, type, and stationing;
- (4)* Length of culvert extension, and length of existing culvert;
- (5)* Location, length, stationing, and type of retaining walls; and
- (6)* Location, length, stationing, and end treatment of guardrail.

(3) Bridge*(a) Stationing of bridge ends;**(b) Elevations including footing, bearing pads, deck, and top of walls;*

- (c) Pile driving record with pile length, size, type, and tip elevation;
 - (d) Post-tensioning records including stressing sequence, jacking force, and duct size and layout;
 - (e) Construction and concrete placement sequences;
 - (f) Bearing details with orientation;
 - (g) Expansion joints including actual clearance with atmospheric temperature; and
 - (h) Any changes in plan or dimensions including any major changes in reinforcing.
- (4) Miscellaneous**
- (a) Revisions to parking areas or turnouts;
 - (b) Final location, type and length of curbs, sidewalks, etc.;
 - (c) Fencing type and limits; and
 - (d) Landscaping and planting.
- (5) Special Contract Procedures**
- (a) Method of excavation, concrete placement, girder erection, structure repairs, etc.

Prepare final as-built drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The as-built working drawings and final as-built drawings will be jointly reviewed for accuracy and completeness by the CO and the Contractor prior to submission of each monthly pay estimate.

If the monthly review finds that the Contractor is not maintaining the as-built working drawings, payment of the Contractor's invoice will be withheld until the as-built working drawings are brought up to date.

Furnish the as-built working drawings to the CO before the final inspection. Correct all details found during the final inspection that are not shown on the as-built working drawings and return to the CO within 5 working days for approval.

Once final as-built working drawings have been approved by the CO, provide final as-built drawings in the latest version of Adobe Acrobat (PDF) format (at the time of submission) on two sets of CD-R or DVD-R. Include the latest version Adobe Acrobat reader on the CD-R or DVD-R. Provide the final as-built drawings with a resolution quality such that the

redlined drawings and notations are clearly discernable. Final payment per Subsection 109.09 will not be made until the CD-R or DVD-R of the final as-built drawings have been reviewed and approved by the CO.

No direct payment will be made for maintaining and furnishing as-built working drawings.

104.04. Delete the text of **(d)** and **(e)** and substitute the following:

(d) Supplemental specifications;

(e) Plans; and

(f) Standard specifications.

104.05. Add the following:

When hauling on National Park Service roads, do not exceed the following load restrictions:

<u>Single Units</u>	<u>Gross Vehicle Weight – pounds</u>
2 axles	40,000
3 axles	48,000
4 or more axles	52,000
<u>Combination Units</u>	
3 axles	57,000
4 axles	62,000
5 or more axles	66,000

Where the ground is saturated with water or during periods of freezing and thawing, the CO may impose further load restrictions or suspend hauling.

104.05. Add the following:

Operate loaded vehicles hauling material at speeds not exceeding 40 miles per hour or the posted speed limit, whichever is lower, and spaced at 500-foot minimum intervals. Do not exceed 25 miles per hour or the posted speed limit, whichever is lower, or operate more than 1 loaded hauling vehicle at a time on a bridge.

Section 105.—CONTROL OF MATERIAL

105.02(b). Add the following:

If any material is to be excavated from any material source outside the construction limits, other than commercially operated sites, before work begins provide a certification from the State Historic Preservation Officer or Indian Tribal Council, if applicable, stating:

- (1) That a cultural resource survey (a survey for historical sites and archeological remains) has been performed at the proposed site, and
- (2) That no significant cultural resources exist in the area that will be disturbed by the Contractor.

105.02. Add the following:

(c) Government-provided material. The Government will furnish embankment material for grading the site of the proposed Tamiami Trail Welcome Center. The fill material will be stockpiled just north of the building site, at the equipment and material staging area shown in the plans. Notify the CO at least 4 weeks before the fill material is needed, to ensure that a sufficient supply will be available.

105.04. Add the following:

Coordinate deliveries of materials with construction schedules to avoid conflict with the work and conditions at the site. Deliver materials in undamaged condition and in the manufacturer's original packaging, with identifying labels intact and legible.

Section 106.—ACCEPTANCE OF WORK

106.01. Add the following after the second paragraph:

The Contractor may propose substituting an equivalent product for one shown in the plans or specified in the contract. Submit the following supporting information, as applicable, for each item proposed as an "approved equal":

- (a) Drawings and samples, as appropriate.
- (b) Comparison of physical properties, features, and operational characteristics between the proposed and specified items.
- (c) Impacts to other elements of the project due to the substitution.
- (d) Name, address, and telephone number of the vendor.

(e) Manufacturer's literature regarding installation, operation, and maintenance of the proposed item. Include schematics of any required electrical, mechanical, or hydraulic systems. Provide information on sources for maintenance service and replacement parts.

Submit supporting information for proposed substitutions at least 30 days before the materials are expected to be incorporated into the work. Do not order any materials prior to receiving written approval from the CO. The Contractor will not be entitled to any compensation or contract time extensions for obtaining, processing, or submitting product information or samples for their proposals.

The CO will evaluate the Contractor's submittals to determine if the proposed substitution is acceptable. The Contractor waives all claims for any additional expenses or time delays incurred as a result of using substitutions.

106.03. Delete the first sentence of the second paragraph and substitute the following:

Other than references in or to the FAR or Federal Law, when these Standard Specifications or Supplemental Contract Requirements reference certifications; certificates; or certified documents, equipment, or individuals, these references are not certifications under Section 4301 of Public Law 104-106, National Defense Authorization Act for Fiscal Year 1996.

Section 107.—LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

107.02. Add the following after the third paragraph:

For the full duration of construction, protect the existing trees that are tagged by the CO in the following manner:

(a) Install and maintain a 4-foot high wood slat fence with steel posts around the perimeter of the root protection area, per Subsection 619.06. The root protection area is defined as an area equal to 10 feet outside the dripline.

(b) All construction which takes place within the root protection area must be approved by the CO. Do not store or locate construction materials, vehicles, staging areas, topsoil, disposal areas, or trailers within the root protection area. Protect the area from flooding, erosion, sedimentation, and potentially harmful materials through run-off or spillage.

(c) Remove all tree protection prior to final acceptance.

107.02. Add the following after the sixth paragraph:

Notify the CO in writing at least 48 hours in advance of any scheduled utility shutdown, investigation, and /or related work.

107.05. Add the following after the second paragraph:

Submit all claims to the insurance company for investigation, regardless of deductible, unless the Contractor has chosen to pay the claim directly. Provide the results of any investigations and subsequent actions to the CO within 1 week of receipt from the insurance company or of action. Determination by the insurance company that the claim is not covered by the policy is not an adequate basis for the Contractor to fail to meet its obligations under the requirements of this Section.

Section 108.—PROSECUTION AND PROGRESS

108.01. Add the following:

Construction operations are limited as follows:

No work will be permitted on Sundays or National legal holidays.

The Government will obtain a permit from the Florida Department of Transportation for the construction of the left turn lane on SR 90/U.S. Route 41. It is expected that the permit will be issued no later than September 30, 2008. Do not begin any work on the turn lane until the permit has been received, and the CO has issued a written notice to proceed for the turn lane construction.

Section 109.—MEASUREMENT AND PAYMENT

109.08(b). Add the following:

Submit invoices by the 7th day after the closing date. Invoices received after the 16th day following the closing date will not be accepted for payment processing that month. Include late, unprocessed invoice submittals in the following month's invoice.

109.08(c). Add the following:

The Government's designated billing office is:

Federal Highway Administration
 Eastern Federal Lands Highway Division
 Loudoun Tech Center
 21400 Ridgetop Circle Room 200
 Sterling, Virginia 20166-6511
 ATTN: CONSTRUCTION DIVISION

Section 152.—CONSTRUCTION SURVEY AND STAKING

152.02. Delete the text of the first two paragraphs and substitute the following:

152.02 General. The Contractor is responsible for establishing initial control and performing all construction survey and staking. The Government will provide horizontal and vertical layout data for use in establishing control for each element of the work. The Government will also furnish data relating to horizontal and vertical alignments; subgrade and finish grade elevations; and other design data. The Contractor will be responsible for performing all required survey and staking from the data provided by the Government.

152.03. Delete the text of paragraphs (e), (h), (i), and (k).

152.03(a). Add the following:

Set benchmarks (at least every 1,000 feet of roadway). Replace any missing control points.

152.03(f). Add the following:

Set grade finishing stakes for grading the building site for the proposed Tamiami Trail Welcome Center at 50-foot minimum grid intervals. Provide additional grade stakes where needed to properly lay out and control the work.

152.03(l). Delete items (9) and (10) and substitute the following:

- (9) Traffic control (both permanent and temporary) signs, signals, markings, delineators, object markers, etc;
- (10) Building foundations, walls, and other pertinent items; and
- (11) Landscaping work.

Section 154.—CONTRACTOR SAMPLING AND TESTING

154.03. Add the following:

Furnish test results to the CO immediately after completing the test. The requirements for furnishing test results do not include sample aging or curing time; therefore, reporting times will be extended accordingly.

Submit proposals for using alternate AASHTO or State approved test methods in writing for approval. Alternate methods may be allowed based on documented equivalence to the method specified.

154.04. Add the following:

On a weekly basis, submit a copy of all current Contractor test results and pay factor calculations based on those tests for items accepted under Subsection 106.05. When large quantities are produced, calculate pay factors as soon as possible. Use this information to make any necessary adjustments to operations to achieve acceptable pay factors. The Government may use the Contractor's test results to determine final pay factors for acceptance according to Subsection 154.05.

Section 155.—SCHEDULES FOR CONSTRUCTION CONTRACTS

155.02. Add the following after the third paragraph:

155.02A Weather Delays.

(a) Weather Delay Definitions.

- (1) Reasonably Predictable Weather.** The number of workdays that can expected to be lost in any month due to rainfall based on 10-year historical weather data.
- (2) Rain Day.** A potentially lost workday on which rainfall is equal to or greater than 0.10 inches.
- (3) Drying Day.** A work day(s) immediately following a rainfall equal to or greater than 1.00 inch which is potentially lost because of wet ground conditions.
- (4) Workday.** A day not excluded from work by Section 108 of the Special Contract Requirements.
- (5) Unusually Severe Weather.** When the number of Actual Workdays Lost is greater than the calculated Total Lost Days for the month in question.

(b) Reasonably Predictable Weather. Determine Reasonably Predictable Weather for this contract by completing Table 155-1. Calculate data for Table 155-1 as follows:

- (1)** Using the last 10 years of historical weather data from the nearest NOAA weather data collection station, compute the average number of workdays lost (rain days plus drying days) for each month and the standard deviation from the average. Add the average number of workdays lost to the standard deviation.
- (2)** The Total number of Lost Days (Average Workdays Lost plus 1 Standard Deviation, rounded to whole days) will be considered normal for each month.
- (3)** Submit a completed Table 155-1 with the initial construction schedule.

(c) Unusually Severe Weather Under FAR Clause 52.249-10, Default (Fixed-Price Construction), the Contractor can request time for a delay due to Unusually Severe Weather.

The number of Actual Workdays Lost is calculated by first totaling the actual Rain Days plus the actual Drying Days occurring in the month in question. From this total, deduct any workdays meeting the following conditions:

(1) The Rain Day or Drying Day occurred on a non-work weekday such as a holiday.

(2) Rainfall occurred at a time when no weather dependent work was in progress or occurred during planned or unplanned shutdowns due to other circumstances such as equipment failure, strikes, material supplies, delays, etc.

(3) The Contractor was still working or able to work on weather dependent activities to the extent that less than 50 percent of the workday was lost due to weather.

If the net number of Actual Workdays Lost is greater than the Total Lost Days, then Unusually Severe Weather occurred during the month in question.

(d) Time Adjustments for Rain Delays. If the net number of Actual Workdays Lost to rain is less than the Total Lost Days for the month in question, no time adjustments will be made. If the net number of Actual Workdays Lost is more, then an excusable time extension may be granted. The Contractor must submit a Weather Time Impact Analysis supporting any alleged delays due to Unusually Severe Weather.

(e) Delays Due To Other Weather Conditions. Delays due to other unusually severe weather conditions (snow, extreme cold or heat, high winds, etc.) must be supported with a Weather Time Impact Analysis using historical weather data.

155.02. Delete the last paragraph and substitute the following:

The Construction Contract Time shown on the construction schedule for contract completion or for any interim completion dates shall be the calendar dates established in the contract.

155.04. Add the following to the first paragraph:

For a computer-generated CPM, use Primavera software or software that is file-compatible with Primavera.

Add the following table at the end of Section 155:

TABLE 155-1

Project Number _____

Location of NOAA Data Collection Station _____

Data Years (10-year history): 19__ through 20__

REASONABLY PREDICTABLE WEATHER

MONTH	AVERAGE WORKDAYS LOST	STANDARD DEVIATION	TOTAL LOST DAYS
JANUARY			
FEBRUARY			
MARCH			
APRIL			
MAY			
JUNE			
JULY			
AUGUST			
SEPTEMBER			
OCTOBER			
NOVEMBER			
DECEMBER			

Section 156.—PUBLIC TRAFFIC

156.03. Add the following:

Hauling will only be permitted from the nearest point of public access to the work site. Minimize hauling over completed pavement.

156.04. Add the following:

(f) Ensure that all drains and inlets within the project limits are fully functional throughout the duration of the project.

156.06(b). Delete the second sentence and substitute the following:

For shoulder drop-offs in excess of 3 inches, provide a 1V:3H fillet with “*Low Shoulder*” warning signs.

156.07. Delete the Subsection and substitute the following:

156.07 Nighttime Operations. Nighttime operations are not permitted. Perform construction operations during the hours of daylight (½ hour after sunrise to ½ hour before sunset).

156.08. Delete the second sentence of the first paragraph and substitute the following:

The traffic safety supervisor may be the superintendent.

Section 203.—REMOVAL OF STRUCTURES AND OBSTRUCTIONS

203.05(b). Delete the Subsection and substitute the following:

(b) **Burn.** Burning is prohibited. Dispose of material according to Subsection 203.05(a).

203.05(c). Delete the Subsection and substitute the following:

(c) **Bury.** Burying debris is prohibited. Dispose of material according to Subsection 203.05(a).

Section 204.—EXCAVATION AND EMBANKMENT

204.01. Add the following:

This work includes site grading for building construction. The Government will furnish fill material for constructing building pads. The Government will stockpile the fill material onsite prior to the beginning of construction.

204.02(b). Delete the first sentence and substitute the following:

Embankment construction consists of placing and compacting roadway or borrow excavation, and Government-furnished fill.

204.02(b). Add the following:

(6) Constructing pads for building foundations.

Section 213.—SUBGRADE STABILIZATION

213.01. Add the following:

This work includes incorporating limerock into the upper layer of a subgrade.

213.02. Add the following:

Limerock	703.20
----------	--------

213.03. Delete the second sentence of the first paragraph and Table 213-1, and substitute the following:

Provide stabilized subgrade material with a minimum Limerock Bearing Ratio (LBR) of 40, determined according to Florida Test Method FM 5-515.

213.03. Add the following:

(h) 200-pound sample of the limerock.

213.04. Delete the third sentence and substitute the following:

Scarify and pulverize the subgrade to a minimum depth of 12 inches.

213.06. Add the following:

(c) Limerock mixtures. Add water and thoroughly mix to adjust the material to within 2 percent of the optimum moisture content. At the completion of mixing, ensure that the material within the stabilization limits meets the following:

- (1) Gradation. 97 percent passes a 3 ½ inch sieve.
- (2) Liquid Limit. Liquid limit is less than or equal to 30.
- (3) Plasticity Index. Plasticity index is less than or equal to 8.

213.09. Add the following:

Limerock will be evaluated under 106.04.

Delete Table 213-2 and substitute the following:

**Table 213-2
Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Remix material (all stabilization mixtures)	Measured and tested for conformance (106.04)	Gradation	AASHTO T 11 and AASHTO T 27	1 sample per 6,000 yd ²	Processed material	Yes	Before using in work
		Moisture-Density	AASHTO T 99 method C ⁽¹⁾	1 sample per 6,000 yd ²	Processed material	Yes	Before using in work
		Compaction	AASHTO T 310 or other approved procedures	1 sample per 2,500 yd ²	In-place completed compacted layer	--	Before placing next layer
		Limerock Bearing Ratio (LBR)	Florida Test Method FM 5-515	1 for each mix design	After proportioning	Yes	Before producing
Remix material (with limerock)		Liquid Limit	AASHTO T 89	1 sample per 6,000 yd ²	Processed material	Yes	Before using in work
		Plastic Limit	AASHTO T 90	1 sample per 6,000 yd ²	Processed material	Yes	Before using in work

(1) Minimum of 5 points per proctor.

Section 301.—UNTREATED AGGREGATE COURSES

301.02 Add the following:

Limerock

703.20

301.03. Delete the second and third paragraphs and substitute the following:

At least 21 days prior to incorporating limerock into the work, furnish the following test results to the CO for approval: the optimum moisture content and maximum dry density determined according to AASHTO T 180, method D; gradation according to AASHTO T 27 and T 11; liquid limit and plasticity limit according to AASHTO T 89 and AASHTO T 90; and Limerock Bearing Ratio (LBR) according to Florida Test Method FM 5-515. In addition, provide the name and location of the source of the aggregate to the CO.

Submit a representative 300-pound sample to the EFLHD Central Laboratory in Sevierville, Tennessee.

301.04. Delete the first sentence of the second paragraph.

301.08. Delete Table 301-1 and substitute the following:

**Table 301-1
Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Aggregate base (limerock)	Measured and tested for conformance (106.04)	Gradation 3 ½ inch 1 inch ¾ inch ½ inch 3/8 inch Other specified sieves	AASHTO T 11 and AASHTO T 27	1 sample per 1,000 tons	From the roadbed prior to compaction	Yes	4 hours
		Liquid Limit	AASHTO T 89	1 sample per 1,000 tons	From the roadbed prior to compaction	Yes	4 hours
		Plastic Limit	AASHTO T 90	1 sample per 1,000 tons	From the roadbed prior to compaction	Yes	4 hours
		Limerock Bearing Ratio (LBR)	Florida Test Method FM 5-515	1 for each type/ source	Production output or stockpile	Yes	Before using in work
		Moisture-Density (maximum density)	AASHTO T 180 method D	1 for each type/ source	Production output or stockpile	Yes	Before using in work
		In-place density and moisture content	AASHTO T 310 or other approved procedures	1 for each 500 tons	In-place completed compacted layer	--	Before placing next layer

Section 401.—SUPERPAVE HOT ASPHALT CONCRETE PAVEMENT

401.01. Add the following:

Use performance grade PG 76-22 asphalt binder for Superpave hot asphalt concrete pavement designated in the plans as surface course. Use minimum performance grade PG 67-22 asphalt binder for Superpave hot asphalt concrete pavement designated in the plans as binder course.

401.03. Add the following:

Provide a fine graded aggregate gradation for all Superpave hot asphalt concrete mixtures.

At the option of the contractor, a State Highway Department Superpave Hot Asphalt Concrete mixture may be submitted for approval that has the same nominal maximum size aggregate, traffic level (design ESAL), and asphalt binder grade as specified.

401.03(b). Add the following:

For State Department of Transportation mixes, submit a job-mix formula that is currently approved and has been tested by the State within a year of the date of intended use. Include documentation from a State highway official certifying that it is an approved State mix.

401.03(b). Add the following:

For percentages of recycled asphalt pavement greater than 15 percent, the contractor must submit a quality control plan showing sufficient control of the recycled asphalt pavement.

Submit all materials and information to the EFLHD Central Laboratory in Sevierville, Tennessee.

401.03(c). Add the following:

Allow a minimum of 21 calendar days for verification of each job-mix formula after receipt of all materials and information at the EFLHD Central Laboratory.

401.13. Add the following:

Begin paving operations at the furthest location from the asphalt plant and proceed towards the plant.

Section 601.—MINOR CONCRETE STRUCTURES

601.02. Add the following:

Fiber Reinforcement

711.06

601.03. Delete the first sentence and substitute the following:

Conform to Table 601-1 or furnish a concrete mix used locally by either a Federal or State agency for the construction of minor concrete structures, that also meets the minimum 28-day compressive strength requirement of Table 601-1.

601.03. Add the following:

Furnish fiber-reinforced concrete for curb and gutter construction. Use a minimum 0.1 percent volume of fiber per cubic yard of concrete.

Section 602.—CULVERTS AND DRAINS

602.03. Add the following:

Furnish culvert pipe from the following groups:

Plastic pipe, PVC, Schedule 40

Furnish cast-in-place or precast mitered concrete end sections for the culverts designated in the plans. The mitered end sections shall conform to the dimensions shown in the 2008 FDOT Design Standards, Index Number 272, for the applicable culvert size.

Section 609.—CURB AND GUTTER

609.05(a)(2). Delete the text and substitute the following:

Form expansion joints at intervals of 20 feet (maximum) on centers. Use ½-inch thick, full-depth preformed expansion joint filler, set ¼-inch below the finished surface.

Section 611.—WATER SYSTEMS

Delete this Section and substitute the following:

Water Systems conform to the Supplemental Specifications, Section 02665 and other applicable Sections.

Section 612.—SANITARY SEWER SYSTEMS

Delete this Section and substitute the following:

Sanitary Sewer Systems conform to the Supplemental Specifications, Section 02732 and other applicable Sections.

Section 624.—TOPSOIL

624.04. Delete the first sentence of the second paragraph and substitute the following:

Spread topsoil to a compacted depth of 4 inches.

624.04. Add the following after the second paragraph:

Where topsoil will be placed on slopes on which the character of the subsoil will not blend with the topsoil, work the topsoil into the subsoil to eliminate any slip-plane between the 2 materials and leave a sufficient cover of topsoil to ensure germination of the seed.

Section 625.—TURF ESTABLISHMENT

625.06. Add the following:

Apply fertilizer at a rate of 400 pounds per acre at the time of seeding.

625.07. Add the following:

Apply Argentine Bahia seed at the rate of 200 pounds per acre.

625.08. Add the following:

Use dry straw or hay mulch. Place loose mulch as a continuous blanket, 2 inches thick.

625.09. Delete the last sentence and substitute the following:

Apply supplemental fertilizer at a rate of 400 pounds per acre, 60 to 90 days after the initial application. Apply supplemental seed at the same rate as the initial seeding. Apply supplemental mulch at the same rate as the initial mulching.

Section 626.—PLANTS, TREES, SHRUBS, VINES, AND GROUND COVERS

626.02. Add the following:

Agricultural limestone	713.02
Sand	703.15

626.03. Add the following:

Landscaping shall be performed by a single firm specialized to do this work.

Prepare a proposed planting schedule. Schedule dates for each type of landscape work during normal seasons for such work in the project area.

Plant trees and shrubs after final grades have been established, but before establishing turf, unless otherwise approved by the CO. If trees and shrubs are planted after turf establishment has been completed, then protect turf establishment areas during planting and promptly repair any damage resulting from the planting operations.

Obtain agronomic soils tests performed by an approved agronomic testing laboratory for all planting areas. The tests shall include fertility and suitability analyses, with written recommendations for soil amendments, fertilizer, and chemical conditioner application rates for soil preparation, planting backfill mix, and maintenance fertilization program. Submit a copy of the soils test results to the CO.

Provide container-grown or balled and burlapped trees and shrubs. Do not use trees or shrubs that have been in cold storage or heeled-in.

626.04. Add the following:

Submit the following for approval:

(a) Fertilizer. One sample packet of each type;

(b) Planting backfill. One-cubic foot sample, with testing certification that the material is weed free.

The CO may substitute or delete specified material subject to the soil conditions encountered.

626.05. Delete the last two paragraphs and substitute the following:

Deliver trees and shrubs after preparations for planting have been completed, and plant immediately. If planting is delayed more than six hours after delivery, set plants in the shade, protect from weather and mechanical damage, and keep roots moist.

626.06. Add the following:

Dispose of subsoil removed from landscape excavations. Do not mix with planting soil or use as backfill for plants.

Before setting trees or shrubs in plant pits, fill the pits with water and allow it to percolate out before planting.

626.07. Delete the first sentence of the first paragraph and substitute the following:

Prepare a planting backfill mixture of two parts topsoil to one part shredded pine bark mulch, as well as any additional soil amendments recommended by the agronomic testing laboratory.

626.07(b). Delete the fourth and fifth sentences and substitute the following:

Backfill around the plant ball to half the depth of the ball, tamping at 6-inch intervals to fill voids around the ball and thoroughly water.

626.07(b). Delete the last sentence and substitute the following:

Do not remove or pull the burlap and twine out from under the ball. Backfill the remainder of the pit and tamp around the root ball.

626.07(c). Add the following after the first sentence:

Score the rootball to a depth of 1 inch along the entire side equally on 4 sides.

626.09. Delete the first paragraph and substitute the following:

Saucer shape the backfill 3 inches above the existing grade for shrubs and 6 inches for trees, for a diameter equal to that of the planting pit, to catch and retain water. Build up the backfill in holes on a slope on the lower side only to catch and hold water. Do not cover the tops of the rootballs with backfill.

626.09. Delete the last sentence of the first paragraph and substitute the following:

Saturate all backfill material in the pits at each watering.

Apply water only by open-end hose at a very low pressure to avoid creating air pockets in the soil and injuring the roots.

626.10. Delete the first sentence and substitute the following:

Support trees with stakes driven at equal spaces around the outside perimeter of the tree pit and to sufficient depth to hold trees firmly. Do not drive stakes through the rootball.

Cut pieces of hose long enough to extend 2 inches past the trunk of the tree when wrapped around. Place the hose around the trunk just below the first lateral branch for deciduous trees and halfway up the height of evergreen trees as shown on the plans. Thread a double strand of wire through the hose and pull both ends horizontally beyond each stake by 3 feet.

Provide approximately a 1 to 3-inch sway in the tree with the stakes in the vertical position after the guying is attached.

Stake trees no later than 48 hours after planting.

626.11. Delete the fourth sentence and substitute the following:

Do not cut the main leader. All cuts to side branches are to be just outside the branch collar (the swollen base of the branch) to encourage wound closure. Do not use tree wound dressing.

626.12. Add the following:

Use pine straw for mulching around trees and shrubs. Apply mulch to cover the limits of the individual saucer areas of each individual plant to a loose measurement depth of 4 to 6 inches at the limits of the saucer area. Feather the depth back to 0 inches at the trunk.

626.14. Add the following:

Replace plants that have died back in the crown 25 percent beyond the normal pruning line, or where the main leader has died back, with the same size and species as the original. The warranty does not include replacing plants damaged or lost due to fires, floods, severe freezes not typical to the region, winds over 75 miles per hour, or acts of vandalism.

Final acceptance for trees and shrubs will be given by the CO at the end of the establishment period once the following items are completed:

- (a) All plant materials that have died or are determined to be unacceptable are replaced.
- (b) All deficiencies in work, and damage to structures and grounds, are corrected.
- (c) All stakes and guys are removed.

Provide typewritten maintenance instructions for all landscape work at the final inspection. The instructions shall include recommended maintenance procedures for one full year following the plant establishment period.

Section 627.—SOD

627.03. Add the following:

Furnish Argentine Bahia sod.

627.05. Delete the last sentence of the first paragraph and substitute the following:

Grade the finished surface of the sod bed to a smoothness comparable to results obtained by hand raking, leaving it clean and free of stones over 1 inch in size, sticks, stumps, other debris, and depressions that might interfere with proper placement or subsequent growth.

Apply agricultural limestone at a rate determined by soil test results, in order to adjust the pH to not less than 6.0 or more than 6.8. Apply Type A (starter) fertilizer at a rate of 220 pounds per acre.

627.06. Add the following:

Thoroughly water the sod, immediately after installation, to a depth of 4 inches.

627.07. Add the following:

Apply Type B (top dressing) fertilizer approximately 30 days after installation. Apply fertilizer at a rate of 140 pounds per acre.

Section 633.—PERMANENT TRAFFIC CONTROL

633.01. Delete the second paragraph and substitute the following:

Sign panels are designated as aluminum.

633.03. Add the following after the first sentence:

Furnish signs also meeting the requirements of the National Park Service Uniguide Sign System Manual. See <http://www.nps.gov/hfc/acquisition/uniguide.htm>

Furnish aluminum sign panels.

Furnish wood posts.

Section 635.—TEMPORARY TRAFFIC CONTROL

635.02. Delete the Construction sign panels Section reference and substitute the following:

Construction sign panels	633.02
--------------------------	--------

635.03. Add the following:

For all signs and other devices requiring orange color, use fluorescent orange, fluorescent red-orange or fluorescent yellow-orange color.

635.03(i). Add the following:

Submit a certification that the devices have been successfully crash tested to meet the requirements of NCHRP 350 and/or have been accepted by the FHWA.

635.07. Delete the last sentence of the first paragraph and substitute the following:

Remove or completely cover all unnecessary signs, or signs that conflict with the construction signing or Traffic Control Plan. Cover signs that are not removed so that no part of the covered sign is visible to traffic. Provide sign covers for temporary signs meeting the following requirements:

- (a) Large enough to completely cover the sign.
- (b) Easy to attach to and remove from the sign without damaging the sign face. Do not use adhesives, glues, tapes, or mechanical fasteners that mar the sign face.
- (c) Black, non-reflective, and opaque.
- (d) Made of plywood (minimum of 3/8-inches thick), aluminum (minimum of 0.040 inches thick), or sheet metal of a sufficient thickness that the covering will not be lifted, bent or damaged by wind.
- (e) Durable enough to resist deterioration due to weathering and atmospheric conditions for the duration of the project.

Section 636.—SIGNAL, LIGHTING, AND ELECTRICAL SYSTEMS

Delete this Section and substitute the following:

Signal, Lighting, and Electrical Systems conform to the Supplemental Specifications, Division 16 and applicable sections in other Divisions.

Section 637.—FACILITIES AND SERVICES

Delete this Section and substitute the following:

The Government will provide office space and all necessary supplies for the CO for the duration of the project.

Add the following after Section 637:

Section 645.—LOCATING UTILITIES

Description

645.01 This work consists of locating and marking existing utilities by excavating test pits to, or using electromagnetic devices, where a physical conflict with proposed construction is suspected and the location is ordered by the CO.

Material

645.02 Materials for restoring the test pit area to its original condition shall be replacement of the materials excavated or their equivalent in newly furnished materials meeting the various applicable sections of this specification.

Construction Requirements

645.03 General. Notify “Sunshine State One Call” at least 48 hours prior to any excavation, at 811 or 1-800-227-3385, to have the utilities marked in the field. Notify the CO 48 hours prior to any excavation.

Exercise special care and extreme caution in order to protect and avoid damage to any utility company facilities. Existing utilities have been generally located and shown on the plans as they are believed to exist. The Government assumes no responsibility for the accuracy of locations shown on the plans. Locate and ensure the safety of all existing utilities. Repair any damage resulting from Contractor’s operations at no additional expense to the Government.

Locate by test pit any utility that may be in conflict with the proposed work. If a conflict appears to exist, then notify the CO in writing immediately and provide information on the location and elevation of the utility so that the CO can adjust the proposed work.

645.04 Locating Utility. Use electromagnetic devices to establish alignment of utilities where applicable. When necessary, thread a metal rod through non-metallic utility pipes to locate them. Where neither method is feasible, locate the utility by perpendicular trench or test pits.

645.05 Excavation. Excavate carefully so as not to disturb utility at its assumed depth. When excavating within roadway pavements where traffic is being maintained, excavate by air-vacuum

methods or equivalent, keeping the area of disturbance to a minimum. Uncover the utility sufficiently to make accurate measurements.

645.06 Record. Describe the utility found (size, material, function), determine the elevation of the top of utility, and prepare a field sketch of the pit. Indicate the date and the station and offset of the utility, noting whether the baseline or the centerline of proposed facility is being referenced. Submit 1 copy to the CO within 24 hours.

645.07 Marking. Mark the utility location by flags or paint. Maintain the markings, including repainting faded or damaged markings as ordered by the CO, for the duration of the project, or until the CO determines that the markings are no longer needed.

645.08 Restoration. Backfill with original material, thoroughly compacting the material with a mechanical tamper. Restore aggregate base courses and pavement using equivalent materials and thicknesses. For portland cement concrete pavements, use fast setting concrete. For asphalt concrete pavements, cold patch, resurfacing of pit will be permitted so long as, in the opinion of the CO, it is thoroughly compacted.

645.09 Acceptance. Locating utilities will be evaluated under Subsection 106.02.

Measurement

645.10 Measure the Section 645 items listed in the bid schedule according to Subsection 109.02.

For markings, do not measure maintaining the markings.

Payment

645.11 The accepted quantities will be paid at the contract price per unit of measurement for the Section 645 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Section 646.—BUILDINGS

Description

646.01 This work consists of constructing the Tamiami Trail Welcome Center, comprising a visitor contact area, comfort station, multipurpose building, and pavilion. The work includes furnishing, fabricating, placing, finishing, curing, and erecting, as applicable, all concrete, structural steel, timber, and other components of the Welcome Center. The work also includes installing electrical systems, HVAC systems, fire protection systems, water supply systems, sanitary sewer systems, and other associated utilities.

Material

646.02 Materials conform to the requirements of the various applicable sections of the Supplemental Specifications.

Construction Requirements

646.03 General. Prepare the site according to Sections 201, 203, and 204. Construct the Welcome Center in accordance with the plans and the applicable sections of the Supplemental Specifications.

Submit all keys, including duplicates, to the CO at or before the final inspection. Wire all keys for each lock securely together. Tag each key with a label clearly identifying which lock the key opens. The label should include the lock number, room name or number, panel or switch number, equipment description, or other identifying information.

Provide one set of any special tools required to operate, adjust, dismantle, or repair equipment installed under this project. Special tools are those made specifically for a piece of equipment, or tools that are not in a standard mechanic's toolkit.

646.04 Acceptance. Material for the Welcome Center and associated utilities will be evaluated under Subsections 106.02 and 106.03. Furnish production certifications for hydraulic cement, structural steel, and structural timber. Furnish production or commercial certifications for other components if required by the Supplemental Specifications or requested by the CO.

Construction of the Welcome Center, and installation of fixtures and utilities, will be evaluated under Subsections 106.02 and 106.04.

Measurement

646.05 Measure the Section 646 items listed in the bid schedule according to Subsection 109.02.

Payment

646.06 The accepted quantities will be paid at the contract price per unit of measurement for the

Section 646 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Section 703.—AGGREGATE

703.02. Add the following:

Gravel will not be permitted.

703.20. Add the following after Subsection 703.19.

703.20 Limerock. Furnish limerock with a minimum of 70 percent of carbonates of calcium and magnesium, and a maximum percentage of water-sensitive clay mineral of 3.

(a) Liquid Limit and Plasticity Requirements. Provide a non-plastic limerock material with a maximum liquid limit of 35.

(b) Deleterious Material. Provide limerock materials free of cherty or other extremely hard pieces, or lumps, balls, or pockets of sand or clay-size material in sufficient quantity as to be detrimental to the proper bonding, finishing, or strength of the limerock base.

(c) Gradation and Size Requirements. Provide limerock that is well graded down to dust, with at least 97 percent passing the 3 ½ inch sieve. The fine material shall consist entirely of dust fracture. Perform all crushing and breaking-up of material to meet size requirements prior to placement on the roadway.

(d) Limerock Bearing Ratio Requirements. Provide a limerock material with an average LBR of not less than 100 at 100 percent of maximum dry density as determined in accordance with AASHTO T 180, method D. Test the LBR in accordance with Florida Test method FM 5-515.

Section 711.—CONCRETE CURING MATERIAL AND ADMIXTURES

711.06. Add the following after Subsection 711.05:

711.06. Fiber Reinforcement. Furnish a polypropylene fiber conforming to ASTM C 116, Type 3, and compatible with the constituents of the concrete mixture. Furnish documentation of compatibility from the manufacturer.

Section 713.—ROADSIDE IMPROVEMENT MATERIAL

713.01. Add the following:

For furnished topsoil, submit a soil analysis report from the State University Agricultural Extension Service or other approved soil testing laboratory. Include in the report the soil textural classification (percentage of sand, silt, clay and organic matter) and additive recommendations.

713.02. Add the following:

Use a maximum of 0.17 pounds of limestone per cubic foot of topsoil in order to adjust an acidic condition.

713.03. Add the following:

Furnish fertilizer containing the following minimum available nutrients, unless soil analysis indicates different concentrations are required:

Fertilizer for turf establishment areas:

Total nitrogen	2 percent
Available phosphoric acid	3 percent
Water-soluble potash	6 percent

Type A (starter) fertilizer for sod:

Total nitrogen	20 percent
Available phosphoric acid	26 percent
Water-soluble potash	5 percent

Type B (top dressing) fertilizer for sod:

Total nitrogen	31 percent
Available phosphoric acid	3 percent
Water-soluble potash	10 percent

Fertilizer for trees and shrubs, except palms:

Total nitrogen	12 percent
Available phosphoric acid	12 percent
Water-soluble potash	12 percent

Fertilizer for palms:

Slow release "Palm Special" granular fertilizer with trace iron, magnesium, and manganese.

713.04. Add the following:

Furnish scarified Argentine Bahia seed. The seed shall have a minimum active germination of 40 percent, and a minimum total germination of 85 percent.

713.05. Add the following:

(i) Shredded Pine Bark Mulch. Furnish well-shredded, aged pine bark mulch, with a maximum width of ½ inches, a neutral pH, and free of sticks, stones, clay, or other matter which may injure plants.

(j) Pine Straw Mulch. Furnish baled premium pine straw mulch, free of sticks, stones, rubbish, or other matter which may injure plants.

713.06(b). Add the following:

The genus, species, and cultivar names shall agree with the nomenclature of the most current edition of “Hortus Third” by L.H. Bailey, Hortorium, Cornell University.

Provide durable tags, stating the date of installation, correct botanical name and size in weather-resistant ink or embossed letters. Secure the tags to each tree, shrub, and other plant materials in a manner which will not restrict growth. Leave the tags on all trees, shrubs, and other plant materials until final acceptance by the CO.

713.06(c). Add the following:

All plants shall be Florida #1 grade or better.

713.08. Add the following:

(h) Tree protection. Tree protection shall be a flexible PVC pipe 4 inches in diameter, 12 to 13 inches in height.

713.10. Add the following:

Furnish Argentine Bahia sod. Cut sod to a depth equal to the growth of the roots, but not less than 1 inch.

713.11. Delete the Subsection and substitute the following:

713.11 Pegs for Sod. Furnish steel, tee-shaped pins with approximately 4-inch long heads and 8-inch long legs.

BIG CYPRESS NATIONAL PRESERVE

TAMIAMI TRAIL WELCOME CENTER
BICY
PMIS NO. 61948 / 110159

SUPPLEMENTAL SPECIFICATIONS



NATIONAL PARK SERVICE
DENVER SERVICE CENTER
August 22, 2007

TAMIAMI TRAIL WELCOME CENTER
BIG CYPRESS NATIONAL PRESERVE, FLORIDA
TABLE OF CONTENTS

DIVISION 1 - GENERAL REQUIREMENTS

- 01312 MECHANICAL AND ELECTRICAL COORDINATION
- 01785 OPERATION AND MAINTENANCE DATA
- 01815 SYSTEM DEMONSTRATION AND TRAINING

DIVISION 02- 16 TECHNICAL SPECIFICATIONS

- 02665 WATER DISTRIBUTION SYSTEM

- 02666 VALVES: BASIC REQUIREMENTS
- 02667 GATE VALVES
- 02732 SANITARY SEWERS
- 02733 PACKAGED POSITIVE DISPLACEMENT GRINDER PUMP
- 02734 PLUG VALVES
- 02735 MISCELLANEOUS VALVES
- 02736 PIPE: POLYETHYLENE

- 03002 CONCRETE
- 03108 FORMWORK
- 03133 PERMANENT INSULATED CONCRETE FORMING SYSTEM
- 03208 REINFORCEMENT
- 03366 CHEMICALLY STAINED CONCRETE FLOOR

- 05120 STRUCTURAL STEEL
- 05211 STEEL JOISTS
- 05313 METAL DECK

- 06100 ROUGH CARPENTRY
- 06200 FINISH CARPENTRY
- 06410 ARCHITECTURAL CABINETWORK (MILLWORK)

TAMIAMI TRAIL WELCOME CENTER
BIG CYPRESS NATIONAL PRESERVE, FLORIDA
TABLE OF CONTENTS

07190	UNDERSLAB VAPOR RETARDER
07218	SPRAYED POLYICYNENE INSULATION
07245	EXTERIOR INSULATION A & FINISH SYSTEM (EIFS)
07412	METAL ROOFING
07600	FLASHING & SHEET METAL
07813	SKYLIGHT
07840	FIRESTOPPING
07900	JOINT SEALANTS
08110	METAL DOORS & FRAMES (AND BORROWED FRAMES)
08120	ALUMINUM DOORS AND FRAMES
08210	WOOD DOORS
08308	ROLLING COUNTER SHUTTER
08410	ALUMINUM ENTRANCES
08525	ALUMINUM WINDOWS
08610	WOOD WINDOWS
08700	FINISH HARDWARE
08800	GLASS & GLAZING
09110	NON-LOAD-BEARING WALL FRAMING SYSTEMS
09250	GYPSUM BOARD
09510	ACOUSTICAL CEILINGS
09678	RESILIENT BASE (RB)
09905	PAINTING AND PROTECTIVE COATINGS
09986	CORAL PATTERN WALL PANELS
10162	SOLID PHENOLIC TOILET PARTITIONS
10200	LOUVERS & VENTS
10444	SIGNAGE
10520	FIRE EXTINGUISHER & CABINETS

TAMIAMI TRAIL WELCOME CENTER
BIG CYPRESS NATIONAL PRESERVE, FLORIDA
TABLE OF CONTENTS

10800	TOILET & BATH ACCESSORIES
12500	WINDOW TREATMENT
13100	LIGHTNING PROTECTION
13448	CONTROL PANELS AND ENCLOSURES
13850	FIRE ALARM SYSTEM
15010	GENERAL MECHANICAL REQUIREMENTS
15100	BASES, SUPPORTS & SLEEVES
15200	HVAC CONTROLS
15300	AIR DISTRIBUTION SYSTEMS
15400	EQUIPMENT
15500	PLUMBING FIXTURES & EQUIPMENT
15600	PIPING SYSTEM AND PIPING SPECIALITIES
15700	INSULATION
15800	BALANCING & OPERATIONAL TESTS
15900	FIRE PROTECTION SYSTEMS
16010	ELECTRICAL: BASIC REQUIREMENTS
16060	GROUNDING
16080	ACCEPTANCE TESTING
16120	WIRE AND CABLE: 600 VOLT AND BELOW
16130	RACEWAYS & BOXES
16135	ELECTRICAL: EXTERIOR UNDERGROUND
16140	WIRING DEVICES
16410	SAFETY SWITCHES
16411	TRANSFER SWITCHES
16412	SEPARATELY MOUNTED CIRCUIT BREAKERS
16441	PANELBOARDS
16490	OVER CURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES

TAMIAMI TRAIL WELCOME CENTER
BIG CYPRESS NATIONAL PRESERVE, FLORIDA
TABLE OF CONTENTS

16491 LOW VOLTAGE SURGE PROTECTION DEVICES
16500 INTERIOR AND EXTERIOR LIGHTING

SECTION 01312

MECHANICAL AND ELECTRICAL COORDINATION

PART 1 GENERAL

1.1 DESCRIPTION

- A. The following schedule clarifies the division of labor and materials between Division 15, Mechanical, and Division 16, Electrical. Contractor shall have overall control for assignment of work and responsibility for completeness and proper operation of work as specified and shown on drawings. MD indicates Mechanical Division and ED indicates Electrical Division.

Items	Products Under	Execution Under	Power Wiring Under	Control Wiring Under
Pumps	MD	MD	ED	ED
Motor Starters and Overload Relays Not Included with Equipment	ED	ED	ED	ED
Equipment Motors	MD	MD	ED	ED
Electric thermostats, remote bulb thermostats, motorized valves, float controls, etc., which are an integral part or directly attached to ducts, pipes, etc.	MD	MD	ED	MD
Motorized valves, damper motors, solenoid valves, etc.	MD	MD	ED	MD
Alarm bells for HVAC systems	MD	MD	MD	MD
Control circuit feeders	MD	MD	ED	MD
Low voltage controls, thermostats, valves, dampers, etc.	ED	ED	ED	ED
Fire, heat and smoke detectors, including relays for fan shutdown, alarming devices	MD	MD	ED	ED
Water heater controls, internally wired	MD	MD	ED	MD
Disconnect switches, thermal overload switches, manual operating switches	ED	ED	ED	ED
Contactors	ED	ED	ED	ED

PART 2 PRODUCTS NOT USED.

PART 3 EXECUTION NOT USED.

END OF SECTION

SECTION 01420**REFERENCE STANDARDS****PART 1 GENERAL****PART 1 GENERAL**

- 1.1 The following abbreviations, which may be used in the construction specifications, refer to the organizations and specifications of the organizations listed below:

AAMA	American Architectural Manufacturers Association 1827 Walden Office Square, Suite 104 Schaumburg, Illinois 60173-4268
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW, Suite 249 Washington, D.C. 20001
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, Michigan 48333-9094
ANSI	American National Standards Institute 11 West 42nd Street, 13th Floor New York, New York 10036
APWA	American Public Works Association 106 West 11th Street, Suite 1800 Kansas City, Missouri 64105-1806
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, New York 10017
ASPE	American Society of Plumbing Engineers 3617 Thousand Oaks Boulevard, Suite 210 Westlake, California 91362-3649
ASSE	American Society of Sanitary Engineering 28901 Clemens Road, Suite 100 Westlake, Ohio 44145
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, Pennsylvania 19428-2959
AWI	Architectural Woodwork Institute 1952 Isaac Newton Square Reston, Virginia 20190
AWPA	American Wood-Preservers' Association 3246 Fall Creek Highway, Suite 1900 Granbury, Texas 76049-7979
AWWA	American Water Works Association 6666 W. Quincy Avenue Denver, Colorado 80235

EPA Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

FDOT Florida Department of Transportation
Standard Specifications and Standard Indexes
Tallahassee, FL

IEEE The Institute of Electrical and Electronics Engineers
345 E. 47th Street
New York, New York 10017-2394

MSS Manufacturers Standardization Society of the Valve and Fittings Industry
127 Park Street, NE
Vienna, Virginia 22180-4602

NEC National Electrical Code (by NFPA)

NECA National Electrical Contractors Association
3 Bethesda Metro Center, Suite 1100
Bethesda, Maryland 20814

NIOSH National Institute for Occupational Safety and Health
NIOSH Building 1, Room 3007
1600 Clifton Road, NE
Atlanta, Georgia 30333

NSF NSF International
(Formerly National Sanitation Foundation)
3475 Plymouth Road
P.O. Box 130140
Ann Arbor, Michigan 48113-0140

PART 2 PRODUCTS Not used.

PART 3 EXECUTION Not used.

END OF SECTION

SECTION 01785**OPERATION AND MAINTENANCE DATA****PART 1 GENERAL****1.1 DESCRIPTION**

- A. The work of this section consists of furnishing operation and maintenance data manuals.

1.2 RELATED WORK

- A. Project Record Drawings – FP – 03, Subsection 104.03.

1.3 SCHEDULING

- A. At start of project, begin accumulating operation and maintenance data and initiate an index. Install and index all data in binders within 30 days after delivery of items. As custom written data and test results are produced, add them to the operation and maintenance data file.
- B. Keep operation and maintenance data current. Make operation and maintenance binders available to the Contracting Officer for inspection at the time of monthly progress payment requests. If operation and maintenance binders are not current the Contracting Officer may retain an appropriate amount of the progress payment.
- C. Before scheduling a final inspection, furnish two complete sets of operation and maintenance data to Contracting Officer for review. Should Contracting Officer find manual to be substantially incomplete, the final inspection will be delayed.
- D. Within 30 days following receipt of review comments, deliver four completed sets of Operation and Maintenance data.

PART 2 PRODUCTS**2.1 BINDERS**

- A. White, commercial quality, hard back, three-ring, 2-inch maximum ring size, lever-locking type slant ring, with clear window pockets on front and side. Cardinal Slant-D Ring, manufactured by Atapco Office Products Group, St. Louis, Missouri; View SlantRing, manufactured by E-Z-D Premiere View Binder, Torrance, California; or approved equal.

2.2 INDEX SYSTEM

- A. Index sheet with mylar reinforced edges at binder holes and tabbed divider sheets with mylar reinforced edges and pre-printed numbered tabs aligned with numbers and title lines on index sheet. Cardinal One-Step, manufactured by Atapco Office Products Group, St. Louis, Missouri; Avery Ready Index, manufactured by Avery Dennison, Covina, California; or approved equal.

PART 3 EXECUTION

3.1 FORM

- A. Provide four complete sets of data.
- B. Number multiple binder volumes consecutively.
- C. Cover Sheet: Identify the project title, location, park, contract number, prime contractor's name and address, date of substantial completion, and binder volume number. Insert cover sheet into clear plastic view pocket on front of binder. Insert sheet with project title and "Operation and Maintenance" into side clear plastic view pocket.
- D. Index System: Organize data into sections by common subjects and subsystems. Place a consecutively numbered tabbed divider sheet in front of each section. Place index sheet at the beginning of each binder, listing sections by subject name. If multiple binders are used, place a table of contents of all data provided behind the index sheet in each binder.
- E. Data: Fill binders to no more than 75 percent of capacity. Punch holes shall not obscure any data. Normal sheet size shall be 8-1/2 inches by 11 inches. Fold oversize sheets and insert them in 8-1/2 by 11-inch clear pocket sheet protectors placed in binders. When the contents of a single tabbed section covers more than one item, provide colored paper sheets to separate the data for each item.
 - 1. Manufacturers' Data: Provide originals for color or copyrighted data. Black and white data may be originals or clean, good quality reproductions. Where originals are printed on both sides of the page, reproductions shall also be printed on both sides of the page. Copies produced by facsimile transmission and sheets with stamps, such as submittal approval stamps, will not be acceptable. Include only sheets that apply to items installed; cross out inapplicable data.
 - 2. Vendor Furnished As-Built Drawings: Maximum 24-inch by 36-inch sheets with minimum character or lettering size of 1/8 inch. Reduced-size reproductions may be provided instead of full-size drawings if the reproductions are clear and legible. If reduced-size drawings are used, identify as "REDUCED SIZE" and provide graphic scales, if applicable.
 - 3. Custom Written Data: Typewritten text, supplemented by drawings and schematics necessary to describe systems adequately.
 - 4. Equipment Data Sheet: Typewritten data, using form at the end of this section.
 - 5. Schedules: Clean, typewritten schedules reflecting final, as-installed conditions. Hand-written mark-ups of schedules submitted earlier are not acceptable.
 - 6. Data that is poorly reproduced or in any way illegible will be rejected.

3.2 CONTENT

- A. Manufacturers' Published Data: Provide all available data, including installation and operating instructions, parts lists, electrical and mechanical schematics, control circuit documentation, performance data, safety instructions, cleaning and care instructions, and illustrations and instructions for maintenance, including lubrication, disassembly and repair, cleaning, and service. Indicate catalog numbers, sizes, colors, options, and other information pertaining to the products furnished which would be required when ordering replacements. For equipment assemblies, provide data for each separate item of equipment furnished as part of the assembly.

- B. **Equipment Data Sheets:** For each item of equipment included in the operation and maintenance data, provide an Equipment Data Sheet using the form at the end of this section. For equipment consisting of both a driven machine and a driver (for example, a pump and a motor), the equipment data shall cover both the driven machine and the driver. For similar type equipment (for example, multiple exhaust fans of the same model and type), provide a single equipment data sheet with an attached schedule listing the individual equipment items.
- C. **Vendor Furnished As-Built Drawings:** Provide for each electrical and each mechanical control system.
1. For each control system, provide control circuit schematic drawings. Identify each wire and terminal block number. Show terminal numbers on all control devices. Show control wires and devices remote from the control panel.
 2. For each control panel, provide a general arrangement drawing showing location of each control component and terminal block on the panel front and interior. Include a materials list of all panel-mounted control components as well as field-installed control components remote from the panel, identifying components, manufacturer, model number, and initial set points or sensing ranges of devices where applicable.
 3. For packaged equipment systems, provide general arrangement drawings showing interrelationships of the various items of equipment and components.
 4. In addition to the control wiring schematic, provide a power wiring schematic drawing showing the power flow to each motor. Identify each power conductor. Show all overcurrent protection and motor starting devices.
- D. **Warranties:** Place a copy of each manufacturer, supplier, and installer warranty extending for a period greater than one year in a single separately identified tabbed section of the manual.
- E. **Test Results:** Include in the operation and maintenance data copies of test results for mechanical and electrical equipment and systems as listed in the individual specification sections.
- F. **Subcontractor and Supplier List:** List all subcontractors and major suppliers who worked on the project. Include each subcontractor's or supplier's address and telephone number and identify work performed.

END OF SECTION

EQUIPMENT DATA SHEET

Equipment Item: _____ Designation: _____

Function: _____

Location: _____

Project: _____

Model No.: _____ Serial No.: _____

Manufacturer Address and Phone:

Supplier Address and Phone:

Preventive Maintenance Tasks:

☞

☞

☞

☞

Nameplate Data:

Spare Parts Furnished and Other Information:

SECTION 01815**SYSTEM DEMONSTRATION AND TRAINING****PART 1 GENERAL****1.1 DESCRIPTION**

- A. The work of this section consists of demonstrating systems and equipment to operating personnel. It also includes training of personnel.

1.2 COORDINATION

- A. Schedule demonstrations and training periods with Contracting Officer. Conduct training sessions after the equipment or system has been accepted and turned over to the Government.

1.3 CLOSEOUT SUBMITTALS

- A. As specified in FP – 03, Subsection 104.03; Section 01785; and other individual sections of the Supplemental Specifications.
- B. For each training session, the Contractor shall submit for approval a proposed outline of the subjects to be covered. The training shall not be conducted until the outline is approved..

PART 2 PRODUCTS**PART 3 EXECUTION****3.1 TRAINING**

- A. As specified herein and in individual sections, furnish the services of instructors to train designated personnel in adjustment, operation, including seasonal and emergency operations, if applicable, maintenance, and safety requirements of equipment and systems. Instructors shall be thoroughly trained in operating theory as well as practical operation and maintenance work for each type of equipment or system. The sequence of the training shall follow the approved training outline.
- B. Individual sections specify the duration of training required. If no duration is listed, provide training of sufficient duration to adequately cover the subjects. When more than four days of instruction are specified, use approximately one-half of the time for classroom and the other half for hands-on instruction with the equipment or system.
- C. Use Operating and Maintenance Data as a training guide.

END OF SECTION

SECTION 02221

TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 1. Excavation, trenching, backfilling and compacting for all underground utilities.
 2. Wastewater piping.
 3. Sewers, channel, and drain piping.
 4. Water piping (potable, wastewater, lift station).
 5. Relocation of existing piping.
 6. Electrical ductbanks, conduits, and direct burial cables.
 7. All related utility and process appurtenances.
- B. Related Sections include but are not necessarily limited to:
 1. Section 15060 – Pipe and Pipe Fittings – Basic Requirements
 2. Section 15100 – Valves: Basic Requirements
 3. Section 15101 – Gate valves
 4. Section 15102 – Plug valves
 5. Section 15114 – Miscellaneous valves

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 1. American Association of State Highway & Transportation Officials (AASHTO):
 - a. T99, The Moisture-Density Relations of Soils Using a 5.5 LB Rammer and a 12 IN Drop.
 - b. T180, Moisture-Density Relations of Soils Using a 10 LB Rammer and an 18 IN Drop.
 2. ASTM International (ASTM):
 - a. C33, Standard Specification for Concrete Aggregates.
 - b. D698, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 - c. D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m)).
 - d. D2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - e. D4253, Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table.
 - f. D4254, Minimum Index Density of Soils and Calculation of Relative Density.
- B. Qualifications: Hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling to assure that all work complies with this Specification.

1.3 DEFINITIONS

- A. Excavation: All excavation will be defined as unclassified.

1.4 SUBMITTALS

- A. Shop Drawings:
 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 2. Trench Safety Plan and/or trench shoring drawings including current certification of trench shields (trench boxes) if employed.

3. Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.
 4. Submit sieve analysis reports on all granular materials.
- B. Miscellaneous Submittals: Submit test reports and fully document each with specific location or stationing information, date, and other pertinent information.

1.5 SITE CONDITIONS

- A. All work must be done in accordance with the safety requirements of the State and OSHA.
- B. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.
- C. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Government to prevent serious interruption of travel.
- D. Protect and maintain bench marks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of Government and controlling agency.
- E. Verify location of existing underground utilities.
- F. Groundwater/surface water found during construction are conditions of the Contract and the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill Material:
 1. As approved by Contracting Officer.
 - a. Free of rock cobbles, roots, sod or other organic matter, and frozen material.
 - b. Moisture content at time of placement: 3 percent plus/minus of optimum moisture content as specified in accordance with ASTM D698.
- B. Subgrade Stabilization Materials: Provide subgrade stabilization material consisting of ASTM, gradation 57.
- C. Bedding Materials:
 1. As approved by the Contracting Officer.
 2. Granular bedding materials:
 - a. ASTM C33, gradation 67
 - 1) Well-graded crushed stone.

PART 3 - EXECUTION

3.1 GENERAL

- A. Remove and dispose of unsuitable materials as directed by Contracting Officer to site suitable for disposal and approved by the Contracting Officer.

3.2 EXCAVATION

- A. Unclassified Excavation: Remove clay, silt, gravel, hard pan, loose shale, and loose limestone fragments/stone as directed by Contracting Officer.
- B. Excavation for Appurtenances:
 1. 12 IN (minimum) clear distance between outer surface and embankment.
- C. Trench Excavation:

1. Excavate trenches by open cut method to depth shown on Drawings and necessary to accommodate work.
 - a. Support existing utility lines where proposed work crosses at a lower elevation.
 - 1) Stabilize excavation to prevent undermining of existing utility.
2. Open trench outside buildings, units, and structures:
 - a. No more than the distance between two manholes, structures, units, or 500 LF, whichever is less.
 - b. Field adjust limitations as weather conditions dictate.
3. Trenching within buildings, units, or structures:
 - a. No more than 100 LF at any one time.
4. Observe following trenching criteria:
 - a. Trench size:
 - 1) Excavate width to accommodate free working space.
 - 2) Maximum trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than the following dimensions:

OVERALL DIAMETER OF UTILITY SERVICE	EXCESS DIMENSION
6 IN and less	24 IN

- 3) Cut trench walls vertically from bottom of trench to 1 FT above top of pipe, conduit, or utility service.
- 4) Keep trenches free of water. Include cost of dewatering in original proposal.
- 5) Methods for trench dewatering are the responsibility of the Contractor.

3.3 PREPARATION OF FOUNDATION FOR PIPE LAYING

- A. Over-Excavation:
 1. Backfill and compact to 90 percent of maximum dry density per ASTM D698.
 2. Backfill with granular bedding material as option.
- B. Rock Excavation:
 1. Excavate minimum of 6 IN below bottom exterior surface of the pipe or conduit, to the maximum excess dimension specified in this section.
 2. Backfill to grade with suitable earth or granular material.
 3. Form bell holes in trench bottom.
 4. Notify contracting officer immediately if rock is encountered. Contracting Officer shall determine the total volume of rock to be removed and considered for payment.
- C. Subgrade Stabilization:
 1. Stabilize the subgrade when directed by the Government.
 2. Observe the following requirements when unstable trench bottom materials are encountered.
 - a. Notify Government when unstable materials are encountered.
 - 1) Define by drawing station locations and limits.
 - b. Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or Contractor operations.
 - 1) Replace with subgrade stabilization.

3.4 BACKFILLING METHODS

- A. Do not backfill until tests to be performed on system show system is in full compliance to specified requirements.
- B. Carefully Compacted Backfill:
 1. Furnish where indicated on Drawings, specified for trench embedment conditions and for compacted backfill conditions up to 12 IN above top of pipe or conduit.
 2. Comply with the following:

- a. Place backfill in lifts not exceeding 8 IN (loose thickness).
 - b. Hand place, shovel slice, and pneumatically tamp all carefully compacted backfill.
 - c. Observe specific manufacturer's recommendations regarding backfilling and compaction.
 - d. Compact each lift to specified requirements.
- C. Common Trench Backfill:
- 1. Perform in accordance with the following:
 - a. Place backfill in lift thicknesses capable of being compacted to densities specified.
 - b. Observe specific manufacturer's recommendations regarding backfilling and compaction.
 - c. Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.
- D. Water flushing for consolidation is not permitted.

3.5 COMPACTION

- A. General:
- 1. Place and assure bedding, backfill, and fill materials achieve an equal or "higher" degree of compaction than undisturbed materials adjacent to the work.
 - 2. In no case shall degree of compaction below "Minimum Compaction" specified be accepted.
- B. Compaction Requirements:
- 1. Unless noted otherwise on Drawings or more stringently by other sections of these Specifications, comply with following trench compaction criteria:

MINIMUM COMPACTIONS

LOCATION	SOIL TYPE	DENSITY
2. Bedding material:		
All locations	Cohesionless soils	75 percent of max relative density by ASTM D4253 and D4254
3. Carefully compacted backfill:		
All applicable areas, including backfill for lift station	Cohesive soils	95 percent of max dry density by ASTM D698
	Cohesionless soils	75 percent of max relative density by ASTM D4253 and D4254
4. Common trench backfill:		
Under pavements roadways surfaces, within highway right-of-ways	Cohesive soils	98 percent of max dry density by ASTM D1557
	Cohesionless soils	{60} percent of relative density by ASTM D4253 and D4254
Under turfed, sodded	Cohesive soils	{95} percent of max

plant seeded, non-
traffic areas

dry density by
ASTM D698

Cohesionless soils

{40} percent of relative
density by ASTM D4253
and D4254

3.6 FIELD QUALITY CONTROL

A. Testing:

1. Perform in-place moisture-density tests.
2. Perform tests through recognized testing laboratory.
3. Perform additional tests as directed until compaction meets or exceeds requirements.
4. Reference to Contracting Officer in this section will imply Contracting Officer when employed by Government and directed by Contracting Officer to undertake necessary inspections as approvals as necessary.
5. Assure Government has immediate access for testing of all soils related work.
6. Ensure excavations are safe for testing personnel.

END OF SECTION

SECTION 02665**WATER DISTRIBUTION SYSTEM****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. Definitions:
 - 1. Unsuitable material:
 - a. Debris and/or soil material judged unsuitable by Contracting Officer for support of slabs or other site improvements.

1.2 QUALITY ASSURANCE

- A. Compaction density test:
 - 1. Standard Proctor, ASTM-D698.
- B. Contractor shall hire an independent soils laboratory to conduct in place moisture and density tests. Contractor to pay for retests of material failing initial tests.

1.3 SUBMITTALS

- A. Project information:
 - 1. Manufacturer's certification for materials.

1.4 JOB CONDITIONS

- A. Verify location of existing utilities and structures and underground utilities.
- B. Protect existing utilities and structures and replace if damaged.
- C. Repair if damaged by this work.
- D. Lengths indicated on drawings are for information only.
- E. Furnish lengths as required.
- F. Perform no pipe work in fill areas until embankment or fill has been completed to at least 2 FT above top of pipe and has been properly compacted.
- G. Verification of existing utilities and structures.
 - 1. Plans indicate existing utilities as indicated on site survey.
 - 2. Verify accuracy, location and depth of each utility prior to trenching or tunneling.
 - 3. If pipe adjustment is necessary due to location of other utilities, secure approval from Contracting Officer.
- H. Revisions to Contract Drawings.
 - 1. If it becomes necessary to change location of lines due to building construction, secure prior written approval from Contracting Officer.
 - 2. If Contractor initiated, make approved changes without added cost to Government.
- I. Do not change pipe sizes without securing prior written approval from Contracting Officer.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Water mains:

1. PVC pipe must meet ASTM Standard D2441 and meet SDR26 for dimension ratio, for 2-inch and 3-inch pipe. All PVC pipe 4" and greater shall conform to AWWA C900 or C905.,
 2. Cast iron pipe and fittings, ANSI/AWWA-C106/A21.6, ANSI/AWWA-C108/, ANSI/AWWA-C111/A21.11, and ANSI/ AWWA-C110/21.10, cement mortar lined in accordance with ANSI/AWWA-C104/A21.4; with mechanical joints or push on joints; or:
 3. Ductile iron pipe and fittings, ANSI/AWWA-C151/A21.51, ANSI/AWWA-C105/A21.5, ANSI/AWWA-C111/A21.11, and ANSI/AWWA-C110/A21.10, thickness Class 2, or heavier, cement mortar lined in accordance with ANSI/ AWWA-C104/A21.4.
- B. Valves: AWWA C500, gate type, with mechanical joint ends or as otherwise may be necessary; cast iron body, bronze mounted, parallel seat, double disk, non-rising stem, open left (counter clockwise), working pressure 200 psi; valves from a single manufacturer.
- C. Valve boxes: Roadway type, cast iron, 2 section, adjustable screw type, proper length and base size for depths required; word "water" cast in cover; compatible with valves.
- D. Corporation and service stops: Bronze with flange joint coupling, threads on inlet end conforming to AWWA C800; tested to minimum hydraulic pressure of 200 psi.
- E. Buttresses:
1. Portland cement concrete, 6 bag mix.
 2. Minimum 28 day compressive strength: 3,000 psi.
- F. Backfill material:
1. As approved by Contracting Officer.
 2. Free of rock, cobbles, roots, sod, organic matter and frozen material.
 3. Moisture content at time of placement:
 - a. 3 percent plus/minus of optimum moisture content.
 - b. Wet dry material, as required.
 - c. Dry wet material, as required.
 - d. Furnish off site material at no additional cost to Government.

PART 3 - EXECUTION

3.1 TRENCH EXCAVATION

- A. Excavate trenches by open cut method to depth indicated and necessary to accommodate work.
1. Permission may be granted for tunnel work for crossing under crosswalks, driveways or existing utility lines.
 2. Such tunnels are limited to 10 FT in length.
- B. Open no more than 300 LF of trench at one time, or less, as required by Contracting Officer.
- C. Failure to comply may necessitate shutdown of entire project until backfilling is performed.
- D. Carry rock excavations minimum of 12 IN below indicated invert elevations.
- E. Do not excavate below indicated grades unless required to remove unsuitable material.
- F. Backfill over excavations in maximum 8 IN lifts compacted to specified density.
- G. Trench size:
1. Excavate only sufficient width to accommodate free working space.
 2. Cut trench walls vertically from bottom of trench to top of pipe, conduit, or utility service.
 3. Trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than following dimensions:

Overall Diameter

of Utility Service	Excess Dimension
33 IN and less	16 IN
more than 33 IN	24 IN

- H. Keep trenches free of water.
- I. Brace and sheet trenches as soil conditions dictate.
- J. Do not remove until backfilling has progressed to a stage that no damage to piping, utility service, or conduit will result due to removal.

3.2 PREPARATION FOR PIPE LAYING

- A. See Drawings and specific pipe material Sections for embedment requirements.
- B. When discrepancy exists between those requirements and these Specifications, provide type of embedment which provides greatest load factor.
- C. Types of embedment:
 - 1. Class A: Concrete cradle.
 - a. Load factors:
 - 1) 2.2 - Lightly Tamped.
 - 2) 2.8 - Carefully tamped.
 - 3) 3.4 - Reinforced Concrete with p=0.4 percent.
 - 2. Class 4: Concrete arch type bedding.
 - a. Load factors:
 - 1) 2.8 - Plain Concrete.
 - 2) 3.4 - Reinforced Concrete with p=0.4 percent.
 - 3) 4.8 - Reinforced Concrete with p=1.0 percent.
 - 3. Class B: First-class bedding.
 - a. Shaped bottom with tamped backfill, or:
 - b. Compacted granular bedding with tamped backfill.
 - c. Load factor:
 - 1) 1.9 - Carefully compacted backfill.
 - 4. Class C: Ordinary bedding.
 - a. Granular bedding with tamped backfill.
 - b. Load factor:
 - 1) 1.5 - Lightly compacted backfill.
- D. Form bell holes in trenches such that only barrel of pipe is firmly supported by bedding material.

3.3 CLEANING PIPES

- A. Thoroughly clean pipes and fittings before laying.
- B. Keep clean until acceptance of Work.
- C. Thoroughly clean inside of every pipe and fitting just before lowering into trench, to remove foreign matter.
- D. Carefully lower into trench in manner to exclude foreign matter while jointing to other pipe.
- E. At close of each work day, or during period when job is not being actively pursued, tightly seal pipe ends with an expansion type stopper or other approved type of watertight seal so that no foreign substance or water may enter line.
- F. Keep seal in place until pipe laying is again resumed.
- G. Under no circumstances use pipe that has been contaminated inside with petroleum products or other liquid that will soak into cement lining or soften bituminous lining.

- H. In event that foreign matter or water enters pipe that has already been laid, immediately cease work and lay no more pipe until contamination has been removed to satisfaction of Contracting Officer.

3.4 LAYING PIPE

- A. Use only proper and suitable tools and appliances for safe and convenient handling and laying of pipes and fittings.
- B. Carefully place pipe, fittings and valves into trench.
- C. Do not dump or roll pipe or fittings into trench.
- D. Do not allow pipe or fitting to drop against pipe or fitting already in trench.
- E. Take care to prevent damage to pipe lining and coating.
- F. Repair lining or coating damaged to satisfaction of Contracting Officer.
- G. Install pipe so ends of pipe abut and there is no shoulder or unevenness inside main.
- H. Take special care to insure that pipes are well bedded on a solid foundation.
- I. Repair defects due to settlement at Contractor's expense.
- J. Dig bell holes large enough to insure proper jointing.
- K. Do not allow pipe to rest on rock.
- L. Whenever a pipe or fitting requires cutting, perform work in a satisfactory manner with tools which leave smooth right angle cuts without damaging lining or pipe.
- M. Make such cuts at no added cost to Government.
- N. Do not spring joints to effect a change in direction unless directed to do so by Contracting Officer.
- O. Secure pipe, fittings and valves in place on concrete foundation, thrust blocks or by strapping, as indicated.
- P. Where foundation or thrust blocks are not indicated, secure pipe, fittings and valves in place as directed by Contracting Officer.

3.5 PERMISSIBLE DEFLECTION AT JOINTS

- A. Wherever it is necessary to deflect pipe from a straight line, either in vertical or horizontal plane, amount of deflection allowed shall not exceed that required for satisfactory calking or assembly of joint.
- B. Make such necessary deflection in accordance with values and tolerances established by pipe manufacturer.

3.6 JOINTS

- A. PVC Pipe
 1. Push-on or insert-lock type joints shall be used.
 2. Bell shall be integrally cast into the pipe
 3. Joint shall use elastomeric gaskets meeting ASTM Standard F477.
- B. Cast iron or ductile iron mechanical joint pipe:
 1. Rubber gasket, cast iron gland ring and T bolts with hex nuts.
 2. Before joint is made, insure that outside of spigot and inside of bell are entirely free of oil, tar and greasy substances to insure to tight bond.
 3. Make joint in accordance with manufacturers instructions.

4. Tighten bolts with a torque wrench set between 50 and 60 LB.
- C. Cast iron or ductile iron push on joint pipe:
1. Circular rubber gasket which fits into specially designed bell or socket end of pipe and a specially prepared lubricant.
 2. Make joints in following manner:
 - a. Thoroughly clean gasket seat and gasket.
 - b. Wipe with a cloth and apply thin film of lubricant to inside surface of gasket which will come into contact with entering pipe.
 - c. Use only lubricant furnished with pipe.
 - d. In no case use mineral oil or petroleum base lubes.
 - e. Thoroughly clean plain end of pipe to be jointed and start it into socket so it is in contact with gasket.
 - f. Apply a thin film of lubricant to outside of plain end for about 1 IN back from end.
 - g. Complete joint by exerting sufficient force on entering pipe so that its plain end is moved past gasket until it makes contact with socket base.
 - h. Method, which does not harm pipe, may be used to hone pipe.

3.7 FITTINGS AND VALVES

- A. Place fittings, gate and air valves, blowoff connections and valves, valve and blow off vaults, air valve manholes and valve boxes along water mains as indicated or where designated by Contracting Officer.
- B. Place in accordance with requirements as provided elsewhere in these Specifications.
- C. Set fittings and valves and join to pipe in manner specified for cleaning, laying and jointing pipe.
- D. Where valves are placed on end of a pipe line place a cast iron plug secure in exposed bell before backfilling.
- E. Provide valve box for every nut operated valve and grease case enclosed operating mechanism valve.
- F. Carefully place valve box at right angle to main.
- G. Do not allow valve box to transmit shock or stress to valve; center it plumb over wrench nut of valve, with box cover flush with surface of finished pavement, or set to elevation indicated.
- H. Rest flange at bottom of top Section on planks which extend 8 IN into solid ground on trench sides.
- I. Take care in tamping backfill around valve to keep box in place and firmly supported to preclude settlement.
- J. Remove and reset boxes found out of place or not firmly supported at no added cost to Government.
- K. Determine whether valve or valves are in proper working order before and after installation.
- L. If not, notify Contracting Officer and replace.

3.8 CONNECTION TO EXISTING WATER SYSTEM

- A. Make connections to water system as indicated.
- B. Make connections at such hours, determined by Contracting Officer, to cause least disturbance of water supply to existing consumers.

- C. Notify Contracting Officer at least 3 days in advance of time Contractor desires to make connections.
- D. Make no connections without Contracting Officer's prior approval.
- E. Include expense of making connections in bid price.

3.9 ARTIFICIAL FOUNDATION

- A. When directed, lay pipe upon an artificial foundation, consisting of gravel, sills, wedges, plank or timber, or of concrete, sized and placed as directed by Contracting Officer.
- B. Include necessary excavation for such construction.

3.10 TESTING WATER MAINS

- A. Test completed water mains for leakage.
- B. Test sections as directed or approved by Contracting Officer.
- C. Maximum allowable leakage not exceeding 1.0 GAL/1000 FT of pipe per hour for 16 IN pipe when tested at 150 psi.
- D. Fill length of water main under test with water and bring to test pressure of 150 psi.
- E. Operate valves in test section during test.
- F. After valves have been tested and deficiencies corrected; fill length of main under test with water, taking care to eliminate air from line.
- G. Raise pressure to test pressure by means of compressed air.
- H. Maintain at test pressure for at least 2 HR.
- I. At end of test period, again fill pipe with water from either measured receptacle or an accurately calibrated meter and determine leakage.
- J. Repair every leak which Contracting Officer deems important, and every section of line in which leakage exceeds maximum allowable amount, whether or not trench has been filled.
- K. Replace every pipe, fitting, valve, etc., which gives evidence under test of being defective.
- L. If line indicates excessive leakage during any phase of test, retest line after correction of defects.
- M. Continue correcting defects until leaks exceeding allowable leakage have been remedied.
- N. Repair leaks and defects or otherwise remedy at no added expense to Government and to complete satisfaction of Contracting Officer, at whatever time that they become apparent.

3.11 STERILIZATION OF WATER MAINS

- A. Sterilize water mains as specified and directed.
- B. Perform sterilization by the following method:
 - 1. By introducing a mixture of calcium hypochlorite (comparable to commercial products known as HTH or Perchloron) and water.
- C. Prior to beginning of sterilizing operations, submit for Contracting Officer's approval, schedule listing details of procedure to be followed.

- D. Before beginning sterilization, remove dirt and foreign matter from mains by a thorough flushing with clean water.
- E. Introduce water slowly and introduce sterilant through corporation cocks at rate 1 LB chlorine gas/2400 GAL of water, or at rate of 1 LB calcium hypochlorite (measured in a dry state prior to preparation of slurry) per 1,680 GAL of water.
- F. After sterilizing agent has been in pipe minimum of 3 HR, take samples and analyze.
- G. If less than 5 mg/L residual chlorine is indicated, drain pipe and repeat treatment.
- H. If more than 5 mg/L residual is indicated, drain lines to waste and refill with clear water.
- I. Take care to prevent contamination of sterilized pipe.

3.12 BACKFILLING

- A. Do not backfill until tests are performed on system, and system complies with specified requirements.
- B. Hand or pneumatic tamp backfill around and over pipe in lifts not exceeding 8 IN loose thickness.
- C. Compact to specified density.
- D. Exercise care in backfilling operations to avoid displacing pipe joints either horizontally or vertically and to avoid breaking pipe.
- E. Do not water flush or puddle to consolidate backfill.

3.13 COMPACTION

- A. Compact trench backfill in areas under paved roads, parking areas, sidewalks and other structures as directed by Contracting Officer to at least 95 percent of maximum dry density.
- B. In locations where trench will not be under paved areas, compact backfill to minimum 90 percent of maximum dry density.

3.14 MAINTENANCE DURING WARRANTY PERIOD

- A. If prior to expiration of warranty period, broken pipes or defects are found in mains or in their appurtenances, remove and replace with proper material and workmanship, at no added cost to Government.
- B. Carefully examine materials for defects prior to placing; do not place defective material.

END OF SECTION

SECTION 02666**VALVES: BASIC REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Valving, actuators, and valving appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 02667 - Gate Valves
 - 2. Section 02734 - Plug Valves
 - 3. Section 02735 - Miscellaneous Valves

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. B1.20.1, Pipe Threads, General Purpose.
 - b. B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
 - c. B16.34, Valves-Flanged, Threaded and Welding End.
 - 2. ASTM International (ASTM):
 - a. D638, Standard Test Method for Tensile Properties of Plastics.
 - b. D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load.
 - c. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - d. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C111, Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
 - b. C500, Gate Valves for Water and Sewerage Systems.
 - c. C509, Resilient-Seated Gate Valves 3 through 12 NPS, for Water and Sewage Systems.
 - d. C550, Protective Epoxy Interior Coatings for Valves and Hydrants.

1.3 DEFINITIONS

- A. The following are definitions of abbreviations used in this section or one of the individual valve sections:
 - 1. CWP: Cold water working pressure
 - 2. WWP: Water working pressure.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Valve pressure and temperature rating.
 - d. Valve material of construction.
 - e. Special linings.
 - f. Valve dimensions and weight.
 - g. Valve flow coefficient.
 - 3. Test reports.
- B. Operation and Maintenance Manuals:

1. See Section 01785.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Refer to individual valve specification sections.

2.2 MATERIALS

- A. Refer to individual valve specification sections.

2.3 VALVE ACTUATORS

- A. Valve Actuators - General:
 1. Provide actuators as shown on Drawings or specified.
 2. Counter clockwise opening as viewed from the top.
 3. Direction of opening and the word OPEN to be cast in handwheel or valve bonnet.
 4. Size actuator to produce required torque with a maximum pull of 80 LB at the maximum pressure rating of the valve provided and withstand without damage a pull of 200 LB on handwheel or chainwheel or 300 foot-pounds torque on the operating nut.
 5. Unless otherwise specified, actuators for valves to be buried, submerged or installed in vaults or manholes shall be sealed to withstand at least 20 FT of submergence.
 6. Extension Stem:
 - a. Install where shown or specified.
 - b. Solid steel with actuator key and nut, diameter not less than stem of valve actuator shaft.
 - c. Pin all stem connections.
 - d. Center in valve box or grating opening band with guide bushing.
- B. Buried Valve Actuators:
 1. Provide screw or slide type adjustable cast iron valve box, 5 IN minimum diameter, 3/16 IN minimum thickness, and identifying cast iron cover.
 2. Box base to enclose buried valve gear box or bonnet.
 3. Provide 2 IN standard actuator nuts complying with Section 3.16 of AWWA C500.
 4. Provide at least two teehandle keys for actuator nuts, with 5 FT extension between key and handle.
 5. Extension Stem:
 - a. Provide for buried valves greater than 4 FT below finish grade.
 - b. Extend to within 6 IN of finish grade.
 6. Provide concrete pad encasement of valve box as shown for all buried valves unless shown otherwise.
- C. Plastic Valve Vault:
 1. Provide in non traffic areas as shown.
 2. Rectangular shape with snap lock lid.
 3. Minimum inside dimension: 9-1/8 IN.
 4. Injection molded polyolefin compound with fibrous inorganic component reinforcing with following minimum strength characteristics:

<u>ASTM TEST CRITERIA</u>	
Tensile: 3,400 psi	D638
Compressive: 3,350 psi	D695
Impact Strength, Izod: 0.6 FT LB/IN	D256
Durometer Hardness, Type D: 60	D2240
Deflection temp @ 66 psi: 230 DegF	D648

5. UV degradation stabilized.

6. Ametek Plymouth Products, or equal.

2.4 FABRICATION

- A. End Connections:
 1. Provide the type of end connections for valves as required in the Piping Schedules presented in Section 15060 or as shown on the Drawings.
 2. Comply with the following standards:
 - a. Threaded: ANSI B1.20.1.
 - b. Flanged: ANSI B16.1 Class 125 unless otherwise noted or AWWA C207.
 - c. Bell and spigot or mechanical (gland) type: AWWA C111.
 - d. Soldered: ANSI B16.18.
 - e. Grooved: Rigid joints per Table 5 of AWWA C606.
- B. Refer to individual valve sections for specifications of each type of valve on Project.
- C. Nuts, Bolts, and Washers:
 1. Wetted or internal to be bronze or stainless steel. Exposed to be zinc or cadmium plated.
- D. On Insulated Piping: Provide valves with extended stems to permit proper insulation application without interference from handle.
- E. Epoxy Interior Coating:
 1. Provide epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Painting Requirements:
 1. Comply with manufacturer's recommendations and Government's maintenance program.
- C. Setting Buried Valves:
 1. Locate valves installed in pipe trenches where buried pipe indicated on Drawings.
 2. Set valves and valve boxes plumb.
 3. Place valve boxes directly over valves with top of box being brought to surface of finished grade.
 4. Install in closed position.
 5. Place valve on firm footing in trench to prevent settling and excessive strain on connection to pipe.
 6. After installation, backfill up to top of box for a minimum distance of 4 FT on each side of box.
- D. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
- E. Install valves accessible for operation, inspection, and maintenance.

3.2 ADJUSTING

- A. Adjust valves, actuators and appurtenant equipment to operate valve, open and close at system pressures.

END OF SECTION

SECTION 02667**GATE VALVES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Gate valves.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 02666 - Valves: Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Water Works Association (AWWA):
 - a. C500, Metal-Seated Gate Valves for Water Supply Service.
 - b. C509, Resilient-Seated Gate Valves for Water and Sewerage Systems.
 - c. C550, Protective Epoxy Interior Castings for Valves and Hydrants.
 - 2. Manufacturer's Standardization Society of the Valve and Fittings Industry, Inc. (MSS):
 - a. SP-9, Spot Facing for Bronze, Iron and Steel Flanges.
 - b. SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - c. SP-80, Bronze Gate, Globe, Angle and Check Valves.

1.3 DEFINITIONS

- A. OS&Y: Outside Screw and Yoke.
- B. NRS: Non-rising Stem.
- C. RS: Rising Stem.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. FP – 03, Subsection 104.03.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the manufacturers listed under the specific valve types are acceptable.

2.2 VALVE: WATER, 2-1/2 IN AND SMALLER

- A. Class 125 bronze gate valve.
- B. Comply with MSS SP-80.
- C. Acceptable Manufacturers:
 - 1. Nibco.
 - 2. Stockham.
 - 3. Or equal.
- D. Materials:

1. Body, bonnet, wedge: Bronze.
 2. Stem: Silicon bronze.
 3. Packing: Teflon or TFE impregnated fiber.
- E. Design Requirements:
1. 125 psi steam, 200 psi nonshock WOG.
 2. Screw in bonnet, non-rising stem, solid wedge.

2.3 VALVES: WATER; 3 TO 12 IN DIA

- A. Resilient Seat Gate Valves, 3 to 12 IN DIA:
1. Comply with AWWA C509.
 2. Materials:
 - a. Stem and stem nut: Bronze.
 - 1) Wetted bronze parts in low zinc bronze.
 - 2) Aluminum bronze components: Heat treated per AWWA C504.
 - b. Body, gate: Cast iron.
 - c. Resilient seat: Styrene Butadiene Rubber (SBR).
 3. Design requirements:
 - a. 200 psi working pressure.
 - b. Buried: NRS O-ring stem seal.
 - c. Exposed: OS&Y, stuffing box stem seal, handwheel.
 - d. Counter clockwise open rotation.
 4. Fusion bonded epoxy coating interior and exterior except stainless steel and bearing surfaces.
 - a. Comply with AWWA C550.
 - 1) Wetted bronze parts in low zinc bronze.
 - 2) Aluminum bronze components: Heat treated per AWWA C504.
- B. Acceptable Manufacturers:
1. Clow.
 2. Mueller.
 3. American Flow Control.
 4. M & H.
 5. Or equal.

2.4 ACCESSORIES

- A. Furnish actuator integral with valve.
- B. Refer to Section 02666 for actuator requirements.

2.5 FABRICATION

- A. General:
 1. Provide valves with clear waterways the full diameter of the valve.
- B. Spot valves in accordance with MSS SP-9.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Section 02666.
- B. Where larger buried valves utilize smaller bypass valves, provide a second valve box installed over the bypass valve operating nut.
- C. Do not install gate valves inverted or with the stems sloped more than 45 degrees from the upright unless the valve was ordered and manufactured specifically for this orientation.

END OF SECTION

SECTION 02732
SANITARY SEWERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Definitions:
1. Unsuitable material: Debris and/or soil material judged unsuitable by Contracting Officer for support of slabs or other site improvements.

1.2 QUALITY ASSURANCE

- A. See Section 02221 for soil testing and compaction requirements.
- B. Compaction density test:
1. Standard Proctor, ASTM-D698.
- C. Contractor shall hire an independent soils laboratory to conduct in place moisture and density tests. Contractor pay for retests of material not passing initial tests.

1.3 JOB CONDITIONS

- A. Verify locations of existing and new underground utilities and coordinate installation with all other utility installers.
- B. Verification of existing utilities and structures.
1. Plans indicate existing utilities indicated on site survey.
 2. Verify accuracy, location and depth of each utility prior to trenching or tunneling.
 3. If pipe adjustment is necessary due to location of other utilities, secure approval from Contracting Officer.
- C. Protect existing structures and utilities from damage.
1. Repair if damaged by this work.
- D. Lengths indicated on drawings are for information only.
1. Furnish lengths as required.
- E. Perform no pipe work in fill areas until embankment or fill has been completed to at least 2 FT above top of pipe and has been properly compacted.
- F. Revisions to Contract Drawings:
1. If it becomes necessary to change location of sanitary lines due to building construction, secure prior written approval from Contracting Officer.
 2. If Contractor initiated, make approved changes without added cost to Government.
- G. Do not change pipe sizes without securing prior written approval from Contracting Officer.
- H. Site utility installer and building plumbing installer shall interface work 5 FT outside face of building:
1. Building plumbing installer shall provide necessary materials (adaptors).

1.4 SUBMITTALS

- A. Shop Drawings:
1. Precast manhole Drawings showing size and type of structure base.
- B. Product data:

1. Manufacturer catalog cuts and literature for pipe, manholes, manhole frame and covers and cleanouts.
- C. Project information:
1. Manufacturer's certification for materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Ductile iron pipe and fittings:
1. AWWA C150, thickness Class 50 with AWWA C111 rubber gasket joints.
 2. Pipe fittings: AWWA C110.
- B. Polyvinyl chloride (PVC) pipe and fittings:
1. 4 IN thru 15 IN DIA: ASTM-D3034, SDR 35 with ASTM-D3212 flexible elastomeric gasket joint.
 2. 4 IN thru 48 IN DIA: ASTM-F794 Series 46 for ribbed sewer pipe with smooth interior with ASTM-D3212 flexible elastomeric gasket joint.
- C. Force main sewer pipe and fittings:
1. ASTM-D2241 PVC with ASTM-F477 elastomeric gaskets.
 2. AWWA C150 ductile iron thickness Class 50 with AWWA C111 rubber gasket joints.

PART 3 - EXECUTION

3.1 EXCAVATION, BACKFILL AND COMPACTION

- A. Excavate trenches to depth indicated on plans and necessary to accommodate work.
- B. Keep trenches free of water.
- C. Form bell holes in trench or bedding materials as indicated so only barrel of pipe is firmly supported by shaped subgrade or bedding.
- D. Compact bedding material under and around pipe up to spring line of pipe in lifts not exceeding 8 IN loose thickness.
- E. Compact-trench backfill evenly on both sides of pipe to top of excavation or to a depth such that pipe will not be injured by subsequent compaction used to achieve required density.
- F. Backfill and compact remainder of trench in 8 IN lifts to specified density.
- G. Exercise care in backfilling operations to avoid displacing pipe joints either horizontally or vertically and to avoid breaking pipe.
- H. Do not water flush for consolidation.
- I. Compact trench backfill in areas under paved roads, parking areas, sidewalks and other structures, to minimum 95 percent of specified density.
- J. Remove materials which cannot be compacted as specified.
- K. Replace with suitable material and compact.

3.2 INSTALLATION OF PIPE

- A. Lay pipelines on uniform grades between inverts.
- B. Locate structures as indicated and construct lines between them.

- C. Lay pipe upgrade beginning at lower end with bell ends of pipe upstream.
- D. Provide proper facilities for lowering pipe into trench.
- E. Do not lay pipe in water.
- F. Do not lay pipe when trench condition or weather is unsuitable for such work.
- G. Remove sections of pipe already placed found to be out of alignment, defective or damaged.
- H. Relay or replace without additional cost to Government.
- I. Bedding:
 - 1. Lay pipe directly on shaped subgrade.
 - 2. No blocking permitted.
 - 3. Form a continuous bearing with a minimum width of bearing equal to 0.6 of outside diameter of pipe, for full length of pipe, except for portion excavated for joint.

3.3 CLEANOUT STRUCTURES

- A. Construct cleanout risers of 6 IN pipe laid on angle on undisturbed natural ground.
- B. Tamp backfill around and above pipe in layers not exceeding 8 IN depth so that no settlement occurs.
- C. Lay base of cleanout on concrete block.

3.4 WYE BRANCHES

- A. Install where sewer connections are indicated or required.
- B. Cutting into piping for connections not permitted except as approved by Contracting Officer.

3.5 FRAMES AND COVERS

- A. Unless otherwise indicated, set frames and covers with top flush with finished pavement grade or 2 IN above unpaved areas.

3.6 CONNECTIONS TO EXISTING MANHOLES

- A. Pipe connections to existing manholes shall be made that finish work will conform to essential applicable requirements specified for new manholes, including concrete work, cutting, and shaping.

3.7 BUILDING CONNECTIONS

- A. Building connections shall include lines to and connection with building waste drainage piping at a point approximately 5 FT outside building, unless otherwise indicated.
 - 1. Where building drain piping is not installed, terminate building connections approximately 5 FT from site of building and plug pipe end.

3.8 LEAKAGE TESTS

- A. Test lines for leakage by low pressure air testing or exfiltration tests, as appropriate:
 - 1. Low pressure air testing ASTM-C828.
 - 2. Exfiltration test:
 - a. Fill line to be tested with water so that a head of at least 2 FT is provided above both water table and top of pipe at upper end of pipeline to be tested.
 - b. Allow filled line to stand until pipe has reached its maximum absorption, but not less than 4 HRS.
 - c. After absorption, head shall be re-established.

- d. Amount of water required to maintain this water level during a 2-HR test period shall be measured.
3. Leakage as measured shall not exceed 250 GAL/IN DIA per mile of pipeline per day.
4. When leakage exceeds maximum amount specified, satisfactory correction shall be made and retesting accomplished.

END OF SECTION

SECTION 02733**PACKAGED POSITIVE DISPLACEMENT GRINDER PUMP****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Packaged positive displacement grinder pumps.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 13448 – Control Panels and Enclosures.
- C. The manufacturer shall furnish complete factory-built and tested grinder pump unit(s), each consisting of a grinder pump core suitably mounted on an integral stand of stainless steel, electrical quick disconnect (NEMA 6P), pump removal harness, discharge assembly and shut-off valve, anti-siphon valve and check valve assembly, electrical alarm assembly, and all necessary internal wiring and controls. For ease of serviceability, all pump motor/grinder units shall be of like type and horsepower throughout the system.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Gear Manufacturers Association (AGMA).
 - 2. American National Standards Institute (ANSI).
 - 3. ASTM International (ASTM):
 - a. A48, Standard Specification for Gray Iron Castings.
 - b. A126, Gray Iron Castings for Valves Flanges, and Pipe Fittings.
- B. Warranty:
 - 1. The grinder pump manufacturer shall provide a part(s) and labor warranty on the complete station and accessories, including, but not limited to, panel and redundant check valve, for a period of twenty-four (24) months after notice of Government's acceptance, but no greater than twenty-seven (27) months after receipt of shipment. Any manufacturing defects found during the warranty period will be reported to the manufacturer by the Government and will be corrected by the manufacturer at no cost to the Government.
- C. Warranty performance Certification:
 - 1. As a bid certification requirement, each bidder shall provide with their bid schedule a Warranty Performance Certification statement executed by the most senior executive officer of the grinder pump manufacturer, which certifies a minimum of a twenty-four (24) month warranty. They must further detail any exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition, including all associated labor and shipping fees, and certify that the manufacturer will bear all costs to correct any original equipment deficiency for the effective period of the warranty. All preventive maintenance type requirements shall be included in this form as exclusions. These requirements include, but are not limited to, unjamming of grinder mechanism, unplugging of lines, periodic motor maintenance, and periodic cleaning of liquid level controls. Should the contractor (supplier) elect to submit a performance bond in lieu of the experience clause outlined above, this Warranty Performance Certification shall also be used as a criterion to evaluate the contractor's (supplier's) performance over the warranty period. A Warranty Performance Certification form is included with the bid schedule and must be completed and submitted as part of the bid package. Bids with incomplete forms or missing forms will be considered non-responsive.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
- B. Operation and Maintenance Manuals:
 - 1. See section 01785.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Grinder pumps:
 - a. eONE.
 - b. Contracting Officer approved equal.

2.2 FABRICATION

- A. Pump:
 - 1. The pump shall be a custom-designed, integral, vertical rotor, motor driven, solids handling pump of the progressing-cavity type with a single mechanical seal. The rotor shall be constructed of stainless steel. Plating on the rotor will not be acceptable due to its tendency to delaminate. The stator shall be of a specifically compounded ethylene-propylene synthetic elastomer. The material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.
- B. Grinder:
 - 1. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder will be of the rotating type with a stationary hardened and ground stainless steel shredding ring spaced in close annular alignment with the driven impeller assembly, which shall carry two hardened type 400 series stainless steel cutter bars.
 - 2. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to eliminate clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:
 - a. The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
 - b. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to prevent jamming and as such must be adhered to.
 - c. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and eliminates blinding of the pump by large objects blocking the inlet shroud.
 - d. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

C. Electric Motor:

1. As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with a low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted.

D. Mechanical Seal:

1. The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

E. Tank: High Density Polyethylene Construction.

1. The tank shall be made of high density polyethylene of a grade selected for environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. Corrugations of outside wall are to be of a minimum amplitude of 1 1/2" to provide necessary transverse stiffness.
2. Any incidental sections of a single wall construction are to be a minimum .250 inch thick. All seams created during tank construction are to be thermally welded and factory tested for leak tightness. Tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to maximum external soil and hydrostatic pressure.
3. The tank shall be furnished with PVC inlet flange to accept a 4.50" OD DWV pipe. Tank capacities shall be as shown on the contract drawings.
4. The tank shall include a lockable cover assembly providing low profile mounting and watertight capability. Accessway design and construction shall facilitate field adjustment of station height in increments of 4" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.
5. The station shall have all necessary penetrations factory sealed and tested. No field penetrations shall be acceptable.

F. Fiberglass Construction.

1. The tank shall consist of a single wall, laminated fiberglass construction. The resin used shall be of a commercial grade suitable for the environment. The reinforcing material shall be a commercial grade of glass fiber capable of bonding with the selected resin. The inner surface shall have a smooth finish and be free of cracks and crazing. The exterior tank surface shall be relatively smooth with no exposed fiber or sharp projections present.
2. The tank wall and bottom shall be of sufficient thickness and construction to withstand the imposed loading due to saturated soil at the specified burial depth for each available tank height. All station components must function normally when exposed to the external soil and hydrostatic pressures developed at the specified burial depth. The tank bottom shall be reinforced with a fiberglass plate extending beyond the tank walls to support concrete anchoring, as required, to prevent flotation. The tank shall include a solid fiberglass cover, secured with threaded stainless steel fasteners, providing low profile mounting. The tank shall also be vented to prevent sewage gases from accumulating in the tank.

G. Check Valves:

1. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the discharge assembly. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back pressure. The valve body shall be an injection molded part made of glass filled PVC. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.
2. Each grinder pump installation shall also include one separate check valve of the type detailed in this section for installation in the 1 1/4" service lateral between the grinder pump station and the sewer main, preferably next to the curb stop. The separate check valve shall be provided as a separate line item in the bid schedule.

H. Controls:

1. All necessary controls, including motor and level controls, shall be located in the top housing of the core unit. The top housing will be attached with stainless steel fasteners.
2. Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The level detection device shall have no moving parts in direct contact with the wastewater. High-level sensing will be accomplished in the manner detailed above by a separate air-bell sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices.
3. To assure reliable operation of the pressure switches, each core shall be equipped with a breather assembly, complete with a suitable means to prevent accidental entry of water into the motor compartment. The grinder pump will be furnished with a 6 conductor, 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a factory-installed NEMA 6P EQD half attached to it.

2.3 SOURCE QUALITY CONTROL

A. Factory Test.

1. Each grinder pump shall be submerged and operated for 5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge line and each unit's dedicated level and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field, shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps will not be acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two (2) different points on its curve, with the maximum pressure no less than 60 psi. The Contracting Officer reserves the right to inspect such testing procedures with representatives of the Government, at the grinder pump manufacturer's facility.
2. Completed basins shall be factory leak tested to assure the integrity of all joints, seams and penetrations.

2.4 MAINTENANCE MATERIALS

A. Extra Materials:

1. Furnish the Government the following extra parts for each pump service category:
 - a. One set of packing.
 - b. One set of balls.
 - c. One set of ball seats.
 - d. One static free belt.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Earth excavation and backfill are specified under site work, but are also to be done as a part of the work under this section, including any necessary sheeting and bracing. The contractor shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general ground water or flooding. The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the Contracting Officer.
- B. Remove packing material. Users instructions **MUST** be given to the Government. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard field-installed 4" inlet grommet (fiberglass tank) or flange (for high-density polyethylene tank); both will accept a 4.50" OD DWV pipe for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.
- C. Installation shall be accomplished so that 1" to 4" of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the hole must be large enough to allow for the concrete anchor.
- D. A 6" inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit. A concrete anti-flotation collar, as detailed on the drawings, and sized according to the manufacturer's instructions, shall be required and shall be precast to the grinder pump or poured in place. Each grinder pump station with its precast anti-flotation collar shall have a minimum of three (3) lifting eyes for loading and unloading purposes. The unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured and set. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.
- E. The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the contractor. An alarm device is required on every installation, there shall be no exceptions. It will be the responsibility of the contractor and the Contracting Officer to coordinate with the individual property Government(s) to determine the optimum location for the Alarm Panel.
- F. The contractor shall mount the alarm device in a conspicuous location, as per national and local codes. The Alarm Panel will be connected to the grinder pump station by a length of 6-conductor, 12-gauge, TC-type cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pumps station will be provided with a minimum of 32', 25' of usable electrical supply cable outside the station, to connect to the alarm panel. This cable shall be provided with a factory-installed EQD half to connect to the mating EQD half on the core.

3.2 FIELD QUALITY CONTROL

- A. The manufacturer shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the Government's personnel in the operation and maintenance of the equipment before the stations are accepted by the Government. All equipment and materials necessary to perform testing shall be the responsibility of the Government or installing contractor. This will include, as a minimum, a portable generator (if temporary power is required) and water in each basin.
- B. The services of a trained factory-authorized technician shall be provided at a rate of 2 days for each 200 grinder pump stations supplied. Each day shall be ten (10) person hours in duration.
- C. Upon completion of the installation, the authorized factory technicians will perform the following test on each station:

1. Make certain the discharge shut-off valve is fully open. This valve must not be closed when the pump is operating. In some installations, there may be a valve(s) at the street main that must also be open.
 2. Turn ON the alarm power circuit.
 3. Fill the wet well with water to a depth sufficient to verify the high level alarm is operating. Shut off water.
 4. Turn ON pump power circuit. Initiate pump operation to verify automatic “on/off” controls are operative. Pump should immediately turn ON. Within one (1) minute alarm light will turn OFF. Within three (3) minutes the pump will turn OFF.
- D. Upon completion of the start-up and testing, the manufacturer shall submit to the Contracting Officer the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

3.3 OPERATION AND MAINTENANCE

- A. Spare Core:
1. The manufacturer will supply one (1) spare grinder pump core for every 50 grinder pump stations installed, complete with all operational controls, level sensors, check valve, anti-siphon valve, pump/motor unit, and grinder.
- B. Manuals:
1. The manufacturer shall supply four (4) copies of Operation and Maintenance Manuals to the Government, and one (1) copy of the same to the Contracting Officer.
 2. See section 01785.

END OF SECTION

SECTION 02734**PLUG VALVES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Plug valves.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 02666 - Valves: Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. A21.11, Rubber - Gasket Joints for Ductile - Iron and Gray - Iron Pressure Pipe and Fittings.
 - b. B16.1, Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
 - 2. ASTM International (ASTM):
 - a. A126, Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - b. A536, Standard Specification for Ductile Iron Castings.
 - c. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C504, Rubber Seated Butterfly Valves.
 - b. C606, Grooved and Shouldered Joints.

1.3 SUBMITTALS

- A. Shop Drawings: See Section 02666.
- B. Operation and Maintenance Manuals: See Section 02666.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the manufacturers listed under the specific valve types are acceptable.

2.2 NON-LUBRICATED ECCENTRIC PLUG VALVES

- A. Acceptable Manufacturer:
 - 1. DeZurik.
 - 2. Millikin.
 - 3. ValMatic.
 - 4. Victaulic.
 - 5. Keystone.
- B. Materials:
 - 1. Body: Cast-iron ASTM A126, Class B.
 - 2. Plug: One piece construction ductile iron, ASTM A536 65-45-12 or cast iron, ASTM A126 Class B.
 - 3. Plug facing: Grease and/or petroleum-resistant resilient Neoprene or Buna-N compound, 70 Type A durometer hardness per ASTM D2240.
 - 4. Shaft bearing bushings: Permanently lubricated TFE or Delrin sleeve type stainless steel or bronze.

5. Valve seats: Welded-in overlay of 90 percent nickel, minimum Brinell hardness of 200, (minimum 1/8 IN thick).
6. Stem seal: Nitrile butadiene packing or Buna-N dual U-cups {or bronze cartridge double O-rings with lower grit seal O-ring} per Sec. 3.7 AWWA C504.

2.3 ACCESSORIES

- A. Refer to Drawings and valve schedule for type of actuator.
 1. Furnish actuator integral with valve.
- B. Refer to Section 02666 for actuator requirements.

2.4 DESIGN REQUIREMENTS

- A. Non-Lubricated Eccentric Plug Valves (Wastewater):
 1. Port area:
 - a. Valves 4 IN through 20 IN: Equal to or exceed 80 percent of full pipe area.
 2. Valve body: Fitted with bolted bonnet.
 3. End connections: See Section 15100.
 4. Stem seal: Adjustable and replaceable without disassembling valve or bonnet.
 5. Designed for seating drip tight in any flow direction.
 6. Rating:
 - a. 1/2 through 12 IN, 175 psi working pressure.
 - b. 14 through 36 IN, 150 psi working pressure.
 - c. Three-way valves, 125 psi working pressure.
 7. Actuator:
 - a. Actuator gearing in enclosure suitable for running in oil with seals on shaft to prevent entry of dirt or water.
 - b. Positive identification on actuator indicating valve position.
 - c. Adjustable stop to set closing torque.

2.5 FABRICATION

- A. See Section 02666.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Section 02666.
- B. Install valves with valve stem horizontal, plug seat on inlet side and with plug rotating up into the open position for valves in horizontal lines.
- C. Install valve with actuator above pipe or plug centerline.

END OF SECTION

SECTION 02735**MISCELLANEOUS VALVES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Air release and vacuum relief valves.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 02666 - Valves: Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
 - 2. American Water Works Association (AWWA):
 - a. C512, Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
 - b. C550, Protective Epoxy Interior Coatings for Valves and Hydrants.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Section 02666.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01340.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the manufacturers listed under the specific valve types are acceptable.

2.2 AIR RELEASE AND VACUUM RELIEF VALVES

- A. General:
 - 1. Conform to AWWA C512.
- B. Air Vacuum Valve (Wastewater):
 - 1. Acceptable manufacturers:
 - a. Vent-O-Mat RGX316 Series, 1 IN.
 - b. Or approved equal.
 - 2. Materials:
 - a. Body and cover: Cast iron.
 - b. Float: Stainless steel.
 - c. Seat: Buna-N.
 - 3. Design requirements:
 - a. Working pressure: 75 psi.
 - b. Capacity 10 cfm at 10 psi differential at 150 psi line pressure.
 - c. Provide gate or ball isolation valve.
 - d. Flush accessories:
 - 1) Blow-off valve.
 - 2) Clear water inlet valve.
 - 3) Hose and quick connect coupling.

2.3 ACCESSORIES

- A. Furnish any accessories required to provide a completely operable valve.

2.4 FABRICATION

- A. Completely shop assemble unit including any interconnecting piping, speed control valves, control isolation valves and electrical components.
- B. Provide internal epoxy coating suitable for potable water for all iron body valves in accordance with AWWA C550.

2.5 SOURCE QUALITY CONTROL

- A. Shop hydrostatically test to piping system test pressure.

2.6 MAINTENANCE MATERIALS

- A. Provide one set of any special tools or wrenches required for operation or maintenance for each type valve.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. General:
 - 1. See Section 02666.
- B. Air Release:
 - 1. Pipe exhaust to a suitable disposal point.

3.2 FIELD QUALITY CONTROL

- A. Clean, inspect, and operate valve to ensure all parts are operable and valve seats properly.
- B. Check and adjust valves and accessories in accordance with manufacturer's instructions and place into operation.

END OF SECTION

SECTION 02736**PIPE: POLYETHYLENE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Polyethylene pipe.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. ASTM International (ASTM):
 - a. Polyethylene (PE) materials:
 - 1) D638, Specifications for Tensile Properties of Plastics.
 - 2) D1248, Specification for Polyethylene.
 - 3) D1693, Specification for Environmental Stress Cracking of Ethylene Plastics.
 - 4) D2683, Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
 - 5) D3350, Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - b. Installation:
 - 1) D3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - 2) D2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
 2. Plastic Pipe Institute:
 - a. Technical Report TR-31/9-79.
 3. NFPA-58.

1.3 SUBMITTALS

- A. Shop Drawings:
1. Installer certification.
 2. Field quality control documents.

1.4 DEFINITIONS

- A. SDR - Standard Dimension Ratio.
- B. IPS - Iron Pipe Size.
- C. CTS - Copper Tube Size.
- D. ESCR - Environmental Stress Crack Resistance.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers of PE pipe are acceptable, others as approved by Government or Contracting Officer in writing:
1. Phillips Driscopipe.
 2. Plexco.
 3. Polypipe.

2.2 PE 3408 PIPING

- A. General: Provide PE 3408 piping with fittings and appurtenances to locations shown on Drawings. Furnish materials in {accordance with ASTM D2513} and full compliance to the following material specifications:
1. Material Description: ASTM D1248-Type III, Class C, Category 5, Grade P34.
 2. Cell Classification: ASTM D3350-PE 345434C.
 3. ESCR: ASTM D1693-Condition C, F₀>5,000 hours.
 4. Modulus of Elasticity: ASTM D638 - 130,000 psi.
 5. Hardness: ASTM D2240 65 Shore D.
 6. SDR: 17.0.
 7. IPS for line size greater than 1 IN.
 8. CTS for line size less than or equal to 1 IN.
- B. Fittings:
1. ASTM D2513.
 2. SDR: 17.0.
 3. 1/2 - 3 IN: ASTM D2683.
 4. 4-10 IN: ASTM D3261.
 5. End connections:
 - a. Socket fused ends for fittings 1 IN and under.
 - b. Butt-fused ends for fitting 1-1/2 IN and greater.
 6. Use IPS reducers on the service mains.
 7. Use tapping tees or straight outlet service saddles to join service lines to the main.
 8. Mitered or field fabricated fittings are not allowed.
- C. Verification
1. The Government or Contracting Officer may request certified lab data to verify the physical properties of the materials supplied under this specification or may take random samples and have them tested by an independent laboratory.
- D. Color-coding
1. HDPE force main pipe shall be color-coded with green striping or have an integral, extruded green coating.
 2. Water pipe to be colored blue.
- E. Installation: Install pipe and fittings in accordance with ASTM D2774 and as recommended by the manufacturer.
1. Provide for a maximum deflection of not more than 3 percent.
 2. PE 3408 shall not be field threaded and such threaded joints shall not be used in gas distribution systems.
- F. Deflection: After backfilling, each section of pipe shall be checked for deflection by pulling a mandrel through the pipe. Pipe with deflection exceeding 5 percent of the inside diameter shall have backfill removed and replaced to provide a deflection of less than 5 percent. Any repaired pipe shall be retested.

PART 3 - EXECUTION

3.1 IDENTIFICATION

- A. Identify each length of pipe clearly at intervals of 5 FT or less. Include manufacturer's name and trademark. Nominal size of pipe, appurtenant information regarding polymer cell classification and critical identifications regarding performance specifications, and "NSF" approvals when applicable.

3.2 INSTALLATION

- A. General:
1. Install buried pipe as indicated on Drawings.

2. The Contractor shall insure that kinking or excessive bend diameters of the pipe do not occur during the installation process.
 3. The Contractor shall insure that the pipe installed in the trench is firmly supported.
 4. The Contractor shall cap all open pipe ends at the end of the work day.
 5. All installed valves shall be tested in the presence of the Contracting Officer. All repairs deemed necessary by the Contracting Officer shall be made by the Contractor.
 6. Contractor shall remove any cave-in portions of the trench prior to placing sand bagging around the pipe.
 7. HDPE pipe and fittings shall be by the same manufacturer. The minimum strength of the fittings shall not be less than that of the pipe.
 8. Service taps shall be installed as shown on the Drawings.
 9. Changes in direction of PE Pipe:
 - a. Pipe may be cold-bent to minimum radius of 20 times the pipe diameter as it is installed.
 - b. If fittings or fusions are present in the bend, the minimum recommended cold bending radius is 125 times the outside diameter of the pipe.
 10. Remove cutting and threading burrs.
- B. Joining Procedures:
1. HDPE pipe joints shall be fused on the surface prior to installation into the trench. Alternative methods of fusing shall be approved by the Contracting Officer.
 - a. PE pipe 1 IN and under shall be socket fused.
 - b. PE pipe joints 1-1/2 IN and over shall be buttfused.
 2. Fusion joiner must be qualified by type of fusion (i.e. butt fusion, socket fusion or sidewall fusion) and fuse pipe only as qualified. Documentation of qualifications/certifications to be submitted with shop drawings.
 3. The fusion process shall be recorded and documented, using McElroy DataLogger, or approved equivalent. The key parameters, including heater temperature and the fusion profile, of the fusion process for each joint shall be recorded and documented. Contractor to submit test reports for approval on a biweekly basis to Contracting Officer/Government.
 4. Each joint must be visually inspected inside and outside for damage, dirt, moisture, or any other abnormalities prior to fusing.
 5. All joint fusion shall be performed in strict accordance with the manufacturer's specifications.
 6. All fusion equipment must be approved by the manufacturer and operated by qualified and certified operators. Cost for testing and certifying personnel shall be born by the Contractor.

3.3 INSTALLATION BY HORIZONTAL DIRECTIONAL DRILLING

A. General:

It is the intent of this section to define the acceptable methods for installing sanitary sewer and water mains by the horizontal directional drilling method.

B. Installation Plan:

1. At least 7 days prior to mobilizing equipment Contractor shall submit his detailed installation plan to the Contracting officer. The plan shall include a detailed plan and profile of the bores and be plotted at a scale no smaller than 1 inch equals 20 feet horizontal and vertical
2. The plan shall also include a listing of major equipment and supervisor personnel and a description of the methods to be used.

C. Variations in Plan or Profile:

The Contractor may request changes to the proposed vertical and horizontal alignment of the installation and the location of the entry and exit points. Proposed changes shall be submitted in writing to the Contracting officer and receive approval of the Contracting officer prior to construction.

D. Alignment:

The proposed plan and profile installation locations are based on alignments to accommodate acquired easements, to avoid obstructions, and to properly maintain operation flow velocities.

E. Qualifications:

Directional drilling and pipe installation shall be done only by an experienced Contractor specializing in directional drilling and whose key personnel have at least five (5) years experience in this work. Furthermore, the Contractor shall have installed directionally drilled pipe at least 2,000 feet in length, and successfully installed at least 25,000 feet in length.

3.4 MATERIALS:**A. General:**

High density polyethylene pipe in accordance with Section 2.2 shall be used in HDD installations.

3.5 PROCEDURE:**A. General:**

1. The Contractor shall install the pipelines by means of horizontal directional drilling. The Contractor shall assemble, support, and pretest the pipeline to installation in the directional drill tunnel.
2. Horizontal directional drilling shall consist of the drilling of a small diameter pilot hole from one end of the alignment to the other, followed by enlarging the hole diameter for the pipeline insertion. The exact method and techniques for completing the directionally drilled installation will be determined by the Contractor, subject to the requirements of these Specifications.
3. The Contractor shall prepare and submit a plan to the Contracting officer for approval for insertion of the HDPE pipe into the opened bore hole. This plan shall include pullback procedure, ballasting, use of rollers, side booms and side rollers, coating protection, internal cleaning, internal gauging, hydrostatic tests, dewatering, and purging.
4. The required piping shall be assembled in a manner that does not obstruct adjacent roadways or public activities. The Contractor shall erect temporary fencing around the entry and exit pipe staging areas.

B. Tolerances:

1. Pipe installed by the directional drilled method must be located in plan as shown on the Drawings, and must be no shallower than shown of the Drawings unless otherwise approved. The contractor shall plot the actual horizontal and vertical alignment of the pilot bore at the intervals not exceeding 30 feet. This "as built" plan and profile shall be updated as the pilot bore is advanced. The Contractor shall at all times provide and maintain instrumentation that will accurately locate the pilot hole and measure drilling fluid flow and pressure. The Contractor shall grant the Contracting officer access to all data and readout pertaining to the position of the bore head and the fluid pressures and flows.
2. When requested, the Contractor shall provide explanations of this position monitoring and steering equipment. The Contractor shall employ experienced personnel to operate the directional drilling equipment and, in particular, the position monitoring and steering equipment. No information pertaining to the position or inclination of the pilot bores shall be withheld from the Contracting Officer.

3. Each exit point shall be located as shown with an over-length tolerance of 10 feet for directional drills of 1,000 linear feet or less and 40 feet for directional drills of greater than 1,000 linear feet and an alignment tolerance of 5 feet left/right with due consideration of the position of the other exit points and the required permanent easement. For gravity sanitary sewer installations, sags in the pipeline shall not exceed 25 percent of the nominal pipe diameter. Sags will only be allowed where the entering and exiting grades are adequate to provide velocities through the sag area sufficient for moving solids. No more than one (1) sag area shall occur between two (2) manholes. The alignment of each pilot bore must be approved by the Contracting Officer before pipe can be pulled. If the pilot bore fails to conform to the above tolerances, the Contracting Officer may, at his option, require a new pilot boring to be made.
4. After the pipe is in place, cleaning pigs shall be used to remove residual water and debris. After the cleaning operation, the Contractor shall provide and run a sizing pig to check for anomalies in the form of buckles, dents, excessive out-of-roundness, and any other deformations. The sizing pig run shall be considered acceptable if the survey results indicate that there are no sharp anomalies (e.g. dens, buckles, gouges, and internal obstructions) greater than 2 percent of the nominal pipe diameter, or excessive ovality greater than 5 percent of the nominal pipe diameter. For gauging purposes, dent locations are those defined above which occur within a span of five feet or less. Pipe ovality shall be measured as the percent difference between the maximum and minimum pipe diameters. For gauging purposes, ovality locations are those defined above which exceed a span of five feet.

C. Ream and Pullback:

1. Reaming: Reaming operations shall be conducted to enlarge the pilot after acceptance of the pilot bore. The number and size of such reaming operations shall be conducted at the discretion of the Contractor.
2. Pulling Loads: The maximum allowable pull exerted on the HDPE pipelines shall be measured continuously and limited to the maximum allowed by the pipe manufacturer so that the pipe or joints are not over stressed.
3. Torsion and Stresses: A swivel shall be used to connect the pipeline to the drill pipe to prevent torsional stresses from occurring in the pipe.
4. The lead end of the pipe shall be closed during the pullback operation.
5. Pipeline Support: The pipelines shall be adequately supported by rollers and side booms and monitored during installation so as to prevent over stressing or buckling during the pullback operation. Such support/rollers shall be spaced at a maximum of 60 feet on centers, and the rollers to be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback. Surface damage shall be repaired by the Contractor before pulling operations resume.
6. The contractor shall at all times handle the HDPE pipe in a manner that does not over stress the pipe. Vertical and horizontal curves shall be limited so that wall stresses do not exceed 50% of yield stress for flexural bending of the HDPE pipe. If the pipe is buckled or otherwise damaged, the damaged section shall be removed and replaced by the Contractor at his expense. The Contractor shall take appropriate steps during pullback to ensure that the HDPE pipe will be installed without damage.

D. Handling Drilling Fluids and Cuttings:

1. During the drilling, reaming, or pullback operations, the Contractor shall make adequate provisions for handling the drilling fluids, or cuttings at the entry and exit pits. To the greatest extent practical, these fluids must not be discharged into the waterway. When the Contractor's provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site. The Contractor shall conduct his directional drilling operation in such a manner that drilling fluids are not forced through the sub-bottom into the waterway. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions. The Contractor shall comply with all permit provisions.
2. Pits constructed at the entry or exit point area shall be so constructed to completely contain the drill fluid and prevent its escape to the beach or waterway.
3. The Contractor shall utilize drilling tools and procedures which will minimize the discharge of any drill fluids. The Contractor shall comply with all mitigation measures listed in the required permits and elsewhere in these Specifications.
4. To the extent practical, the Contractor shall maintain a closed loop drilling fluid system.
5. The Contractor shall minimize drilling fluid disposal quantities by utilizing a drilling fluid cleaning system which allows the returned fluids to be reused.
6. As part of the installation plan specified herein before, the Contractor shall submit a drilling fluid plan which details types of drilling fluids, cleaning and recycling equipment, estimated flow rates, and procedures for minimizing drilling fluid escape.

3.6 DRILLING OPERATIONS

The Contractor shall prepare a plan to be submitted for Contracting Officer approval which describes the noise reduction program, solids control plan, pilot hole drilling procedure, the reaming operation, and the pullback procedure. All drilling operations shall be performed by supervisors and personnel experienced in horizontal directional drilling. All required support, including drilling tool suppliers, survey systems, mud cleaning, mud disposal, and other required support systems used during this operation shall be provided by the Contractor.

Drill pipe shall be API steel drill pipe, Range 2, Premium Class or higher, Grade S-135 in a diameter sufficient for the torque and longitudinal loads and fluid capacities required for the work. Only drill pipe inspected under API's Recommended Practice Specification API RP 7G within 30 days prior to start and certified as double white band or better shall be used.

A smoothly drilled pilot hole shall follow the design centerline of the pipe profile and alignment described on the construction drawings.

The position of the drill string shall be monitored by the Contractor with the downhole survey instruments. Contractor shall compute the position in the X, Y and Z axis relative to ground surface from downhole survey data a minimum of once per length of each drilling pipe (approximately 31 foot interval). Deviations from the acceptable tolerances described in the Specifications shall be documented and immediately brought to the attention of the Contracting Officer for discussion and/or approval. The profile and alignment defined on the construction drawings for the bores define the minimum depth and radius of curvature. At no point in the drilled profile shall the radius of curvature of the bore be less than 1,600 feet. The Contractor shall maintain and provide to the Contracting Officer, upon request, the data generated by the downhole survey tools in a form suitable for independent calculation of the pilot hole profile.

Between the water's edge and the entry or exit point the Contractor shall provide and use a separate steering system employing a ground survey grid system, such as "TRU-TRACKER" or equal wherever possible. The exit point shall fall within a rectangle 10 feet wide and 40 feet long centered on the planned exit point.

During the entire operation, waste and leftover drilling fluids from the pits and cuttings shall be dewatered and disposed of in accordance with all permits and regulatory agencies requirements. Remaining water shall be cleaned by Contractor to meet permit requirements.

Technical criteria for bentonite shall be as given in API Spec. 13A, Specification for Oil Well Drilling Fluids Material for fresh water drilling fluids. Any modification to the basic drilling fluid involving additives must describe the type of material to be used and be included in Contractor's drilling plan presented to the Contracting Officer. The Owner retains the right to sample and monitor the waste drilling mud, cuttings and water.

B. Environmental Provisions:

The Horizontal Directional Drilling operation is to be operated in a manner to eliminate the discharge of water, drilling mud and cuttings to the adjacent creek or land areas involved during the construction process. The Contractor shall provide equipment and procedures to maximize the recirculation or reuse of drilling mud to minimize waste. All excavated pits used in the drilling operation shall be lined by Contractor with heavy duty plastic sheeting with sealed joints to prevent the migration of drilling fluids and/or ground water.

The Contractor shall visit the site and must be aware of all structures and site limitations at the directional drill crossing and provide the Contracting Officer with a drilling plan outlining procedures to prevent drilling fluid from adversely affecting the surrounding area.

The general work areas on the entry and exit sides of the crossing shall be enclosed by a berm to contain unplanned spills or discharge.

Waste cuttings and drilling mud shall be processed through a solids control plant comprised as a minimum of sumps, pumps, tanks, desalter/desandcr, centrifuges, material handlers, and haulers all in a quantity sufficient to perform the cleaning/separating operation without interference with the drilling program. The dewatered and dried by the Contractor to the extent necessary for disposal in offsite landfills. Water from the dewatering process shall be treated by the Contractor to meet permit requirements and disposed of locally. The cuttings and water for disposal are subject to being sampled and tested. The construction site and adjacent areas will be checked frequently for signs of unplanned leaks or seeps.

Equipment (graders, shovels, etc.) and materials (such as groundsheets, hay bales, booms, and absorbent pads) for cleanup and contingencies shall be provided in sufficient quantities by the Contractor and maintained at all sites for use in the event of inadvertent leaks, seeps or spills.

Waste drilling mud and cuttings shall be dewatered, dried, and stock piled such that it can be loaded by a front end loader, transferred to a truck and hauled offsite to a suitable legal disposal site. The maximum allowed water content of these solids is 50% of weight.

Due to a limited storage space at the worksites, dewatering and disposal work shall be concurrent with drilling operations. Treatment of water shall satisfy regulatory agencies before it is discharged.

END OF SECTION

THIS PAGE WAS INTENTIONALLY LEFT BLANK

SECTION 03002 CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Cast-in-place concrete and grout.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. 212.3R, Chemical Admixtures for Concrete.
 - d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - e. 304.2R, Placing Concrete by Pumping Methods.
 - f. 305R, Hot Weather Concreting.
 - g. 306R, Cold Weather Concreting.
 - h. 318, Building Code Requirements for Structural Concrete.
 - i. 347R, Recommended Practice for Concrete Formwork
 - j. ACI 301 "Specifications for Structural Concrete for Buildings.
 2. ASTM International (ASTM):
 - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - d. A775, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - f. C33, Standard Specification for Concrete Aggregates.
 - g. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - h. C94, Standard Specification for Ready-Mixed Concrete.
 - i. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - j. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
 - k. C150, Standard Specification for Portland Cement.
 - l. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete.
 - m. C172, Standard Practice for Sampling Freshly Mixed Concrete.
 - n. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - o. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - p. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - q. C289, Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
 - r. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - s. C494, Standard Specification for Chemical Admixtures for Concrete.

- t. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
 - u. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - v. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - w. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - x. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - y. E329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
3. Corps of Engineers (COE):
- a. none
 - b. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
- B. Quality Control:
- 1. Concrete testing agency:
 - a. Contractor to employ and pay for services of a testing laboratory to:
 - 1) Perform materials evaluation.
 - 2) Design concrete mixes.
 - b. Concrete testing agency to meet requirements of ASTM E329.
 - 2. Do not begin concrete production until proposed concrete mix design has been approved by Contracting Officer.
 - a. Approval of concrete mix design by Contracting Officer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
 - 3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
 - a. Do not use revised concrete mixes until submitted to and approved by Contracting Officer.
 - 4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
- C. Qualifications:
- 1. Ready mixed concrete batch plant certified by National Ready Mixed Concrete Association (NRMCA).
 - 2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in the state where the project is located.

1.3 DEFINITIONS

- A. Per ACI 116R except as modified herein:
- 1. none
 - 2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
 - 3. Exposed concrete: Exposed to view after construction is complete.
 - 4. Indicated: Indicated by Contract Documents.
 - 5. none
 - 6. Nonexposed concrete: Not exposed to view after construction is complete.
 - 7. Required: Required by Contract Documents.
 - 8. Specified strength: Specified compressive strength at 28 days.
 - 9. Submitted: Submitted to Contracting officer.

1.4 SUBMITTALS

- A. Shop Drawings:

1. See FP-03, Subsection 104.03.
2. Concrete mix designs proposed for use.
 - a. Concrete mix design submittal to include the following information:
 - 1) Sieve analysis and source of fine and coarse aggregates.
 - 2) Test for aggregate organic impurities.
 - 3) Test for deleterious aggregate per ASTM C289.
 - 4) Proportioning of all materials.
 - 5) Type of cement with mill certificate for cement.
 - 6) Type of fly ash with certificate of conformance to specification requirements.
 - 7) Slump.
 - 8) Air content.
 - 9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
 - 10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
 - 11) Shrinkage test results.
 - 12) Standard deviation value for concrete production facility.
3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Chemical sealer.
 - 4) Bonding and patching mortar.
 - 5) Construction joint bonding adhesive.
 - 6) Non-shrink grout with cure/seal compound.
 - 7) none
4. Reinforcing steel:
 - a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
 - b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
 - c. Obtain approval of Shop Drawings by Contracting Officer before fabrication.
 - d. Mill certificates.
5. Strength test results of in place concrete including slump, air content and concrete temperature.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage of Material:
 1. Cement and fly ash:
 - a. Store in moistureproof, weathertight enclosures.
 - b. Do not use if caked or lumpy.
 2. Aggregate:
 - a. Store to prevent segregation and contamination with other sizes or foreign materials.
 - b. Obtain samples for testing from aggregates at point of batching.
 - c. Do not use frozen or partially frozen aggregates.
 - d. Do not use bottom 6 IN of stockpiles in contact with ground.
 - e. Allow sand to drain until moisture content is uniform prior to use.
 3. Admixtures:
 - a. Protect from contamination, evaporation, freezing, or damage.
 - b. Maintain within temperature range recommended by manufacturer.
 - c. Completely mix solutions and suspensions prior to use.
 4. Reinforcing steel: Support and store all rebars above ground.
- B. Delivery:
 1. Concrete:
 - a. Prepare a delivery ticket for each load for ready-mixed concrete.

- b. Truck operator shall hand ticket to Contracting Officer at the time of delivery.
- c. Ticket to show:
 - 1) Mix identification mark.
 - 2) Quantity delivered.
 - 3) Amount of each material in batch.
 - 4) Outdoor temp in the shade.
 - 5) Time at which cement was added.
 - 6) Numerical sequence of the delivery.
 - 7) Amount of water added.
- 2. Reinforcing steel:
 - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
 - b. Mark numbers to match Shop Drawing mark number.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
 - 1. Nonshrink, nonmetallic grout:
 - a. Sika "SikaGrout 212."
 - b. Euclid Chemical "NS Grout."
 - c. BASF Admixtures, Inc. "Masterflow 713."
 - 2. Epoxy grout:
 - a. BASF Admixtures, Inc. "Brutem MPG."
 - b. Euclid Chemical Company, "E3-G."
 - c. Fosroc, "Conbextra EPHF".
 - 3. Expansion joint fillers:
 - a. Permaglaze Co.
 - b. Rubatex Corp.
 - c. Williams Products, Inc.
 - 4. Waterstops, PVC:
 - a. none
 - b. none
 - c. none
 - d. none.
 - 5. Form coating:
 - a. Richmond "Rich Cote."
 - b. Industrial Lubricants "Nox-Crete Form Coating."
 - c. Euclid Chemical "Eucoslip VOX."
 - 6. Prefabricated forms:
 - a. Simplex "Industrial Steel Frame Forms."
 - b. Symons "Steel Ply."
 - c. Universal "Uniform."
 - 7. Chemical sealer:
 - a. L & M Construction Chemicals, Inc.
 - b. Euclid Chemical Company.
 - c. Dayton Superior.
 - 8. Bonding agent:
 - a. Euclid Chemical Co.
 - b. BASF Admixtures, Inc.
 - c. L & M Construction Chemicals Inc.
 - 9. High-Range Water Reducer (Super Plasticizer)
 - a. Base:
 - 1) Grace Construction Products.

- b. Optional:
 - 1) Master Builders.
 - 2) Euclid Chemical.
 - 3) Procrete Industries.

2.2 MATERIALS

- A. Portland Cement: Conform to ASTM C150 {Type I} {Type II}.
- B. Fly Ash:
 - 1. ASTM C618, Class F or Class C.
 - 2. Nonstaining.
 - a. Hardened concrete containing fly ash to be uniform light gray color.
 - 3. Maximum loss on ignition: 4 percent.
 - 4. Compatible with other concrete ingredients.
 - 5. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.
- C. Admixtures:
 - 1. General:
 - a. Use only when specifically required or permitted by Contract Documents, otherwise must be approved by Contracting Officer.
 - 2. Air entraining admixtures: ASTM C260.
 - 3. Water reducing, retarding, and accelerating admixtures:
 - a. ASTM C494 Type A through E.
 - b. Conform to provisions of ACI 212.3R.
 - c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Contracting Officer and at no cost to Owner.
 - d. Follow manufacturer's instructions.
 - e. Use chloride free admixtures only.
 - 4. Water soluble chloride ion content contributed from any ingredients is not permitted.
 - 5. Do not use calcium chloride.
 - 6. Pozzolanic admixtures: ASTM C618.
 - 7. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
 - 8. High Range Water Reducer (Super Plasticizer)
 - a. ASTM – C494, Type F or G
 - b. Base Products. “Daracem- 100” by Grace Construction Products; “Rheobuild” by Master Builders; “Eucon 37” or “Eucon 537” by Euclid Chemical; “PSP-N”, “PSP-N2”, “PSP-R” and “PSP-L “ by Procrete Industries.
- D. Water: Potable, clean, free of oils, acids and organic matter.
- E. Aggregates:
 - 1. Normal weight concrete: ASTM C33, except as modified below.
 - 2. Fine aggregate:
 - a. Clean natural sand.
 - b. No manufactured or artificial sand.
 - 3. Coarse aggregate:
 - a. Crushed rock, natural gravel, or other inert granular material.
 - b. Maximum amount of clay or shale particles: 1 percent.
 - 4. Gradation of coarse aggregate:
 - a. “pea gravel concrete” Size #7, #8
 - b. All other concrete: Size #57 or #67.
- F. Concrete Grout:
 - 1. Nonshrink nonmetallic grout:
 - a. Nonmetallic, noncorrosive, nonstaining, premixed with only water to be added.

- b. Grout to produce a positive but controlled expansion.
 - c. Mass expansion not to be created by gas liberation.
 - d. Minimum compressive strength of nonshrink grout at 28 days: 6500 psi.
 - e. In accordance with COE CRD-C621.
2. Epoxy grout:
- a. 3-component epoxy resin system.
 - 1) Two liquid epoxy components.
 - 2) One inert aggregate filler component.
 - b. Each component packaged separately for mixing at jobsite.
- G. Reinforcing Steel:
- 1. Reinforcing bars: ASTM A615, Grade 60.
 - 2. Welded wire fabric: ASTM A185.
 - a. Minimum yield strength: 60,000 psi.
- H. Forms:
- 1. Prefabricated or job built.
 - 2. Wood forms:
 - a. New 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.
 - b. Built-in-place or prefabricated type panel.
 - c. 4 x 8 FT sheets for built-in-place type except where smaller pieces will cover entire area.
 - d. When approved, plywood may be reused.
 - 3. Metal forms:
 - a. Metal forms excluding aluminum may be used.
 - b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.
 - 4. Chamfer strips: Clear white pine, surface against concrete planed.
 - 5. Form ties:
 - a. Removable end, permanently embedded body type with cones on outer ends not requiring auxiliary spreaders.
 - b. Cone diameter: 3/4 IN minimum to 1 IN maximum.
 - c. Embedded portion 1-1/2 IN minimum back from concrete face.
 - d. If not provided with threaded ends, constructed for breaking off ends without damage to concrete.
 - e. Provide ties with built-in waterstops at all walls that will be in contact with process liquid during plant operation.
 - 6. Form release: Nonstaining and shall not prevent bonding of future finishes to concrete surface.
- I. Waterstops:
- 1. none
 - 2. none
 - 3. none
 - 4. noneted otherwise.
 - 5. Expansion joints:
 - a. Length: 9 IN.
 - b. Center bulb: 1 IN OD x 1/2 IN ID.
 - 6. Provide hog rings or grommets spaced at maximum 12 IN OC along the length of the water stop.
 - 7. Provide factory made waterstop fabrications at all changes of direction, intersections and transitions leaving only straight butt splices for the field.
- J. Chairs, Runners, Bolsters, Spacers, and Hangers:
- 1. Stainless steel, epoxy coated, or plastic coated metal.
 - a. Plastic coated: Rebar support tips in contact with the forms only.
- K. Chemical Floor Sealer:
- 1. Colorless low VOC water-based solution containing acrylic copolymers.

- a. ASTM C1315, Class B, minimum 30 percent solids.
 2. Similar to L & M Construction Chemicals Inc. Dress & Seal WB 30.
- L. Vapor Retarder:
1. Vapor transmission not exceeding 0.1 perm.
 2. Tear strength 15 psi.
 3. Similar to: Alumiseal "Zero Perm".
- M. Membrane Curing Compound:
1. ASTM C309, Type I-D.
 2. Resin based, dissipates upon exposure to UV light.
 3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.
 4. Curing compounds used in water treatment plant construction to be nontoxic and taste and odor free.
- N. Bonding Agent:
1. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
 2. Euclid Chemical Co. "Flex-Con."
 3. BASF Admixtures, Inc. "Acryl-Set."
 4. L & M Construction Chemicals "Everbond."
 5. Thoro System Products "Acryl 60."
- O. Expansion Joint Filler:
1. In contact with water or sewage:
 - a. Closed cell neoprene.
 - b. ASTM D1056, Class SC (oil resistant and medium swell) of 2 to 5 psi compression deflection (Grade SCE41).
 2. Exterior driveways, curbs and sidewalks:
 - a. Asphalt expansion joint filler.
 - b. ASTM D994.
 3. Other use:
 - a. Fiber expansion joint filler.
 - b. ASTM D1751.

2.3 CONCRETE MIXES

- A. General:
1. All concrete to be ready mixed concrete conforming to ASTM C94.
 2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
 3. All concrete to be normal weight concrete.
- B. Strength:
1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH*
I.C.F. Concrete fill	Normal weight	4000 psi
Foundations & Slab on Grades	Normal weight	4000 psi
Exterior paving & all other general use concrete	Normal weight	3000 psi

* Minimum 28-day compressive strength.

- C. Air Entrainment:
1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

MAX AGGREGATE SIZE	TOTAL AIR CONTENT PERCENT
1 IN or 3/4 IN	3 to 5
3/8"	3 to 5

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
3. Pumped concrete:
 - a. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified above.
4. Slumps to conform to the following:
 - a. Without Super Plastizer 4" to 5 1/2"
 - b. With Super Plastizer - I.C.F. wall fill 7" to 8"
 - c. With Super Plastizer - Foundations & slab on grades 6" to 8"
5. Determine slump per ASTM C143.

E. Selection of Proportions:

1. General:
 - a. Proportion ingredients to:
 - 1) Produce proper workability, durability, strength, and other required properties.
 - 2) Prevent segregation and collection of excessive free water on surface.
2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

SPECIFIED STRENGTH	MINIMUM CEMENT, LB/CY			MAXIMUM WATER CEMENT RATIO BY WEIGHT
	MAXIMUM AGGREGATE SIZE			
	3/8 IN	3/4 IN	1 IN	
4000	---	517	517	0.45
4000	611	611	611	0.45
3000	---	686	665	0.40

3. Substitution of fly ash: Maximum of 20 percent by weight of cement at rate of 1 LB fly ash for 1 LB of cement.
4. Sand cement grout:
 - a. Three parts sand.
 - b. One part Portland cement.
 - c. Entrained air: Six percent plus or minus one percent.
 - d. Sufficient water for required workability.
 - e. Minimum 28-day compressive strength: 3,000 psi.
5. Normal weight concrete:
 - a. Proportion mixture to provide desired characteristics using one of methods described below:
 - 1) Method 1 (Trial Mix): Per ACI 318, Chapter 5, except as modified herein.
 - a) Air content within range specified above.
 - b) Record and report temperature of trial mixes.
 - c) Proportion trial mixes per ACI 211.1.
 - 2) Method 2 (Field Experience): Per ACI 318, Chapter 5, except as modified herein:
 - a) Field test records must be acceptable to Engineer to use this method.
 - b) Test records shall represent materials, proportions and conditions similar to those specified.
6. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Paragraph 5.3 of ACI 318 using the standard deviation of the proposed concrete production facility as described in Paragraph 5.3.1 of ACI 318.

F. Allowable Shrinkage: 0.048 percent per ASTM C157.

PART 3 - EXECUTION

3.1 FORMING AND PLACING CONCRETE

A. Formwork:

1. Contractor is responsible for design and erection of formwork.
2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
 - a. Allowable tolerances: As recommended in ACI 347R.
3. Provide slabs and beams of minimum indicated depth when sloping foundation base slabs or elevated floor slabs to drains.
 - a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.
 - b. Do not place floor drains through beams.
4. Openings: Provide openings in formwork to accommodate work of other trades.
 - a. Accurately place and securely support items built into forms.
5. Chamfer strips: Place 3/4 IN chamfer strips in forms to produce 3/4 IN wide beveled edges on permanently exposed corners of members.
6. Clean and adjust forms prior to concrete placement.
7. Tighten forms to prevent mortar leakage.
8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.

B. Reinforcement:

1. Position, support and secure reinforcement against displacement.
2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.
3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
5. Extend reinforcement to within 2 IN of concrete perimeter edges.
 - a. If perimeter edge is earth formed, extend reinforcement to within 3 IN of the edge.
6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
7. Do not weld reinforcing bars.
8. Welded wire fabric:
 - a. Install welded wire fabric in maximum practical sizes.
 - b. Splice sides and ends with a splice lap length measured between outermost cross wires of each fabric sheet not less than:
 - 1) One spacing of cross wires plus 2 IN.
 - 2) 1.5 x development length.
 - 3) 6 IN.
 - c. Development length: ACI 318 basic development length for the specified fabric yield strength.

C. Construction, Expansion, and Contraction Joints:

1. Provide at locations indicated on contract drawings.
2. Locate construction joints in floor slabs as indicated on contract drawings.
3. Locate construction joints in columns and walls as indicated on contract drawings.
4. Install construction joints perpendicular to main reinforcement with all reinforcement continued across construction joints.
5. At least 48 HRS shall elapse between placing of adjoining concrete construction.
6. Thoroughly clean and remove all laitance and loose and foreign particles from construction joints.
7. Before new concrete is placed, coat all construction joints with an approved bonding adhesive used and applied in accordance with manufacturer's instructions.

D. Embedments:

1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.
 2. Use setting diagrams, templates and instructions for locating and setting.
 3. Secure waterstops in correct position using hog rings or grommets spaced along the length of the waterstop and wire tie to adjacent reinforcing steel.
- E. Placing Concrete:
1. Place concrete in compliance with ACI 304R and ACI 304.2R.
 2. Place in a continuous operation within planned joints or sections.
 3. Begin placement when work of other trades affecting concrete is completed.
 4. Place concrete by methods which prevent aggregate segregation.
 5. Do not allow concrete to free fall more than 5.5 FT.
 6. Where free fall of concrete will exceed 5.5 FT, place concrete by means of tremie pipe or chute.
- F. Consolidation: Consolidate all concrete using mechanical vibrators.
- G. Protection:
1. Protect concrete from physical damage or reduced strength due to weather extremes.
 2. In cold weather comply with ACI 306R except as modified herein.
 - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
 - b. Minimum concrete temperature at the time of mixing:

OUTDOOR TEMPERATURE AT PLACEMENT (IN SHADE)	CONCRETE TEMPERATURE AT MIXING
Below 30 DegF	70 DegF
Between 30-45 DegF	60 DegF
Above 45 DegF	50 DegF

- c. Do not place heated concrete that is warmer than 80 DegF.
 - d. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 DegF for 7 days or 70 DegF for 3 days.
 - e. Do not allow concrete to cool suddenly.
 3. In hot weather comply with ACI 305R except as modified herein.
 - a. At air temperature of 90 DegF and above, keep concrete as cool as possible during placement and curing.
 - b. Do not allow concrete temperature to exceed 90 DegF at placement.
 - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
 - d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 LBS/SF/HR as determined from ACI 305R, Figure 2.1.5.
- H. Curing for Horizontal Slab surfaces:
1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
 2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound. In areas that receive stained concrete, do not use curing compound, or if curing compound is used it must be compatible with staining & sealing process.
 3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period for non stained surfaces, provide same protection continuously for areas to receive stain until staining process has begun.
 4. Provide curing for minimum of 7 days.
 5. In hot weather follow curing procedures outlined in ACI 305R.
 6. In cold weather follow curing procedures outlined in ACI 306R.
 7. If forms are removed before 7 days have elapsed, finish curing of formed surfaces by one of above methods for the remainder of the curing period.
- I. Form Removal:

1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.

3.2 CONCRETE FINISHES

A. Tolerances:

1. Class A: 1/8 IN in 10 FT.
2. Class B: 1/4 IN in 10 FT.

B. Surfaces Exposed to View:

1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:
 - a. To be covered with a coating or covering material applied directly to concrete.
 - b. Scheduled for grout cleaned finish.
2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.
3. Fill tie holes with nonshrink nonmetallic grout.

C. Surfaces Not Exposed to View:

1. Patch voids, air pockets and honeycomb areas with cement grout.
2. Fill tie holes with nonshrink nonmetallic 5000 psi min. grout.

D. Grout Cleaned Finish:

1. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient bonding agent/water mixture to produce a grout with the consistency of thick paint.
 - a. White Portland cement shall be substituted for gray Portland cement to produce a color that matches color of surrounding concrete as determined by trial patch for areas not to be painted.
2. Wet surface of concrete to prevent absorption of water by grout and uniformly apply grout with brushes or spray gun.
3. Immediately scrub the surface with a cork float or stone to coat and fill air bubbles and holes.
4. While grout is still plastic, remove all excess grout by working surface with rubber float, sack or other approved means.
5. After the surface whitens from drying, rub vigorously with clean burlap.
6. Keep final finish damp for a minimum of 36 HRS after final rubbing.

E. Slab Float Finish:

1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
2. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.
3. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two different angles.
4. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
5. Refloat slab immediately to a uniform sandy texture.

F. Troweled Finish:

1. Float finish surface.
2. Next power trowel, and finally hand trowel.
3. Produce a smooth surface which is relatively free of defects with first hand troweling.
4. Perform additional trowelings by hand after surface has hardened sufficiently.
5. Final trowel when a ringing sound is produced as trowel is moved over surface.
6. Thoroughly consolidate surface by hand troweling.
7. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
8. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.

- #### G. Broom Finish:
- Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

- H. Apply chemical floor hardener to permanently exposed interior concrete floor slab surfaces where indicated.
1. Apply in accordance with manufacturer's instructions.

3.3 GROUT

- A. Preparation:
1. Nonshrinking nonmetallic grout:
 - a. Clean concrete surface to receive grout.
 - b. Saturate concrete with water for 24 HRS prior to grouting.
 2. Rock anchors:
 - a. Clean rock anchors of all loose material.
 - b. Orient hook or bends in anchor bars to clear anchor bolts, reinforcements, and other embedments to be installed later.
 3. Epoxy grout: Apply only to clean, dry, {roughened,} sound surface.
- B. Application:
1. Nonshrinking nonmetallic grout:
 - a. Mix in a mechanical mixer.
 - b. Use no more water than necessary to produce flowable grout.
 - c. Place in accordance with manufacturer's instructions.
 - d. Completely fill all spaces and cavities below the bottom of baseplates.
 - e. Provide forms where baseplates and bedplates do not confine grout.
 - f. Where exposed to view, finish grout edges smooth.
 - g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.
 - h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.
 - i. Wet cure grout for 7 days, minimum.
 2. Rock anchors:
 - a. See Item 1 above.
 - b. If rodded:
 - 1) Fill each hole so that it overflows when anchor bar is inserted.
 - 2) Force anchor bars into place.
 - c. If pressure placed, set anchor bar before grouting.
 - d. Take special care to avoid any movement of anchors that have been placed.
 3. Epoxy grout:
 - a. Mix and place in accordance with manufacturer's instructions.
 - b. Completely fill all cavities and spaces around dowels and anchors without voids.
 - c. Obtain manufacturer's field technical assistance as required to ensure proper placement.

3.4 FIELD QUALITY CONTROL

- A. Contractor will employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
1. Contractor to cooperate with Owner in obtaining and testing samples.
- B. Tests During Construction:
1. Strength test - procedure:
 - a. Four cylinders, 6 IN DIA x 12 IN high, will be taken from each sample per ASTM C172 and ASTM C31.
 - b. Cylinders will be tested per ASTM C39:
 - 1) One at 7 days.
 - 2) Two at 28 days.
 - 3) One extra if needed.
 - c. Not less than one test each day concrete placed.
 - d. Not less than one test for each 50 CY or major fraction thereof placed in one day.
 - e. Not less than one test for each type of concrete poured.
 - f. Not less than one test for each concrete structure exceeding 2 CY volume.
 2. Slump test:

- a. Per ASTM C143.
- b. Determined for each strength test sample.
- c. Additional slump tests may be taken.
- 3. Air content:
 - a. Per ASTM C231, ASTM C173, and ASTM C138.
 - b. Determined for each strength test sample.
- 4. Temperature: Determined for each strength test sample.
- C. Evaluation of Tests:
 - 1. Strength test results:
 - a. Average of 28-day strength of two cylinders from each sample.
 - 1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testings, strength of remaining cylinder will be test result.
 - 2) If both cylinders show any of above defects, test will be discarded.
- D. Acceptance of Concrete:
 - 1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
 - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.
 - b. No individual strength test falls below the required specified 28-day compressive strength by more than 250 psi.
 - 2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Contracting Officer.
 - a. Perform additional tests and/or corrective measures at no additional cost to Owner.

3.5 SCHEDULES

- A. Form Types:
 - 1. Surfaces exposed to view:
 - a. Prefabricated or job-built wood forms.
 - b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.
 - c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.
 - d. Construct forms sufficiently tight to prevent leakage of mortar.
 - 2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.
 - 3. Other types of forms may be used:
 - a. For surfaces not restricted to plywood or lined forms.
 - b. As backing for form lining.
- B. Grout:
 - 1. Nonshrinking nonmetallic grout: General use.
 - 2. Epoxy grout:
 - a. Grouting of dowels and anchor bolts into existing concrete.
 - b. Other uses indicated on Drawings.
 - 3. none
- C. Concrete:
 - 1. none
 - 2. none.
 - 3. Concrete fill: Where indicated on Drawings.
 - 4. none
 - 5. Normal weight concrete: {All other locations} {All concrete}.
 - 6. none.
 - 7. General use concrete: All other locations.
- D. Concrete Finishes:
 - 1. Grout cleaned finish: Where indicated on Drawings.

2. Slab finishes:
 - a. Use following finishes as applicable, unless otherwise indicated:
 - 1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.
 - 2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.
 - 3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.

END OF SECTION

SECTION 03108**FORMWORK****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Formwork requirements for concrete construction.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 03002 - Concrete Mixing, Placing, Jointing, and Curing.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 116R, Cement and Concrete Terminology.
 - b. 347R, Guide to Formwork for Concrete.
 - 2. Building code:
 - a. Florida Building Code
- B. Miscellaneous:
 - 1. Design and engineering of formwork, shoring and reshoring as well as its construction is the responsibility of the Contractor.
 - 2. Design requirements:
 - a. Design formwork for loads, lateral pressures and allowable stresses outlined in ACI 347R and for design considerations, wind loads, allowable stresses and other applicable requirements of the controlling local Building Code.
 - 1) Where conflicts occur between the above two (2) standards, the more stringent requirements shall govern.
 - b. Design formwork to limit maximum deflection of form facing materials reflected in concrete surfaces exposed to view to 1/240 of span between structural members.
 - 3. For slabs and beams not cast on the ground, develop a procedure and schedule for removal of shores {and installation of reshores} and for calculating the loads transferred to the structure during this process.
 - a. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
 - b. When developing procedure, schedule and structural calculations, consider the following at each stage of construction:
 - 1) The structural system that exists.
 - 2) Effects of all loads during construction.
 - 3) Strength of concrete.
 - 4) The influence of deformations of the structure and shoring system on the distribution of dead loads and construction loads.
 - 5) The strength and spacing of shores or shoring systems used, as well as the method of shoring, bracing, shore removal, and reshoring including the minimum time intervals between the various operations.
 - 6) Any other loading or condition that affects the safety or serviceability of the structure during construction.

1.3 DEFINITIONS

- A. Words and terms used in these Specifications are defined in ACI 116R.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer and type of proposed form materials.
 - d. Manufacturer and type of proposed form ties.
 - e. Manufacturer and type of proposed form coating material.
 - f. Manufacturer and type of void forms including compressive strength.
- B. Samples:
 - 1. A 12 IN SQ sample of each of the following form finishes:

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Void forms:
 - a. SureVoid Products, Inc.
 - b. Deslauriers, Inc.
 - 2. Stay-in-place forms:
 - a. Alabama Metal Industries Corporation.

2.2 MATERIALS

- A. Forms for Surfaces Exposed to View:
 - 1. Wood forms:
 - a. New 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.
 - b. Built-in-place or prefabricated type panel.
 - c. 4 x 8 FT sheets for built-in-place type except where smaller pieces will cover entire area.
 - d. When approved, plywood may be reused.
 - 2. Metal forms:
 - a. Metal forms excluding aluminum may be used.
 - b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.
- B. Forms for Surfaces Not Exposed to View:
 - 1. Wood or metal sufficiently tight to prevent leakage.
 - 2. Do not use aluminum forms.

2.3 ACCESSORIES

- A. Form Ties:
 - 1. Commercially fabricated for use in form construction.
 - a. Do not use wire ties.
 - 2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.
 - 3. 3/4 IN minimum to 1 IN maximum diameter cones on both ends.
 - 4. Embedded portion of ties to be not less than 1-1/2 IN from face of concrete after ends have been removed.
 - 5. Provide ties with built-in waterstops in all walls that will be in contact with process liquid during plant operation.

6. Through-wall ties that are designed to be entirely removed are not allowed in all walls that will be in contact with process liquid during plant operation.
- B. Void Forms:
1. Continuous void forms.
 2. Specially designed and manufactured for the purpose of creating a void area directly under concrete members which will allow a space for soil vertical upward movement.
 3. Able to support the weight of concrete and construction loads to be placed thereon with no decrease in required void form depth.
 4. Constructed from double faced corrugated cardboard or fiberboard which is wax impregnated and laminated with moisture-resistant adhesive.
 5. Capable of resisting moisture with no loss of load carrying strength or change in depth or configuration.
- C. Stay-In-Place Forms:
1. Ribbed expanded metal leave-in-place concrete forms commercially fabricated to provide an intentionally rougher surface.
 2. Hot-dipped galvanized.
 3. Similar to "Stay-Form" by Alabama Metal Industries Corporation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Form Surface Treatment:
1. Before placing of either reinforcing steel or concrete, cover surfaces of forms with an approved coating material that will effectively prevent absorption of moisture and prevent bond with concrete, will not stain concrete or prevent bonding of future finishes.
 - a. A field applied form release agent or sealer of approved type or a factory applied nonabsorptive liner may be used.
 2. Do not allow excess form coating material to stand in puddles in forms nor in contact with hardened concrete against which fresh concrete is to be placed.
- B. Provide temporary openings at base of column and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed, and to limit height of free fall of concrete to prevent aggregate segregation.
1. Temporary openings to limit height of free fall of concrete shall be spaced no more than 8 FT apart.
- C. Clean surfaces of forms, reinforcing steel and other embedded materials of any accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed.

3.2 ERECTION

- A. Install products in accordance with manufacturer's instructions.
- B. Tolerances:
1. Variation from plumb:
 - a. In lines and surfaces of columns, piers, walls, and in risers.
 - 1) Maximum in any 10 FT of height: 1/4 IN.
 - 2) Maximum for entire height: 1/2 IN.
 - b. For exposed corner columns, control-joint grooves, and other exposed to view lines:
 - 1) Maximum in any 20 FT length: 1/4 IN.
 - 2) Maximum for entire length: 1/2 IN.
 2. Variation from level or from grades specified:
 - a. In slab soffits, ceilings, beam soffits and in arises, measured before removal of supporting shores.
 - 1) Maximum in any 10 FT of length: 1/4 IN.

- 2) Maximum in any bay or in any 20 FT length: 3/8 IN.
 - 3) Maximum for entire length: 3/4 IN.
 - b. In exposed lintels, sills, parapets, horizontal grooves, and other exposed to view lines:
 - 1) Maximum in any bay or in 20 FT length: 1/4 IN.
 - 2) Maximum for entire length: 1/2 IN.
 3. Variation of linear structure lines from established position in plan and related position of columns, walls, and partitions:
 - a. Maximum in any bay: 1/2 IN.
 - b. Maximum in any 20 FT of length: 1/2 IN.
 - c. Maximum for entire length: 1 IN.
 4. Variation in sizes and location of sleeves, floor openings, and wall openings: Maximum of +1/2 IN.
 5. Variation in horizontal plan location of beam, column and wall centerlines from required location: Maximum of +1/2 IN.
 6. Variation in cross sectional dimensions of columns and beams and in thickness of slabs and walls: Maximum of -1/4 IN, +1/2 IN.
 7. Footings and foundations:
 - a. Variations in concrete dimensions in plan: -1/2 IN, +2 IN.
 - b. Misplacement or eccentricity:
 - 1) 2 percent of footing width in direction of misplacement but not more than 2 IN.
 - c. Thickness:
 - 1) Decrease in specified thickness: 5 percent.
 - 2) Increase in specified thickness: No limit except that which may interfere with other construction.
 8. Variation in steps:
 - a. In a flight of stairs:
 - 1) Rise: +1/8 IN.
 - 2) Tread: +1/4 IN.
 - b. In consecutive steps:
 - 1) Rise: +1/16 IN.
 - 2) Tread: +1/8 IN.
 9. Establish and maintain in an undisturbed condition and until final completion and acceptance of Project, sufficient control points and bench marks to be used for reference purposes to check tolerances.
 10. Regardless of tolerances listed allow no portion of structure to extend beyond legal boundary of Project.
 11. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete.
- C. Make forms sufficiently tight to prevent loss of mortar from concrete.
- D. Place 3/4 IN chamfer strips in exposed to view corners of forms to produce 3/4 IN wide beveled edges.
- E. At construction joints, overlap contact surface of form sheathing for flush surfaces exposed to view over hardened concrete in previous placement by at least 1 IN.
1. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain a true surface.
 2. Where possible, locate juncture of built-in-place wood or metal forms at architectural lines, control joints or at construction joints.
- F. Where circular walls are to be formed and forms made up of straight sections are proposed for use, provide straight lengths not exceeding 2 FT wide.
1. Brace and tie formwork to maintain correct position and shape of members.
- G. Construct wood forms for wall openings to facilitate loosening, if necessary, to counteract swelling.

- H. Anchor formwork to shores or other supporting surfaces or members so that movement of any part of formwork system is prevented during concrete placement.
- I. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing steel.
- J. Provide positive means of adjustment (wedges or jacks) of shores and struts and take up all settlement during concrete placing operation.
 - 1. Securely brace forms against lateral deflection.
 - 2. Fasten wedges used for final adjustment of forms prior to concrete placement in position after final check.
- K. After void forms are in place and before concrete is placed thereon, cover joints between abutting form sections and cover ends of forms to prevent intrusion of soil, concrete or any other materials.
 - 1. Install void forms in accordance with manufacturer's instructions.
- L. Stay-In-Place Forms:
 - 1. Support stay-in-place forms as required to maintain the formwork in proper position.
 - 2. Hold the edge of stay-in-place forms back a minimum of 2 IN from all smooth formed concrete surfaces.
 - 3. Stay-in-place forms may be used at the Contractor's option at:
 - a. Surfaces that will be backfilled with soil.
 - 1) Maintain a minimum of 3 IN of concrete cover over all reinforcing.
 - b. Roughened construction joints.
 - c. Other locations approved by Contracting Officer.

3.3 REMOVAL OF FORMS

- A. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its weight and loads placed thereon.
- B. When required for concrete curing in hot weather, required for repair of surface defects or when finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations or lack of support.
- C. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging.
 - 1. Perform any needed repairs or treatment required on such sloping surfaces at once, followed by curing specified in Section 03002.
- D. Loosen wood forms for wall openings as soon as this can be accomplished without damage to concrete.
- E. Formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal.
- F. Where no reshoring is planned, leave forms and shoring used to support weight of concrete in place until concrete has attained its specified 28 day compressive strength.
 - 1. Where a reshoring procedure is planned, supporting formwork may be removed when concrete has reached the concrete strength required by the formwork designer's structural calculations.
- G. When shores and other vertical supports are so arranged that non-load-carrying form facing material may be removed without loosening or disturbing shores and supports, facing material may be removed when concrete has sufficiently hardened to resist damage from removal.

3.4 RESHORING - NONE

END OF SECTION

SECTION 03133**PERMANENT INSULATED CONCRETE FORMING SYSTEM****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.

ACI INTERNATIONAL (ACI)

ACI 347R (1994) Guide to Formwork for Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 236 (1989) Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box

ASTM C 578 (2000) Rigid, Cellular Polystyrene Thermal Insulation

ASTM E 84 (2000) Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E 90 (1999) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

1.2 SUBMITTALS

The following shall be submitted in accordance with Section FP – 03, Subsection 104.03:

SD-02 Shop Drawings

Formwork:

Drawings showing details of formwork, including dimensions of insulating form panels, joints, supports, studding and shoring, and sequence of shoring removal.

SD-03 Product Data

Design:

Design analysis and calculations for form design and methodology used in the design.

Form Materials:

Manufacturer's data including literature describing form materials and accessories.

Reports:
ICBO or comparable code approval report.

SD-04 Samples

Permanent Insulating Forms:
One sample standard block unit of insulating formwork prior to installation of the forms.

SD-07 Certificates

Permanent Insulating Forms:
Certificates attesting that permanent insulated concrete forming system conforms to the specified requirements.

1.3 DESIGN REQUIREMENTS

Formwork shall be designed in accordance with methodology of ACI 347R for anticipated loads, lateral pressures, and stresses. Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

1.4 PERFORMANCE REQUIREMENTS

a. Insulating Properties of System

Forms filled with concrete shall provide minimum insulation value of R-28 in accordance with ASTM C 236.

b. Fire Resistance Rating of System

Forms filled 6" to 6 5/8" thickness of concrete shall have a minimum fire rating of 3 hours for the assembly.

c. Acoustical Properties of System

Acoustical performance of insulated concrete wall assembly shall have been tested in accordance with ASTM E 90 test procedure and shall have attained an STC rating of no less than 55.

d. Pull Out and Shear Load Properties of System

Pull Out or Withdrawal Resistance of Type "S" fine thread drywall screw shall have been tested in accordance with ICBO ES AC116, Section 4.2, using a safety factor of five (5) and shall have achieved 17.23 kg (38 lbs.) Pull Out or Withdrawal Resistance of Type "W" course thread drywall screw shall have been tested in accordance with ICBO ES AC116, Section 4.2, using a safety factor of five (5) and shall have achieved 22.67 kg (50 lbs.) Shear Load or Lateral Resistance of Type "S" fine thread drywall screw shall have been tested in accordance with ICBO ES AC116, Section 4.1, using a safety factor of 3.2 and shall have achieved 34.47 kg (76 lbs.) Shear Load or Lateral Resistance of Type "W" course thread drywall screw shall have been tested in accordance with ICBO ES AC116, Section 4.1, using a safety factor of 3.2 and shall have achieved 34.01 kg (75 lbs.)

1.5 DELIVERY, STORAGE AND HANDLING

Deliver components in original unopened wrapping clearly marked to identify Manufacturer's name, trade name and contents.

Polystyrene materials shall be stored above ground under cover, level, and in a dry location. Panels shall be kept dry until installed and filled with concrete. Protect polystyrene materials from direct sunlight and wind.

Part 2 Products

2.1 MANUFACTURERS

a. Acceptable Manufacturers and Systems

Superform Insulated Concrete Forming System or equal Manufacturer.
Any manufacturer whose product meets specified design, performance, and material requirements.

b. Permanent Insulating Form Materials

c. Permanent Insulating Forms

Fire-retardant modified, expanded polystyrene, confirming to ASTM C 578, minimum 60.325 mm (2.375 inches) thick each side of wall, molded at 24 kg per cubic meter (1.5 lbs. per cubic foot) and fabricated to stack and interlock with form units above and below.

d. Special Shapes

Provide top blocks, left corner blocks, right corner blocks, brickledge blocks or comparable, and other special shapes as required to construct wall assemblies as indicated on the Drawings.

e. Webs or Ties

System shall include webs or ties molded into polystyrene panels and corners, consisting of structural high density polymer foam or polypropylene, providing rigid lateral support for form panels and corner support, full height fastening strips on each face of wall system for attachment of finishing materials, and support for steel reinforcing bars to be cast into cast-in-place concrete wall.

f. Bracing System

Provide manufacturer's standard bracing system.

Part 3 Execution

3.1 INSTALLATION

a. Permanent Insulating Forms

Comply with Manufacturer's installation instructions and recommended procedures.

Install wall forms straight and plumb in accordance with layout indicated on Drawings.

Forms shall be mortar tight, properly aligned and adequately supported and conforming to construction tolerance given in TABLE 1. Properly brace or tie to maintain position, shape and lateral stability, and provide sufficient strength to carry construction operations and material dead loads without deflection or vibration. Carefully watch as work proceeds and promptly correct faults. Where forms for continuous surfaces are placed in successive units, the forms shall fit over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar.

TABLE 1
TOLERANCES FOR FORMED SURFACES

1.	Variations from the plumb:	In any 9 ft of length ----- 1/4"
	a. In the lines and surfaces of columns, piers, walls and in arises	Maximum for entire length ----- 5/8"
	b. For exposed corner columns, control-joint grooves, and other conspicuous lines	In any 18 ft of length ----- 1/4" Maximum for entire length ----- 3/8"
2.	Variation from the level or from the grades indicated on the drawings:	In any 9 ft of length ----- 1/4" In any bay or in any 18 ft of length --- 3/8"
	a. In slab soffits, ceiling beam soffits, and in arises, measured before removal of supporting shores	Maximum for entire length ----- 5/8"
	b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	In any bay or in any 18 ft of length ---- 1/4" Maximum for entire length ----- 3/8"
3.	Variation of the linear building lines from established position in plan	In any 18 ft ----- 3/8" Maximum ----- 5/8"
4.	Variation of distance between walls, columns, partitions	1/4" per 9 ft of distance but no more than 1/2" in any one bay, and not more than 5/8" total variation

- 5. Variation in the sizes and locations of sleeves and wall opening
Minus ----- 1/4"
Plus ----- 3/8"

- 6. Variation in cross-sectional dimensions of columns and beams in the thickness of slabs and walls
Minus ----- 1/4"
Plus ----- 3/8"

REINFORCEMENT

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes:

1. Reinforcing bar requirements for concrete construction.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):
 - a. SP-66, ACI Detailing Manual.
 - b. 318, Building Code Requirements for Structural Concrete.
2. ASTM International (ASTM):
 - a. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - b. A497, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
 - c. A615, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - d. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - e. A775, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
3. American Welding Society (AWS):
 - a. D1.4, Structural Welding Code - Reinforcing Steel.
4. Concrete Reinforcing Steel Institute (CRSI):
 - a. Manual of Standard Practice.

B. Qualifications:

1. Welding operators, processes and procedures to be qualified in accordance with AWS D1.4.
2. Welding operators to have been qualified during the previous 12 months prior to commencement of welding.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Section FP – 03, Subsection 104.03.
2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Mill certificates for all reinforcing.
 - d. Manufacture and type of proprietary rebar mechanical splices.
 - e. Manufacturer and type of rebar adhesive anchor including installation instructions.
3. Qualifications of welding operators, welding processes and procedures.
4. Rebar number, sizes, spacing, dimensions, configurations, locations, mark numbers, lap splice lengths and locations, concrete cover and rebar supports.
5. Sufficient rebar details to permit installation of reinforcing.
6. Rebar details in accordance with ACI SP-66.
7. Locations where proprietary rebar mechanical splices are required or proposed for use.
8. Shop Drawings shall be in sufficient detail to permit installation of reinforcing without reference to Contract Drawings.
 - a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Contract Drawings but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Support and store all reinforcing above ground.
- B. Ship to jobsite with attached plastic or metal tags with permanent mark numbers which match the Shop Drawing mark numbers.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURES

- A. Subject to compliance with Contract Documents, the following Manufacturers are acceptable:
 - 1. Rebar adhesive anchors:
 - a. HIT-HY150 System by HILTI FASTENING SYSTEMS, INC.
 - b. Epcon Adhesive Anchoring System by ITW Ramset/Red Head.
 - c. Power-Fast by Powers Fastening, Inc.
 - 2. Rebar mechanical splices:
 - a. Lenton Rebar Splicing by Erico, Inc.
 - b. Richmond dowel bar splicer system by Richmond Screw and Anchor Co., Inc.
 - c. Bar-Grip Systems by Barsplice Products, Inc.

2.2 MATERIALS

- A. Reinforcing Bars: ASTM A615, grade 60, deformed.
- B. Reinforcing Bars to be Welded: ASTM A706.
- C. Welded Wire Fabric: ASTM A185 or ASTM A497.
- D. Proprietary Rebar Mechanical Splices: To develop in tension and compression a minimum of 125 percent of the yield strength of the rebars being spliced.
- E. Welding Electrodes:
 - 1. E90 meeting requirements of AWS D1.4.
- F. Rebar Adhesive Anchors:
 - 1. Manufactured for the specific purpose of embedding and developing {125 percent of} the yield strength of rebars in hardened concrete.

2.3 ACCESSORIES

- A. Metal Chairs, Runners, Bolsters, Spacers, Hangers, and Other Rebar Supports:
 - 1. Plastic-coated tips in contact with forms.
 - 2. Plastic coating meeting requirements of CRSI Manual of Standard Practice.
- B. Protective plastic caps at mechanical splices.

2.4 FABRICATION

- A. Tolerances:
 - 1. Sheared lengths: +1 IN.
 - 2. Overall dimensions of stirrups, ties and spirals: +1/2 IN.
 - 3. All other bends: +0 IN, -1/2 IN.
- B. Minimum diameter of bends measured on the inside of the rebar to be as indicated in ACI 318 Paragraph 7.2.
- C. Ship rebars to jobsite with attached plastic or metal tags.
 - 1. Place on each tag the mark number of the rebar corresponding to the mark number indicated on the Shop Drawing.
 - 2. Mark numbers on tags to be so placed that the numbers cannot be removed.
 - 3. For epoxy-coated rebars, use only plastic tags secured to rebars by nylon or plastic ties.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Tolerances:
1. Rebar placement:
 - a. Clear distance to formed surfaces: +1/4 IN.
 - b. Minimum spacing between bars: -1/4 IN.
 - c. Top bars in slabs and beams:
 - 1) Members 8 IN deep or less: +1/4 IN.
 - 2) Members between 8 IN and 2 FT deep: -1/4 IN, +1/2 IN.
 - 3) Members more than 2 FT deep: -1/4 IN, +1 IN.
 - d. Crosswise of members: Spaced evenly within +1 IN.
 - e. Lengthwise of members: +1 IN.
 2. Minimum clear distances between rebars:
 - a. Beams, walls and slabs: Distance equal to rebar diameter or 1 IN, whichever is greater.
 - b. Columns: Distance equal to 1-1/2 times the rebar diameter or 1-1/2 IN, whichever is greater.
 - c. Beam and slab rebars shall be threaded through the column vertical rebars without displacing the column vertical rebars and still maintaining the clear distances required for the beam and slab rebars.
- B. Minimum concrete protective covering for reinforcement: See ACI 318 unless noted otherwise on contract drawings.
- C. Unless indicated otherwise on Drawings, provide splice lengths for reinforcing as follows:
1. #3 through # 6 bar – 48 bar diameters
#7 through # 9 bar - 62 bar diameters
 2. For welded wire fabric: Splice lap length measured between outermost cross wires of each fabric sheet shall not be less than 1 spacing of cross wires plus 2 IN, nor less than 1.5 x development length nor less than 6 IN. Development length shall be as required for the yield strength of the welded wire fabric in accordance with Paragraph 12.8 of ACI 318.
 3. Provide splices of reinforcing not specifically indicated or specified subject to approval of Contracting Officer. Mechanical proprietary splice connectors may only be used when approved or indicated on the Contract Drawings.
- D. Welding:
1. Obtain written approval by the Contracting Officer prior to welding any reinforcing.
 2. Perform welding of rebars in accordance with requirements of AWS D1.4.
 3. Have each welder place an approved identifying mark near each completed weld.
- E. Placing Rebars:
1. Assure that reinforcement at time concrete is placed is free of mud, oil or other materials that may affect or reduce bond.
 2. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided dimensions and weights including heights of deformations on a cleaned sample is not less than required by applicable ASTM specification that governs for the rebar supplied.
 3. Rebar support:
 - a. Uncoated rebar:
 - 1) Support rebars no greater than 4'-0" o.c. along the length and fasten together to prevent displacement by construction loads or placing of concrete.
 - 2) On ground, provide supporting concrete blocks or metal bar supports with bottom plate.
 - a) Do not use concrete blocks to support slab-on-grade reinforcing.
 - 3) Over formwork, provide plastic-coated metal chairs, runners, bolsters, spacers, hangers and other rebar support. Only tips in contact with the forms need to be plastic coated.
 4. Support rebars over cardboard void forms by means of concrete supports which will not puncture or damage the void forms during construction nor impair the strength of the concrete members in any way.

- J-116
5. Where parallel horizontal reinforcement in beams is indicated to be placed in two or more layers, rebars in the upper layers shall be placed directly above rebars in the bottom layer with clear distance between layers to be 1 IN. Place spacer rebars at 3 FT maximum centers to maintain the required 1 IN clear distance between layers.
 6. Extend reinforcement to within 2 IN of concrete perimeter edges. If perimeter edge is formed by earth {or stay-in-place forms}, extend reinforcement to within 3 IN of the edge.
 7. To assure proper placement, furnish templates for all column vertical bars and dowels.
 8. Do not bend reinforcement after embedding in hardened concrete unless approved by Contracting Officer. Do not bend reinforcing by means of heat.
 9. Do not tack weld reinforcing.
 10. Embed rebars into hardened concrete utilizing adhesive anchor system specifically manufactured for such installation:
 - a. Drill hole in concrete with diameter and depth as required to develop {125 percent of} the yield strength of the bar according to manufacturer's requirements.
 - b. Clean hole free of conc. dust then place adhesive in drilled hole.
 - c. Insert rebar into hole and adhesive in accordance with manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

- A. Reinforcement Congestion and Interferences:
1. Notify Contracting Officer whenever the specified clearances between rebars cannot be met.
 2. Do not place any concrete until the Contracting Officer submits a solution to rebar congestion problem.
 3. Rebars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items.
 4. If rebars are moved more than one bar diameter, obtain Contracting officer's approval of resulting arrangement of rebars.
 5. No cutting of rebars shall be done without written approval of Contracting officer.

END OF SECTION

SECTION 03366**CHEMICALLY STAINED CONCRETE FLOOR****PART 1 - GENERAL****1.1 SUMMARY****~~B.A.~~** Section Includes:

1. Chemically stained concrete floor finish.
2. Sealer.

Formatted: Bullets and Numbering

~~C.B.~~ Related Sections:

1. Division 3 Section 03002 – "Cast-In-Place Concrete" for general applications of concrete.

Formatted: Bullets and Numbering

1.2 SUBMITTALS

- A. Product Data: Manufacturer's technical data sheets and installation instructions for each product specified.
- B. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available.
- C. Qualification Data: For firms indicated in "Quality Assurance" Article, including lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of stain and sealer products shall have minimum 10 years experience in the production of the specified products.
- B. Installer Qualifications: Minimum 3 years experience in staining applications and successfully completed not less than 6 projects comparable in scale and complexity.
- C. Substitutions: The use of any products other than those specified shall be considered providing that the Contractor requests its use in writing within 14 days prior to bid date. This request shall be accompanied by:
 1. A certificate of compliance from the material manufacturer stating that the proposed products meet or exceed the requirements specified.
 2. Documented proof that the proposed material has a 10 year proven record of performance for staining concrete substrates, confirmed by at least 6 local projects that the Contracting Officer can examine.
- D. Regulatory Requirements:
 1. Products shall comply with the United States Clean Air Act for maximum Volatile Organic Compound (VOC) content as specified in PART 2 of this section.

- E. Source Limitations: Obtain each specified material from same source and maintain high degree of consistency in workmanship throughout Project.
- F. Field Samples:
 - 1. Provide under provisions of applicable Division 1 Sections.
 - 2. At location on Project selected by Contracting Officer, prepare field samples 4 by 4 feet for review and approval.
 - 3. Construct field sample using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in field sample panels.
 - 4. Field samples shall be stained and sealed by the individual workers who will actually be performing the work for the Project.
 - 5. Obtain written approval of the field samples from the Contracting Officer before start of work.
 - 6. Retain approved field samples through completion of the Work for use as a quality standard for finished work.
 - 7. Approved field samples may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver the specified products in original, unopened containers with legible manufacturer's identification and information.
- B. Store specified products in conditions recommended by the manufacturer.

1.5 PROJECT CONDITIONS

- A. Environmental Conditions: Maintain an ambient temperature of between 50° and 90° F during application and at least 48 hours after application.
- B. Protection: Precautions shall be taken to avoid damage or contamination of any surfaces near the work zone. Protect completed stain work from moisture or contamination.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers and products equivalent to the following are acceptable:

Manufacturer: L.M. SCOFIELD COMPANY, Douglasville, Georgia.

2.2 MATERIALS

- A. Chemical Stains: LITHOCHROME® Chemstain™; L.M. SCOFIELD COMPANY, reactive water-based solution of metallic salts which react with the calcium hydroxide in the cured concrete substrate to produce permanent, variegated or translucent color effects.

1. Colors: Provide the following color:
a. Color 1: CS-12 Weathered Bronze.

- B. Sealers:

1. SCOFIELD® Selectseal-W™; L.M. SCOFIELD COMPANY, water-based, clear aliphatic polyurethane specifically formulated for protecting chemically stained concrete hardscapes and floors.

- C. Sealants: LITHOSEAL™ Trafficalk-3G™; L.M. SCOFIELD COMPANY.

1. Colors: As selected by Contracting Officer from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Contractor shall examine areas and conditions under which work will be performed and identify conditions detrimental to proper and timely completion of work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Compliance with Manufacturer's Instructions: Contractor shall obtain, understand and comply with the current versions of the manufacturer's technical data sheets and installation instructions as referenced in Section 1.2.A. Wherever technical data such as preparation or installation instructions differs from language in this specification or other written material, the information submitted in accordance with Section 1.2.A is considered definitive.

3.2 PREPARATION

- A. New Concrete:

1. Newly placed concrete shall be sufficiently cured to allow concrete to become reactive, minimum 14 days.

2. If any of the following colors are used, the minimum cure time of the concrete shall be 30 to 60 days to meet water vapor transmission requirements.
 - a. Weathered Bronze.
 3. Do not use liquid curing materials. Cure concrete flatwork with new, unwrinkled, non-staining, high quality curing paper. Do not overlap curing paper.
 4. Surfaces shall be cured using the same method and different sections (pours) chemically stained when the concrete is the same age.
 5. Immediately prior to chemically staining, thoroughly clean the concrete. Sweep surfaces, then pressure wash or scrub using a rotary floor machine. Use suitable, high quality commercial detergents to facilitate cleaning. Rinse surfaces after cleaning until rinse water is completely clean. Allow floor to dry completely prior to application of floor stain.
- B. Scoring: Score decorative jointing in concrete surfaces 1/8-inch (3.2 mm) deep with diamond blades. Rinse until water is completely clean. Score before staining.

3.3 APPLICATION OF CHEMICAL STAIN

- A. Concrete surfaces shall be dry and properly prepared as described above. Protect surrounding areas from over-spray, run-off and tracking. Divide surfaces into small work sections using wall, joint lines, or other stationary breaks as natural stopping points.
- B. Apply chemical stains full strength (undiluted) at the coverage rate recommended by the manufacturer and use application equipment described in the manufacturer's printed technical literature. The color of the liquid chemical stain has no resemblance to the final color produced on the concrete substrate.
- C. Chemical stains normally fizz when reacting with the concrete. If fizzing does not occur, the substrate has not been adequately prepared or the concrete pH level is too low. If this should happen, contact the local representative for further recommendations.
- D. Transfer chemical stain to the substrate by brush or spray and immediate scrub into surface.
- E. Reaction time depends on wind conditions, temperatures, and humidity levels.
- F. When multiple coats of one or more colors are required, washing and drying between colors is desirable to evaluate the color prior to the next coat.
- G. After the final coat of chemical stain has remained on the surface for a minimum of four hours, remove all residue by wet scrubbing with commercial grade detergent. Rinse surfaces after scrubbing until rinse water is completely clean. Run off may stain the adjacent areas or harm plants. Collect rinse water by wet vacuuming or absorbing with an inert material.

3.4 APPLICATION OF SEALER

- A. Concrete substrate shall be completely dry.
- B. Sealer shall be produced by the chemical stain manufacturer.
- C. Test surface for proper PH level prior to applying sealer.

- D. Apply sealer according to manufacturer's written instructions at a rate of 300 to 500 square feet per gallon per coat.
- E. Maintain a wet edge at all times.
- F. Allow sealer to completely dry before applying additional coats.
- G. Apply second coat of sealer at 90 degrees to the direction of the first coat using the same application method and rates.
- H. Seal horizontal joints in areas subject to pedestrian or vehicular traffic.

3.5 PROTECTION

- A. Protect floor from traffic for at least 72 hours after final application of sealer.

3.6 MAINTENANCE

- A. Maintain chemically stained and sealed floors by sweeping. Clean spills when they occur and rinse dirt off with water. Wet-clean heavily soiled areas by mopping or by scrubbing with a rotary floor machine equipped with a scrubbing brush and a suitable, high quality commercial detergent. Maintain interior floors that require polishing by using a compatible, premium-grade, emulsion-type, commercial floor polish, following manufacturer's instructions and safety requirements.
 - 1. Information on commercial floor polishes is available by contacting Johnson Diversey, Sturtevant, Wisconsin, 800-558-2332.

3.7 APPLICATORS

- A. For a list of qualified contractors, contact your local Scofield representative or the appropriate Division Office: Eastern Division – 201-672-9050; or equivalent manufacturer if substituted.

END OF SECTION

SECTION 05120
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Structural steel, including the fabrication and erection of framing and bracing members, including connections.
- B. Related Sections include but are not necessarily limited to:
1. Section 05211 - Steel Joists.
 2. Section 05313 - Metal Deck.
 3. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Institute of Steel Construction (AISC):
 - a. Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
 - b. Code of Standard Practice for Steel Buildings and Bridges dated March 7, 2000.
 - c. Quality Certification Program for Fabricators
 - d. Erector Certification Program.
 - e. Manual of Steel Construction.
 2. American Society of Civil Engineers (ASCE).
 3. American Society of Mechanical Engineers (ASME):
 - a. B18.22.1, Plain Washers.
 4. ASTM International (ASTM):
 - a. A2, Standard Specification for Carbon Steel Girder Rails of Plain, Grooved, and Guard Types.
 - b. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - c. A36, Standard Specification for Carbon Structural Steel.
 - d. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - e. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
 - f. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - g. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - h. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - i. {A354, Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.}
 - j. {A449, Standard Specification for Quenched and Tempered Steel Bolts and Studs.}
 - k. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - l. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - m. A563, Standard Specification for Carbon and Alloy Steel Nuts.
 - n. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - o. {A847, Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance}.
 - p. A992, Standard Specification for Steel for Structural Shapes.
 - q. F436, Standard Specification for Hardened Steel Washers.

- r. F593, Standard Specification for Stainless Steel Bolts, Hex Caps Screws and Studs.
 - s. F959, Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
 - t. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
5. Specification for Structural Joints using ASTM A325 or ASTM A490 Bolts as approved by the Research Council on Structural Connections (RCSC) of the Engineering Foundation (referred to herein as Specification for Structural Joints).
 6. American Welding Society (AWS):
 - a. A5.1, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - b. A5.5, Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.
 - c. A5.17, Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
 - d. A5.18, Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding.
 - e. A5.20, Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.
 - f. A5.23, Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding.
 - g. A5.28, Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding.
 - h. A5.29, Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding.
 - i. D1.1, Structural Welding Code - Steel (referred herein as AWS Code).
 - j. Steel stud connectors and their installation to comply with requirements of AWS Code.
 7. Building code:
 - a. International Code Council (ICC):
 - 1) International Building Code and associated standards, {2000}{2003}{2006} Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
1. Steel fabricator:
 - a. Minimum of 8 years experience in fabrication of structural steel and shall be certified under AISC Quality Certification Program Category {I} {II} {III} {MB} {Supplement}.
 - b. Use a professional engineer on fabrication staff.
 2. Steel erector:
 - a. Minimum of 8 years of experience in erection of structural steel.
 - b. With an active and enforced quality assurance program in place, as described in the Building Code.
 3. Qualify welding procedures and welding operators in accordance with AWS.

1.3 SUBMITTALS

- A. Shop Drawings:
1. See Section 01340 for requirements for the mechanics and administration of the submittal process.
 2. Fabrication and/or layout drawings:
 - a. Prepare Shop Drawings under National Institute of Steel Detailing Quality Procedures Program certification.
 - b. Complete Shop Drawings for all of the work showing clearly all pieces, sizes, dimensions, details, connections materials and shop coatings.
 - 1) All Shop Drawings must be checked and signed "approved" before submittal.
 - 2) Show all cuts, copes, and holes.
 - 3) Indicate all shop and field bolts.
 - 4) Indicate all shop and field welds using AWS symbols.
 - 5) Be reviewed and sealed by a professional engineer retained by Contractor to verify conformance with design criteria stipulated in the Contract Documents.
 - c. Prepare complete erection drawings showing the location and marks of all pieces.
 - 1) Copies of up-to-date erection drawings shall accompany the Shop Drawings.

- a) Use match marks on the erection drawings to indicate the sheet number on which each particular member is detailed.
- d. Correct any incorrect or unacceptable material or fabrication due to incorrect detailing, shop work, or erection, without additional charge.
- 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Detailed supplemental specification relating to load indicator washers or high-strength bolts - alternate design for approval of Engineer (submitted at Contractor's option if desired by Contractor for use).
 - d. Source and certification of quality for high-strength bolts, nuts and washers.
- 4. Certifications:
 - a. Certificates of compliance with standards specified for all major components and fasteners incorporated into work.
 - b. Copies of current welding certificates for each welder assigned to perform welding indicating compliance with testing specified by AWS.
 - c. Welder qualification data and prequalified procedures.
- 5. Test reports:
 - a. Certified copies of mill tests.
 - b. Manufacturer's load test and temperature sensitivity data for expansion anchor bolts and adhesive anchor bolts.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store steel members above ground on skids or other supports.
 - 1. Keep free of dirt and other foreign material and protect against corrosion.

1.5 DEFINITION

- A. Code: AISC Code of Standard Practice for Steel Buildings and Bridges.
- B. Owner: May mean the Owner's Designated Representative for Construction as defined by the Building Code.
- C. Galvanizing: Hot-dipped galvanizing per ASTM A153 with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. High-strength bolts:
 - a. Bethlehem Steel Corporation.
 - b. Lewis Bolt & Nut Company.
 - c. Nucor Fasteners.
 - d. St. Louis Screw and Bolt Company.
 - 2. Load indicator washers for high-strength bolts:
 - a. Bethlehem Steel Corporation.
 - b. Mid-South Bolt and Screw Co., Inc.
 - c. J and M Turner, Inc.
 - 3. Alternate design high-strength bolts:
 - a. T. C. Bolt Corporation.
 - b. Construction Fastener Systems Division of Bristol Machine Company.
 - c. LeJuene Bolt Co.
 - 4. Headed studs and deformed bar anchors:
 - a. Nelson Stud Welding Division, TRW, Inc.

- b. Stud Welding Products, Inc.
 - 5. Expansion anchor bolts:
 - a. Kwik Bolts by Hilti, Inc.
 - b. Trubolt by ITW Ramset/Red Head.
 - c. Powerbolt by Powers Rawl.
 - 6. Adhesive anchors bolts:
 - a. HVA Adhesive Anchor System by Hilti.
 - b. HIT HY 150 Adhesive Anchor by Hilti.
 - c. HSE 2411 Epoxy Adhesive Anchor by Hilti.
 - d. EPCON Ceramic 6 Epoxy by ITW Ramset/Red Head.
 - e. Power Fast by Powers Rawl.
 - f. Needle Capsule Anchor Systems by Powers Rawl.
 - 7. Anchor bolt sleeves:
 - a. Sinco/Wilson.
- B. Submit request for substitution in accordance with Specification Section 01640.

2.2 MATERIALS

- A. Steel, Structural Shapes and Plate (unless noted otherwise on Drawings):
 - 1. All W-shapes and WT-shapes: ASTM A572, Grade 50.
 - a. Provide ASTM A572, Grade 50 with special requirements per AISC Technical Bulletin #3, New Shape Material, dated March 3, 1997.
 - b. ASTM A992 may be used in lieu of ASTM A572, Grade 50.
 - 2. All other plates and rolled shapes: ASTM A36.
- B. Plate and Bar: ASTM A36.
- C. Pipe: ASTM A53, Grade B (Type E or S) (Fy=35).
- D. Hollow Structural Sections (HSS):
 - 1. Round: ASTM A500, Grade B (Fy=42) {or ASTM A847 weathering steel}.
 - 2. Square or rectangular: ASTM A500, Grade B (Fy=46) {or ASTM A847 weathering steel}.
- E. High-Strength Bolts, Nuts and Washers, ASTM A325 with ASTM A563 nuts.
 - 1. High-strength bolts:
 - a. Provide two (2) ASTM F436 washers for all bolts.
 - b. Provide beveled washers at connections of sloped/tapered sections.
 - 2. High-strength bolts with load indicating devices, ASTM F959, Type 325.
 - a. Provide at Contractor's option and subject to approval of Engineer.
 - 3. Alternate high-strength design:
 - a. Provide at Contractor's option and subject to approval of Engineer.
- F. Bolts and Nuts, Unfinished: ASTM A307, Grade A.
- G. Washers, Plain (Unfinished Bolts): ASME B18.22.1, Type B.
- H. Welding Electrodes (AWS):
 - 1. Shielded metal arc: AWS A5.1 or AWS A5.5, E70XX or E801X-X.
 - 2. Submerged arc: AWS A5.17 or AWS A5.23, F7XX-EXXX or F8XX-EXXX-XX.
 - 3. Gas metal arc: AWS A5.18, E70S-X or E70U-1 or AWS A5.28, ER805-XX, E80C-XXX.
 - 4. Flux cored arc: AWS A5.20, E7XT-X (except 2, 3, 10, GS), AWS A5.29, E7XT-X or E8XTX-X, E8XTX-XM.
- I. Anchor Rods and Bolts:
 - 1. ASTM F1554, Grade 55 with weldability supplement S1 {or ASTM A36} for threaded rods {galvanized} {or ASTM A449 or ASTM A354 high strength}.
 - 2. ASTM A307, Grade A for headed bolts {galvanized}.
 - 3. ASTM F593 Type 304 or 316 stainless steel with matching nut and washer.
- J. Headed Studs and Deformed Bar Anchors:

1. Studs: ASTM A108, complying with AWS Code Section 7, Type B; minimum yield strength 50,000 psi, minimum tensile strength 60,000 psi.
 - a. Uniform diameter.
 - b. Heads: Concentric and normal to shaft.
 - c. Weld end: Chamfered and solid flux.
 2. Deformed anchor bars:
 - a. ASTM A496, complying with AWS Code Section 7 Type C.
 - b. Minimum yield strength: 70,000 psi.
 - c. Minimum tensile strength: 80,000 psi.
 - d. Straight, unless indicated otherwise.
 - e. Solid flux.
 3. After welding, remove ceramic ferrules and maintain free from any substance which would interfere with function, or prevent bonding to concrete.
- K. Nonshrink Grout: See Section {03002}.
- L. Expansion Anchor Bolts and Adhesive Anchor Bolts for Fastening to Concrete:
1. Use of expansion bolts requires approval by Engineer.
 2. Stainless steel, Type 304 or 316.
 3. Provide minimum edge distance cover as recommended by manufacturer or as indicated on Drawings.
 4. Submit manufacturer's data to verify at least the load test capacities of the following embedment depth:
 - a. Submit manufacturer's load test data to verify at least the anchor bolt capacities at the following embedment depths:

ANCHOR BOLT DIAMETER (IN)	EMBEDMENT (IN)	MINIMUM ULTIMATE TENSION CAPACITY (KIP)*, **
3/8	3	4.8
1/2	4	8.1
5/8	5	11.4
3/4	6	15.4
7/8	7	20.0
1	8	24.7
1-1/4	10	34.3

* Data must be based on actual tests performed in unreinforced mass concrete of not more than 4000 psi compressive strength.

** Capacity must be at a concrete temperature of at least 130 DegF.

2.3 FABRICATION

- A. Comply with requirements of applicable Building Codes and AISC Specification with modifications and additional requirements specified herein.
 1. Identify high-strength steel material in fabricated members in accordance with ASTM A6.
- B. Minimize the amount of field welding.
 1. Shop assemble components into largest size possible commensurate with transportation and handling limitations.
 2. Shop connections: Bolted with high-strength bolts or welded.
- C. Connection Details:
 1. Connections not fully detailed on Drawings shall be designed by a Professional Engineer registered in the State of {Florida}, retained by Contractor, based on requirements of Contract Documents.
 2. Where beam reactions are shown on Drawings, design beam connection to support reaction shown.

3. Where no reactions are shown each beam connection shall be designed to support one-half of total uniform load capacity tabulated in AISC tables for "Uniform Load Constants for Beams" for the given shape, span and steel specified.
 4. Where indicated on the Drawings, design beam connections for the axial load or transfer forces indicated in addition to the shear value indicated above.
 5. Design bracing connections for loads indicated on the Drawings.
- D. Provide as a minimum, two (2) 3/4 IN DIA, high-strength bolts for all bolted connections.
- E. Provide bearing type connections for all bolted connections, unless specified otherwise or required to be slip-critical by the RCSC Specification for Structural Joints.
- F. One-sided or other types of eccentric connections not indicated will not be permitted without prior approval.
- G. Field Connections: Provide bolts for all field connections except where shown otherwise on the Drawings.
1. Use high-strength bolts unless shown or specified otherwise.
 2. Use of high-strength bolts: Conform to RCSC's Specifications for Structural Joints Using ASTM A325 Bolts, as approved by Specification for Structural Joints, and published by AISC.
 3. Unfinished bolts may be used for attaching stair treads to stringers.
 4. If structural steel details (field welds versus shop welds, etc.) shown on design Drawings are not compatible with selected erection procedures, submit proposed modifications for review.
 5. Connections to structural steel provided by others: Provide all connectors and coordinate location of bolt holes to match connection holes in steel provided by others.
- H. Accurately mill column end bearing surfaces to true plane.
- I. Fabricate and erect beams with non-specified camber in accordance with AISC Specification Chapter L1.
- J. Cut, drill, or punch holes at right angles to surface of metal.
1. Do not make or enlarge holes by burning.
 2. Make holes clean cut, without torn or ragged edges.
 3. Remove outside burrs resulting from drilling or reaming operations with tool making 1/16 IN bevel.
 4. Provide holes in members to permit connection of work of other trades or contractors.
- K. Make allowance for draw in all cross bracing to provide small amount of initial tension in members.
- L. Make splices only where indicated or where approved.
- M. Cope at 45 degrees, corners of stiffener plates at junction of member flanges with webs.
- N. Flame cut bevels for welds, provided such cutting is done automatically.
1. Leave free of burrs and slag by grinding or planing the cut edges.
- O. Grind smooth all rough welds and sharp steel edges shall be ground to approximately 1/8 IN radius.
- P. Tolerances (unless noted otherwise on Drawings):
1. ASTM A6: When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating, and mechanical straightening, subject to the limitations of the AISC specification.
 2. Fabrication tolerance:
 - a. Member length:
 - 1) Both ends finished for contact bearing: 1/32 IN.
 - 2) Framed members {30 FT or less: 1/16 IN}. {Over 30 FT: 1/8 IN}.
 - b. Member straightness:

- 1) Compression members: 1/1000 of axial length between points laterally supported.
- 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
- c. Specified member camber (except compression members):
 - 1) 50 FT or less: +1/2 IN.
 - 2) Over 50 FT: +1/2 IN (plus 1/8 IN per 10 FT over 50 FT).
 - 3) Members received from mill with 75 percent of specified camber require no further cambering.
 - 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
 - 5) Camber shall be measured in fabrication shop in unstressed condition.
- d. At bolted splices, depth deviation shall be taken up by filler plates.
 - 1) At welded joints, adjust weld profile to conform to variation in depth.
 - 2) Slope weld surface per AWS requirements.
- e. Finished members shall be free from twists, bends and open joints.
 - 1) Sharp kinks, bends and deviation from the above tolerances are cause for rejection of material.

2.4 WELDING

- A. Comply with AWS Code, and other requirements indicated herein, for all welding, techniques of welding employed, appearance and quality of welds, and methods used to correct defective work.
 1. Qualify joint welding procedures or test in accordance with AWS qualification procedures.
- B. Test and qualify welders, welding operators and tackers in compliance with AWS Code for position and type of welding to which they will be assigned.
 1. Conduct tests in presence of approved testing agency.
 2. Certification within previous 12 months will be acceptable, provided samples of the welder's work are satisfactory.
- C. Before Starting Welding:
 1. Carefully plumb and align members in compliance with specified requirements.
 2. Fully tighten bolts.
 3. Comply with Section 5 of AWS Code for assembly and surface preparation.
 4. Preheat base metal to temperature stated in AWS Code.
 - a. When no preheat temperature is given in AWS Code and base metal is below 50 DegF, preheat base metal to at least 70 DegF.
 - b. Maintain temperature during welding.
 - c. Preheat surface of all base metal within distance from point of welding equal to thickness of thicker part being welded or 3 IN, whichever is greater, to specified preheat temperature.
 - d. Maintain this temperature during welding.
 5. Each welder shall use identifying mark at welds.
- D. Make flange welds before making web welds.
- E. Where groove welds have back-up plates, make first three (3) passes with 1/8 IN round electrodes.
 1. Use backup plates in accordance with AWS Code, extending minimum of 1 IN either side of joint.
- F. Flame cut edges of stiffener plates at shop or field butt weld.
 1. Do not shear.
- G. Grind flush web fillets at webs notched to receive backup plates for flange groove welds.
- H. Low Hydrogen Electrodes: Dry and store electrodes in compliance with AWS Code.
- I. Do not perform welding when ambient temperature is lower than 0 DegF or where surfaces are wet or exposed to rain, snow, or high wind, or when welders are exposed to inclement conditions.

- J. Headed Studs and Deformed Bar Anchors:
 - 1. Automatically end welded in accordance with the AWS Code and manufacturer's recommendations.
 - 2. Fillet welding of headed studs and deformed bar anchors is not allowed unless approved by Engineer.
- K. Test in-place studs in accordance with requirements of AWS Code to ensure satisfactory welding of studs to members.
 - 1. Replace studs failing this test.
- L. When headed stud-type shear connectors are to be applied, clean top surface of members to receive studs in shop to remove oil, scale, rust, dirt, and other materials injurious to satisfactory welding.
 - 1. Do not shop paint or galvanize metal surfaces to receive field applied studs.

2.5 SHOP COATING

- A. Refer to Section 09905 and coordinate shop primer, surface preparation and coating with field applied primers and coatings where specified.
- B. Provide suitable methods of handling and transporting painted steel to avoid damage to coating.
- C. Do not coat following surfaces:
 - 1. Machined surfaces, surfaces adjacent to field welds, and surfaces fully embedded in concrete.
 - 2. All other members for which no coating is specified.
 - 3. Contact surfaces at bolted slip-critical connections, unless surface condition conforms to Part 3b of the Specification for Structural Joints.
- D. Clean thoroughly all surfaces not coated before shipping.
 - 1. Remove loose mill scale, rust, dirt, oil and grease.
 - 2. Protect machined surfaces.

2.6 SOURCE QUALITY CONTROL

- A. OWNER pays for inspection and testing:
- B. Responsibilities of Testing Agency:
 - 1. Inspect shop and field welding in accordance with Section 6 of AWS Code including the following non-destructive testing:
 - a. Visually inspect all welds.
 - b. In addition to visual inspection, test 50 percent of full penetration welds and 20 percent of fillet welds with liquid dye penetrant.
 - c. Test 20 percent of liquid dye penetrant tested full penetration welds with ultrasonic or radiographic testing.
 - 2. Inspect high-strength bolting in accordance with Section 9 of the Specification for Structural Joints.
 - a. Verify proper pretension for slip-critical bolted connection.
 - b. Verify direct tension indicator gaps.
 - 3. Inspect structural steel which has been erected.
 - 4. Inspect stud welding in accordance with Article 7.8, AWS Code.
 - 5. Prepare and submit inspection and test reports to Engineer.
 - a. Assist Engineer to determine corrective measures necessary for defective work.

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractor is solely responsible for safety.

1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
 - a. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, bracing or rigid connections are installed.
 2. Partially complete structural members shall not be loaded without an investigation by the Contractor.
 3. Until all elements of the permanent structure and lateral bracing system are complete, provide temporary bracing designed, furnished, and installed by the Contractor for the partially complete structure.
- B. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including wind, construction activities, and operation of equipment is the responsibility of the Contractor.
1. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.
 2. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
 3. Contractor shall be responsible for the design of the temporary bracing system and must consider the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades.
 - a. If not obvious from experience or from the Drawings, the Contractor shall confer with the Engineer to identify those structural steel element that must be complete before the temporary bracing system is removed.
 4. Remove and dispose of all temporary work and facilities off-site.
- C. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work.
1. Report defects in work-in-place which may influence satisfactory completion of the work.
 2. Absence of such notification will be construed as acceptance of work-in-place.
- D. Field Measurement:
1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
 2. Contractor responsible for the accurate fit of the work.
- E. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection.
1. Notify Engineer of any errors or deviations found by such checking.

3.2 ERECTION

- A. Framing member location tolerances after erection shall not exceed the frame tolerances listed in Article 3.3.
- B. Erect plumb and level; introduce temporary bracing required to support erection loads.
- C. Use light drifting necessary to draw holes together.
 1. Drifting to match unfair holes is not allowed.
- D. Welding:
 1. Conform to AWS D1.1 and requirements of this Specification.
 2. When joining two (2) sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.
- E. Shore existing members when unbolting of common connections is required.
 1. Use new bolts for rebolting connections.
- F. Clean stored material of all foreign matter accumulated during erection period.

- G. Clean bearing and contact surfaces before assembly.
- H. Set beam and column base and bearing plates accurately, as indicated, on nonshrink grout.
 - 1. Set and anchor each base plate to proper line and elevation.
 - 2. Use metal wedges, shims or setting nuts as required and tighten anchor bolts.
 - a. Use same metal as base plate.
 - b. Cut off protrusions of wedges and shims flush with edge of base plate.
 - 3. Fill sleeves around anchor bolts with nonshrink grout.
 - 4. Pack grout solidly between bottom of plate and bearing surface.
 - 5. Refer to Section {03002} for nonshrink grout requirements.
- I. Anchor Bolts:
 - 1. Anchor bolt location tolerance per Section 7.5 of the Code.
 - 2. Tie anchor bolts in position to embedded reinforcing steel using wire.
 - 3. Welding or tack welding is prohibited.
 - 4. Provide steel templates for locating anchor bolts.
 - 5. Coat bolt threads and nuts with heavy coat of clean grease.
- J. Install high strength bolts with hardened washers.
 - 1. Install and tighten in accordance with Section 8 of Specifications for Structural Joints.
 - 2. Coordinate installation with inspection.
 - a. Do not start installation until coordination with Testing Agency is complete.
 - 3. Bearing-type connections: High-strength bolts shall be tightened to snug-tight condition.
 - 4. Slip-critical connections: Perform calibration testing for all methods of installation of high-strength bolts in accordance with Section 8(b) of Specification for Structural Joints, using ASTM A325 bolts.
 - a. Turn-of-nut tightening: Torque wrenches shall be used only by laboratory personnel.
 - b. Calibrated wrench tightening: Calibrate on a daily basis.
 - c. Direct tension indicator tightening: If previously approved by Engineer.
 - d. Installation of alternate design bolts: If previously approved by Engineer.
 - 5. In the event any bolt in a connection is found to be defective, check and retighten all bolts in the connection.
- K. Do not use gas cutting to correct fabrication errors.
 - 1. In case members do not fit or holes do not match, ream out the holes and insert the next larger size bolt.
 - a. If the connections require new holes, then drill new holes.
 - b. Make no such corrections without prior approval of the Engineer.
 - 2. Burning of holes: Not permitted.
- L. Prior to making field connections to existing structural steel, remove completely all paint from existing steel which will be in contact with new steel and new welds.
- M. Tighten and leave in place erection bolts used in welded construction.
- N. Provide beveled washers to give full bearing to bolt head or nut where bolts are to be used on surfaces having slopes greater than 1 in 20 with a plane normal to bolt axis.
- O. After bolts are tightened, upset threads of A307 unfinished bolts and anchor bolts to prevent nuts from backing off.
- P. After erection, grind smooth all sharp surface irregularities resulting from field cutting or welding; power tool clean welds, bolts, washers and abrasions to shop coat removing all rust and foreign matter.
- Q. Expansion anchor bolts and adhesive anchor bolts:
 - 1. Minimum embedment as recommended by manufacturer or specified herein, whichever is larger.
 - 2. Notify Engineer if required depth of embedment cannot be achieved at a particular bolt location.
 - 3. Follow manufacturer's recommendations for installation and torque.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency responsibilities are described in Article 2.6.
- B. Erected Frame Tolerance (Unless noted otherwise on the Drawings):
 - 1. Overall finished dimensions shall not exceed cumulative effect of rolling, fabrication and erection tolerance.
 - 2. Erection tolerances are defined relative to member working points and working lines as follows:
 - a. Actual centerline of top flange or surface at each end for horizontal members.
 - b. Actual center of member at each end for all other members.
 - c. Other points may be used, providing they are based on these definitions.
 - d. Working line is straight line connecting member working points.
 - 3. Tolerances on position and alignment are as specified in the Code, unless otherwise modified. "Adjustable items" such as lintels, wall supports, curb angles, window mullions and similar members shall be provided with adjustable connections to supporting structural frame.
 - 4. Steel erector shall certify the location of erected structural steel is acceptable for plumbness, level and aligned within tolerances specified.
 - a. Such certification can be provided upon completion of any part of work and shall be done prior to start of work by other trades that may be supported, attached or applied to structural steel work.

3.4 CLEANING AND REPAIR OF SHOP PRIMER PAINT

- A. After erection, clean all steel of mud or other foreign materials, and repair any damage.
 - 1. Touchup coatings to comply with Section 09905.

END OF SECTION

SECTION 05211**STEEL JOISTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Manufactured open-web steel joists {joist girders} and joist accessories.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 05120 - Structural Steel.
 - 2. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Institute of Steel Construction (AISC):
 - a. Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
 - 2. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - c. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 3. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code - Steel.
 - 4. Steel Joist Institute (SJI):
 - a. Recommended Code of Standard Practice for Steel Joists and Joist Girders.
 - b. Standard Specification for Open Web Steel Joists, K-Series.
 - c. Standard Load Table Open Web Steel Joists, K-Series.
 - d. none
 - e. none
 - f. none
 - g. none
 - 5. Corps of Engineers (COE):
 - a. CRD-C621, Standard Specification Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).
- B. Qualifications:
 - 1. Manufacturer: Member of SJI.
 - a. Structural design calculations and details of manufactured joists shall be prepared by a qualified professional engineer retained by the manufacturer.
 - 2. Qualification of welding work:
 - a. Qualify welding processes, operations, and operators in accordance with requirements of AWS D1.1.
 - b. Welding operators to have been qualified during the 12-month period prior to commencement of welding.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP-03, Subsection 104.03.
 - 2. Fabrication and/or layout drawings:
 - a. Detailed Shop Drawings showing size and layout of each joist unit, bridging, connections, and accessories. Include mark, number, type, location, and spacing of joists and bridging.

- b. Show joining splice and connection to other work details.
 - c. Provide templates or location drawings for installation of anchor bolts.
 - d. Provide details of bridging, method of attachment to joists, and joist end anchorage and other details required for joist installation. Indicate beveled end plates for joist roof pitch where required.
 - e. Show shop-applied coatings.
 - f. Shop Drawings shall not be reproductions of the Contract Drawings.
 - g. Show the net wind uplift loads that joists were designed for on Shop Drawings
3. Product technical data including:
- a. Joist manufacturer's load tables, Standard Specifications and installation instructions for each type of joist and its accessories. Include product data describing materials, shop coating, bridging, and accessories.
4. Certifications:
- a. Manufacturer's certification that steel joists and accessories comply with specified requirements.
 - b. Manufacturer member of SJI.
 - c. Joist material, shop welding and testing, manufacturing and shop inspection and testing are in accordance with SJI requirements.
 - d. {Capability of joists per Paragraph 2.3A and D}.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle steel joists as recommended by SJI.
 - 1. Exercise care to avoid damage to joists.
- B. Store joists clear of earth on platforms, skids or other supports.
 - 1. Protect joists after delivery to prevent rust and deterioration.
- C. Provide anchor bolts and other items to be embedded in concrete or masonry, with templates as required, in time for incorporation into the work.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Nucor Corporation Vulcraft Divisions.
 - 2. CANAM Steel Corporation.
 - 3. Socar Incorporated.

2.2 MATERIALS

- A. Steel: Comply with SJI and AISC Specifications for joist series indicated.
- B. High-Strength Bolts, Nuts and Washers: ASTM A325 as required, heavy hexagon structural bolts with nuts and hardened washers.
- C. Bolts and Nuts, Unfinished: ASTM A307, Grade A, regular hexagon type, low carbon steel, with carbon steel washers.

2.3 STEEL JOISTS

- A. Design of steel joists to be supplied to have been checked by the SJI and found to conform to the standard specifications and load tables.
- B. Fabricate Joists and Accessories in accordance with SJI Specifications and as follows:
 - 1. Make shop connections and splices using either arc or resistance welding.
 - a. Do not shop bolt connections.
 - 2. Design and fabricate for maximum deflection of 1/360 of clear span under design live load.

3. Shop holes, field holes, and enlargement of holes will not be permitted unless approved by Engineer.
4. Fabricate bearing ends to provide following minimum bearing unless a longer bearing length is indicated on the Contract Documents.

K SERIES	
On masonry or concrete:	4 IN min
On steel:	2-1/2 IN min

5. With steel angle tops and bottom short members

- C. Provide extended bottom chords where indicated.
 1. Comply with SJI and AISC requirements and load tables.
- D. Provide extended top chords where indicated.
 1. Comply with SJI and AISC requirements and load tables.
- E. Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord.
 1. Provide either an extended bottom chord or a separate unit of sufficient strength to support ceiling construction.
 2. Extend ends to within 1/2 IN of wall surface.
- F. Provide nailers bolted to top chord where indicated.
- G. Prepare and paint steel joists and accessories in compliance with Section 09905.
- H. Shop Painting:
- I. Comply with SJI Specifications:
 1. Joist designations indicated on the Drawing are minimum requirements; increase as required to comply with design requirements specified.
 2. Wherever possible increased joists shall have the same depth as joist indicated on Drawings.
 3. Where necessary to increase joist depths to meet design requirements, coordinate all project changes required due to the increased depth.
 4. Make all required joist revisions at no additional cost to Contracting Officer.

2.4 SOURCE QUALITY CONTROL

- A. Engineer reserves right to inspect joists or manufacturer's shop during joist fabrication.
- B. Identify each joist type, size and manufacturer.
 1. Provide tagging or other suitable (permanent) means.
 2. Maintain identification continuously.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine areas and conditions under which steel joists are to be installed for conditions detrimental to proper and timely completion of work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Do not start placement of steel joists until supporting work is in place and secured.
- D. Joists will be subject to rejection if:
 1. Joists do not comply with requirements of SJI and AISC Specifications and requirements herein.

2. Joists are improperly manufactured, welded, painted or installed.
3. Joists are damaged so that strength is impaired.
4. Joists are not installed as indicated on Drawings.
5. Chords are not installed straight within a tolerance of plus or minus 0.0028 times the length of the joist or the distance between points of lateral support.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
 1. Where not specifically indicated otherwise, place and secure steel joists in accordance with SJI and AISC Specifications and as herein specified.
- B. Splice joists delivered to the site in more than one piece.
- C. Do not overload joists.
 1. Note: Joists may not be stable or able to carry design loads until bridging and deck is fully installed.
 2. Contractor is solely responsible for safety, construction methods and sequencing of the Work.
 3. Do not install joists damaged so that strength is impaired.
- D. Place joists on supporting work, adjust and align in accurate location and spacing before permanently fastening.
 1. Provide end bearing and anchorages to secure all joists to supporting members or walls in accordance with SJI Specifications, unless otherwise indicated.
 2. When joists do not bear flush on supporting member or wall, take corrective measures to ensure full bearing.
 - a. Provide steel shims as required for uniform flush bearing.
- E. Field weld joists to supporting steel framework in accordance with SJI, AISC and AWS Specifications for type of joists used.
 1. Coordinate welding sequence and procedure with placing of joists.
- F. Bearing on Masonry or Concrete Bearing Surfaces:
 1. Secure joists resting on masonry or concrete bearing surfaces by bedding in mortar and anchoring to masonry or concrete construction as specified in SJI Specifications for type of steel joist used.
 - a. Masonry or concrete required to support joists to have reach required 28-day compressive strength prior to placing joists thereon.
 - b. Area under joist bearing shall be solidly fill with grout.
 2. Furnish anchor bolts or steel bearing plates to be built into concrete and masonry construction.
 - a. Furnish templates as may be necessary for accurate location of anchors. Steel bearing plates to conform to ASTM A36.
 3. Bedding mortar:
 - a. Sand cement grout:
 - 1) Approximately 3 parts sand, 1 part portland cement, 6 plus/minus 1 percent entrained air and water to produce a slump which allows grout to completely fill required areas and surround adjacent reinforcing.
 - 2) Minimum 28-day compressive strength: 3000 psi.
 - b. Non-shrink grout complying with COE CRD-C621.
- G. Provide type, size, spacing, and attachment of bridging in accord with SJI and AISC Specifications, where not specifically indicated otherwise, except as modified herein.
 1. Provide diagonal type bridging as indicated.
 2. Do not use sag rods as substitute for bridging.
- H. Install bridging completely, immediately after erection, and before any loads are applied.
 1. Anchor ends of bridging lines at top and bottom chords of each joist and where terminating at walls or beams.

2. Provide bridging connections at top and bottom chords capable of safely resisting a force specified by SJI Specifications for open web, long span, deep long span joists, and joist girders respectively.
 3. Where five rows of bridging are required in spans over 40 FT, laterally brace each joist before erecting next joist or applying loads.
 4. Do not release hoisting cables before installing center row of diagonal bridging and anchoring bridging line to prevent lateral movement.
 5. During construction period, Contractor is responsible for any loads placed on joists.
 - a. Contractor's attention is directed the fact that joists may be unstable and cannot carry their design load until steel deck and bridging are completely installed.
- I. Remove or repair damaged joists or other work, to satisfaction of Engineer at no additional expense to Owner.
- J. After installation, touch up paint or field paint as specified in Section 09905.

3.3 FIELD QUALITY CONTROL

END OF SECTION

SECTION 05313**METAL DECK****PART 1 - GENERAL****1.1 SUMMARY**

A. Section Includes:

1. Manufactured metal roof deck.
2. Manufactured {composite} metal form deck.

B. Related Sections include but are not necessarily limited to:

1. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Iron and Steel Institute (AISI):
 - a. Specification for the Design of Cold-Formed Steel Structural Members.
2. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - c. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - d. A924, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - e. A1008, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - f. D746, Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - g. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
3. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code - Steel.
 - b. D1.3, Structural Welding Code - Sheet Steel.
4. Steel Deck Institute (SDI):
 - a. Design Manual for Composite Decks, Form Decks, Roof Decks, and Cellular Metal Floor Deck with Electrical Distribution.
5. Underwriters Laboratories, Inc. (UL):
 - a. Fire Resistance Directory.

B. Qualifications:

1. Manufacturer: Member of SDI.
 - a. Structural design of manufactured deck shall be prepared by a qualified professional engineer retained by the manufacturer.
2. Qualification of welding work:
 - a. Qualify welding processes, operations, and operators in accordance with requirements of AWS D1.1 and AWS D1.3.
 - b. Welding operators to have been qualified during the 12-month period prior to commencement of welding, and be experienced in welding light gage metal.

1.3 SUBMITTALS

A. Shop Drawings:

1. See FP – 03, Subsection 104.03.
2. Fabrication and/or layout drawings:
 - a. Detailed Shop Drawings showing the following:

- 1) Complete framing and erection layouts.
 - 2) Location, length, type, cross section, thickness, and markings of metal deck units.
 - a) Size and location of openings.
 - b) Accessories and reinforcing.
 - 3) Sequence and procedure to be followed for erecting, fastening, and securing the deck units.
 - 4) Shop applied coatings.
 - 5) Location of required shoring for composite metal form decks.
 - 6) Details and gages of accessories and miscellaneous items showing sump pans, cant strips, ridge and valley plates, closure strips and insulation supports.
 - 7) Welding procedures for installation including size, number, type and location of all welds required to install deck units.
 - 8) Recommended welding rod size, type, burn off rate and welder setting for deck thickness to be joined.
 - a) Define welds by use of standard AWS welding symbols.
 - 9) Correct fitting of members and accessories.
 - 10) Size and location of all openings in deck and all conditions requiring closure panels and supplementary framing.
 - 11) Shop Drawings shall not be reproductions of the Contract Drawings.
3. Product technical data including:
 - a. Metal deck manufacturer's specifications and installation instructions.
 - b. Manufacturer's specifications and installation instructions for:
 - 1) Welds and welding procedure.
 - 2) Galvanizing repair paint.
 - 3) Screws.
 - 4) Joint sealing compound.
 - c. Manufacturer's load tables for deck to be furnished on this project, including:
 - 1) Allowable gravity load for metal roof deck.
 - 2) Allowable diaphragm shear values for metal roof deck.
 - 3) Allowable superimposed load for composite metal form deck.
 - 4) Allowable unshored span lengths for composite form deck.
 4. Manufacturer's certification that metal deck complies with specified requirements:
 - a. Manufacturer member of SDI.
 - b. Deck material, manufacturing, and shop testing and inspection are in accordance with SDI requirements.
 - c. Welders.
 5. Test reports.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle metal deck as recommended by SDI.
 1. Exercise care to avoid damage to deck.
- B. Protect materials from rusting, denting or crushing.
 1. Store metal deck on project site off the ground with one end elevated to provide drainage and protected from the elements with a waterproof covering, ventilated to avoid condensation.
 2. Prevent rust, deterioration and accumulation of foreign material.

1.5 PROJECT CONDITIONS

- A. Do not overload supporting members.
 1. Until the entire assembly is complete, the structural elements may not be stable or capable of supporting code or stated design loads.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. 1-1/2 IN deep metal roof deck:
 - a. Vulcraft, Type 1.5B.
 - b. United Steel Deck, Inc., Type B.
 2. none
 - a. none
 - b.
 3. none
 4. none
 - a. none
 5. none
 - a. none
 - b. none
 6. none
 - a. none
 - b. none

2.2 METAL ROOF DECK

- A. Design of the metal deck to be supplied to have been checked by the SDI and found to conform to the standard specifications and load tables.
 1. The allowable superimposed live uniform loading per square foot for metal roof deck supplied for the spans indicated shall equal or exceed the allowable superimposed live uniform load per square foot for the same spans as indicated in the SDI latest tables.
 2. Maximum deflection: Less than 1/240 of span under live load.
- B. Use deck configurations complying with SDI Design Manual and as indicated.
 1. none
 2. Galvanized deck: ASTM A653 with ASTM A924 {G90} zinc coating.
- C. Metal Roof Deck, 1-1/2 IN Deep:
 1. Wide rib type, sheet steel, { 20} GA, minimum, with minimum uncoated thickness of {.0358} IN, {galvanized} {shop painted} {galvanized or shop painted}.
 2. Wide rib deck: Depth 1-1/2 IN, ribs spaced approximately 6 IN OC; width of rib opening at top surface maximum 2-1/2 IN; width of bottom rib surface minimum 1-3/4 IN.
- D. None

2.3 NONE.



- A. none
- 1. none
- B. none

2.4 FABRICATION

- A. Minimum Deck Thickness:
 1. Where gage of metal is indicated, provide the following:

- a. Minimum uncoated decimal thickness:

GAGE	DESIGN THICKNESS
20	0.0358 IN

- b. The delivered thickness of the uncoated steel shall not be less than 95 percent of the design thickness.
2. The steel used shall have a minimum yield stress of 33 ksi.
- B. Fabrication:
1. Fabricate deck units in lengths to span three or more support spacings with flush, telescoped or nested 2 IN end laps.
 - a. Joints occur on supporting members.
 - b. Provide deck units having {overlapping} {interlocking} male and female type side laps or joints to provide positive vertical and lateral alignment of adjacent deck units.

2.5 ACCESSORIES

A. Metal Closure Strips:

1. Form to configuration required to provide tight-fitting closures at open ends and sides of deck.
2. Minimum thickness before galvanizing 0.0358 IN (20 GA).

B. Ridge and Valley Plates:

1. Minimum width: 4-1/2 IN.
2. Bend to provide tight-fitting closure with deck units.
3. Provide plates in 10 FT length where possible.
4. Minimum thickness before galvanizing: {0.0358 IN (20 GA).} {0.0747 IN (14 GA).}

C. Roof Sump Pans:

1. Fabricate from a single piece of galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain.
2. Provide sump pans of adequate size to receive roof drains with bearing flanges minimum 3 IN wide.
3. Recess pans not less than 1-1/2 IN below roof deck surface, unless otherwise indicated or required by deck configuration.
4. Minimum thickness before galvanizing: 0.0747 IN (14 GA).

D. Cant Strips:

1. Bend cant strips to form 45 degree slope not less than 5 IN wide, with top and bottom flanges not less than 3 IN wide.
2. Minimum thickness before galvanizing 0.0358 IN (20 GA).

E. Insulation supports.

F. Venting: Slotted openings in bottom flutes in accordance with manufacturer's standards.

G. Metal Closures and Pour Stops: Form to configuration required to provide mortar-tight closures at open sides and ends of deck.

H. Primer Paint Required for Metal Deck: Deck manufacturer's baked on, rust-inhibitive paint applied to chemically cleaned and phosphate chemically treated metal surfaces.

I. Galvanized coating for metal deck accessories shall conform to ASTM A924 {G90} zinc coating.

J. Galvanized Repair Paint: For repair of damaged galvanized surfaces, comply with Section 09905.

K. Screws:

1. Self-drilling, self-tapping, #12 size minimum hex washer head sheet metal screws.
2. Carbon steel by Hilti or equal.

- a. Organic zinc chromate coated, Hilti Kwik-cote or equal.
- L. Miscellaneous Steel Shapes: Comply with ASTM A36.
- M. Sheet Metal Accessories: Same material and finish as deck members.
- N. Flexible Closure Strips for Deck:
 1. Vulcanized, closed cell expanded chloroprene elastomer, complying with ASTM D1056, Grade SCE 41.
 2. Brittleness temperature: -40 DegF, ASTM D746.
 3. Flammability resistance: "Self-extinguishing."
 4. Install with adhesive in accordance with manufacturer's instructions.
 - a. Ensure complete closure.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine areas and conditions under which metal deck is to be installed for conditions detrimental to proper and timely completion of work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Do not start placement of metal deck until supporting work is in place and secured.
- D. Deck will be subject to rejection if:
 1. Metal deck units do not comply with requirements of SDI specifications and requirements herein.
 2. Metal deck is improperly manufactured, painted or installed.
 3. Metal deck is damaged so that strength is impaired.
 4. Metal deck is not installed as indicated on Drawings.

3.2 INSTALLATION

- A. Install roof deck units, {composite form deck units} and accessories as indicated, in accordance with SDI Design Manual, manufacturer's recommendations, final approved Shop Drawings and as specified herein.
- 1. Furnish manufacturer's standard accessories as needed to complete the deck installation.
 - B. Locate deck bundles to prevent overloading of structure.
 - C. Do not overload metal deck or supporting members:
 1. Contractor is solely responsible for safety, construction means, methods and sequencing of the Work.
 2. Until the entire assembly is complete, the structural elements may not be stable or capable of supporting code or stated design loads.
 3. Use care to assure deck construction loads are less than the recommendation of the SDI Design Manual, except where temporary shoring is installed.
 - D. Place each deck unit on supporting structural frame, adjust to final position, accurately align with ends bearing on supporting members.
 1. Lap roof deck units at ends no less than 2 IN.
 2. Interlock units at sides without stretching, contracting, or deforming.
 3. Place deck units flat and square and secure to framing without warp or excessive deflection.
 4. Place units in accurate and close alignment for entire length of run and with close registration of flutes of one unit with those of abutting unit.
 - E. Plug weld sizes specified are effective fusion diameter of welds.
 1. Weld metal shall penetrate all layers of deck material and have good fusion to supporting members.
 2. Do not burn through deck.
 - F. Prevent overtightening of screw fasteners by using a tool with a depth limiting nose piece and a clutch.
 - G. Fastening of 1-1/2 IN Deep Metal Roof Deck:

1. Secure deck units to supporting frame and side laps as follows:
 - a. Fasten edge ribs of panels at each support.
 - b. At all interior supports and at ends of deck use:
 - 1) For 24 IN wide deck: Three 5/8 IN round plug welds per deck unit.
 - 2) For 30 and 36 IN wide deck: Four 5/8 IN round plug welds per deck unit.
 - 3) none
 - c. At perimeter supports, use 5/8 IN round plug welds at 12 IN OC.
 - d. At side laps, use {#12 hexhead screws at 18 IN OC} {5/8 IN round puddle weld or 3/8 x 1-1/2 IN arc seam weld at 18 IN OC}.
- e. Provide 5/8" round plug welds at each deck valley at 6" o.c to anchor deck to all supports
- .
 - H. none
 - I. Remove and replace deck which is structurally weak or unsound or which has burn holes due to improper welding or damage which Engineer declares defective.
 - J. Cut and fit deck units and accessories around other work projecting through or adjacent to decking.
 1. Make cutting and fitting neat, square and trim.
 - a. Cut deck by mechanical means, not by burning.
 2. Neatly and accurately install reinforcing at all openings except:
 - a. Circular openings less than 6 IN DIA.
 - b. Rectangular openings having no side dimension greater than 6 IN.
 3. Reinforce openings that have not been framed between 6 and 12 IN with 20 GA flat steel sheet 12 IN greater in each dimension than opening.
 - a. Place sheet around opening and fusion weld to top surface of deck at each corner and midway along each side.
 - K. Install insulation supports for support of roof insulation.
 1. Provide where top surface of roof deck does not occur adjacent to edge and openings as required to completely support roof insulation.
 2. Weld into position.
 - L. Install metal closure strips at all open uncovered ends and edges of roof deck, and in voids between deck and other construction.
 1. Weld into position to provide a complete decking installation.
 2. Provide flexible closure strips instead of metal closures, at Contractor's option and when approved by Engineer wherever their use will ensure complete closure.
 - a. Install with elastomeric type adhesive in accordance with written directions and recommendations of manufacturers of closure strips and adhesives.
 - M. Ridge and Valley Plates:
 1. Weld ridge and valley plates to top surface of roof deck.
 2. Lap end joints not less than 3 IN with laps in direction of water flow.
 - N. Roof Sump Pans:
 1. Place over openings in roof deck.
 2. Weld to top deck surface.
 - a. Space welds maximum 12 IN OC with at least one weld at each corner and each side midway between each corner.
 3. Cut opening in bottom of roof sump to accommodate drain size indicated.
 - O. Cant Strips:
 1. Weld cant strips to top surface of roof deck at 12 IN OC.
 2. Lap end joints not less than 3 IN.
 - P. Install metal closures to close all openings and gaps between form deck and other construction, at objects projecting through deck, at locations where deck changes direction, and at open ends of deck units where deck units terminate.

1. Weld into position to provide a complete installation.
 - Q. Install pour stops continuous around the perimeter of the floor:
 1. Locate so that the floor slab terminates beyond the perimeter support centerline a distance as indicated on the Contract Drawings.
 2. Weld into position adequately to resist forces due to placement and finishing of concrete and in accordance with manufacturer's recommendations.
 - R. Clean and Touch Up:
 1. Remove all surplus materials and debris from surface of deck after installation.
 2. Wire brush, clean and paint scarred areas, welds and rust spots on top surfaces of deck units and supporting steel members in compliance with Section 09905.
 3. Touch-up damaged galvanized surfaces with galvanizing repair paint applied {in accordance with manufacturer's instructions} {in compliance with Section 09905}.

3.3 FIELD QUALITY CONTROL

- A. Remove and replace defective or damaged deck units.
- B. Testing:
 1. The following test shall be made in the presence of the {Contracting Officer} and {Testing Agency} employed on the project on the first deck panel to be installed.
 2. Place one end of panel over a perimeter support and attach it only to that support with two welds as specified 6 IN apart.
 3. The opposite end of the panel shall be moved in plane parallel to the span of the panel until shear distress is noted in the weld.
 4. The welds shall be of sufficient quality to cause local distortions in the panel around the welds and show good perimeter contact between the welds and the panel.
 5. When the results of this test are satisfactory and approved by the {Contracting Officer} and {Testing Agency}, the remainder of the deck may be installed using the same weld rod size and type, amperage setting, and procedures used in the tested deck.
 6. The remainder of the welds shall be visually inspected.
 - a. When in the opinion of the {Engineer} {Testing Agency} any weld is of poor quality, an additional weld shall be provided adjacent to the rejected weld.
 - b. It shall be a sufficient distance away from the rejected weld so that the new weld will be done on sound, unburned deck.

END OF SECTION

SECTION 06100
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Rough carpentry.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Forest and Paper Association (AF&PA):
 - a. NDS, National Design Specifications.
 2. American Wood Preservers Association (AWPA):
 - a. Book of Standards.
 - b. Use Category System.
 3. APA - The Engineered Wood Association (APA):
 - a. PRP-108, Performance Standards and Qualification Policy for Structural Use Panels.
 - b. U450D, Storage and Handling of APA Trademarked Panels.
 - c. Y510T, Plywood Design Specification.
 4. ASTM International (ASTM):
 - a. D2898, Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
 - b. D4442, Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - c. D4444, Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters.
 - d. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 5. Environmental Protection Agency (EPA).
 6. Underwriters Laboratories, Inc. (UL):
 - a. 723, Standard for Safety Test for Surface Burning Characteristics of Building Materials.
 7. National Institute of Standards and Technology (NIST):
 - a. PS 1, Construction and Industrial Plywood.
 - b. PS 2, Performance Standard for Wood-Based Structural-Use Panels.
 - c. PS 20, American Softwood Lumber Standard.
 8. Western Wood Products Association (WWPA).
 9. Building code:
 - a. Florida Building Code (FBC):
 - 1) Florida Building Code and associated standards, 2004 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
1. Wood Treatment Plant: AWPA M3.
 2. Treated Wood Inspection: AWPA M2.
- C. Miscellaneous:
1. Factory marking:
 - a. Lumber:
 - 1) Identify type, grade, moisture content, inspection service, producing mill, and other qualities specified.
 - 2) Marking may be omitted, as allowed by Building Code, if certificate of inspection is provided for each shipment.

1.3 SUBMITTALS

- A. Shop Drawings:
 1. See Section FP – 03, Subsection 104.03.
 2. Fabrication drawings of all fabricated items.
 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions for all products specified.
 4. Certifications:
 - a. Chemicals used in treatment process are registered with and approved by EPA.
 - b. Moisture content of material prior to treatment: 25 percent maximum.
 - c. Material has been kiln-dried after treatment (KDAT) to the moisture content specified.
 5. Documentation of treatment of preservative treated material in accordance with standards referenced.

1.4 DELIVERY AND STORAGE

- A. Delivery, storage and handling of untreated wood products:
 1. Lumber: As recommended by the grading agency indicated on the grade stamp.
 2. Plywood: APA U450D.
- B. Delivery, storage, handling and disposal of treated wood products: AWPA M4.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: (All lumber and plywood use on project shall be borate treated equivalent to N-Durz by Great Southern Woods.
 1. Lumber (for framing, blocking, nailers, furring, grounds and similar members):
 - a. NIST PS 20.
 - b. Species:
 - 1) Treated material: As indicated in the appropriate AWPA Standard
 - c. Grade:
 - 1) For nominal sizes up to and including 2 x 4: Standard and better.
 - 2) For nominal sizes up to 2 IN thick and wider than 4 IN: #2 and better.
 2. Plywood:
 - a. NIST PS 1, NIST PS 2.
 - b. APA PRP-108, Y510T.
 - c. Sheathing
 - 1) Exposure: INT (Equipment backboards, blocking); EXT (Pavilion roof deck)
 - 2) Thickness: 5/8 IN.
 3. Moisture content:
 - a. Kiln-dry, ASTM D4442 and ASTM D4444.
 - b. Lumber, 19 percent maximum.
 - c. Plywood, 15 percent maximum.
- B. Rigid Board for roof and EIFS substrates
 - a. 5/8 IN. thick, glass mat-faced, noncombustible, nonstructural, treated gypsum core panels equivalent to DensDeck by Georga-Pacific Gypsum company.
 - b. Resist mold growth when tested, as manufactured, per ASTM D 3273.
- C. Preservative Treated Material:
 1. Moisture content:
 - a. Prior to treatment: 25 percent.
 - b. Kiln-dry after treatment (KDAT), ASTM D4442 and ASTM D4444:
 - 1) Lumber: 19 percent maximum.
 - 2) Plywood: 18 percent maximum.
 2. Preservative:
 - a. Waterborne, AWPA P5.

- b. As indicated in the appropriate AWPA commodity standards.
- 3. Pressure-treat material in accordance with AWPA C1 and the following:
 - a. Lumber: C2, C15 and C29.
 - b. Plywood: C9 and C29.
- 4. Wherever practicable, material to be treated shall be manufactured in its final form prior to treatment.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify measurements, dimensions, and shop drawing details before proceeding.
- B. Coordinate location of furring, nailers, blocking, grounds and similar supports for attached work.
- C. Eliminate sharp projections which would puncture roofing, flashing or underlayment material.

3.2 ERECTION AND INSTALLATION

- A. General:
 - 1. Provide treated material in accordance with appropriate AWPA standard for intended end use.
 - 2. Provide preservative treated material for all wood used:
 - a. Outside building.
 - b. Below grade.
 - 3. Field treat cuts and holes in preservative and fire-retardant treated material in accordance with AWPA M4.
- B. Attach work securely by anchoring and fastening as indicated or required to support applied loading.
 - 1. Provide washers under bolt heads and nuts.
 - 2. Fasten plywood in accordance with APA recommendations.
 - 3. Use galvanized nails and fasteners unless indicated otherwise.
 - 4. Use common wire nails or screws for general work.
 - 5. Use fasteners of size that will not penetrate members where opposite side will be exposed to view or receive finish materials.
 - 6. Install fasteners without splitting of wood; predrill as required.
 - 7. Do not drive threaded friction type fasteners.
 - 8. Tighten bolts and lag screws at installation and retighten as required.
- C. Set work to required levels and lines, plumb, true.
 - 1. Shim as required.
 - 2. Cut and fit accurately.
- D. Provide wood grounds, nailers, or blocking where required for attachment of other work and surface applied items.
 - 1. Form to shapes indicated or required.
 - 2. Grounds:
 - a. Dressed, key beveled lumber minimum 1-1/2 IN wide of thickness required to bring face of ground even with finish material.
 - b. Remove temporary grounds when no longer required.
 - 3. Install roofing nailers as indicated:
 - a. Install per roofing manufacturer's recommendations.
 - b. Match height of nailers to insulation.
 - c. Anchor nailers to resist force of 75 PLF.
 - d. Use minimum of three (3) anchors for each nailer with 1/2 IN vent spaces between lengths of nailers.
 - e. Install nailers over vapor retarder where indicated.
- E. Install wood furring plumb and level with closure strips at all edges and openings.

- F. When wood has been exposed to moisture allow to completely dry out prior to covering with additional wood or another material.
- G. Correct or replace wood which shows bowing, warping or twisting to provide a straight, plumb and level substrate for applications of other materials.
- H. Mechanically attach roof boards into metal deck using spacing recommended by manufacturer to allow for compliance to applicable wind loads and as to maintain rating for specified roof system.

END OF SECTION

SECTION 06200
FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Finish carpentry.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 06100 - Rough Carpentry.
 - 2. Section 06410 - Architectural Cabinetwork (Millwork).
 - 3. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Architectural Woodwork Institute (AWI):
 - a. Architectural Woodwork Quality Standards.
- B. Qualifications:
 - 1. Workmanship and materials shall meet AWI premium grade standards.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Section FP – 03, Subsection 104.03.
 - 2. Fabrication drawings of all fabricated items.
 - 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, materials shall be equivalent to products provided by the following acceptable manufacturers:
- B. Stain and varnish:
 - a. Pratt and Lambert.
 - b. Cabot.
 - c. PPG/Rez.

2.2 MATERIALS

- A. Hardwood Trim: Solid, S4S:
 - 1. AWI 300 premium grade, Grade II, for exposed surfaces.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set items in proper location, assemble, level, neatly fit and secure in place.

- B. Set all nails.
- C. Fill holes.
- D. Sand smooth before application of finishes.
- E. Finishing Hardwood:
 - 1. Apply all materials in accordance with manufacturer's recommendations.
 - 2. Set all nails.
 - 3. Sand smooth.
 - 4. Apply one coat of gloss varnish specified cut 10 percent with paint thinner recommended by manufacturer.
 - 5. Sand and dust.
 - 6. Fill all nail holes, manufacturing defects, etc., with wood filler which has been tinted to match color of stain.
 - 7. Apply one coat gloss varnish specified at full strength.
 - 8. Sand and dust.
 - 9. Apply final coat of satin varnish specified at full strength.

END OF SECTION

SECTION 06410**ARCHITECTURAL CABINETWORK (MILLWORK)****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Architectural cabinetwork.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07900 - Joint Sealants.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Hardboard Association/American National Standards Institute (AHA/ANSI):
 - a. A135.4, Basic Hardboard.
 - 2. ASTM International (ASTM):
 - a. D4442, Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - b. D4444, Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters.
 - 3. American Wood Preservers Association (AWPA):
 - a. Book of Standards.
 - b. Use Category System.
 - 4. Architectural Woodwork Institute (AWI):
 - a. Architectural Woodwork Quality Standards.
 - 5. Hardwood Plywood and Veneer Association (HPVA):
 - a. HP-1, Standard for Hardwood and Decorative Plywood.
- B. Qualifications:
 - 1. Fabricator shall have minimum of 10 years experience in design and fabrication of architectural cabinetwork with minimum of three (3) successfully completed projects with similar scope in the last two (2) years.
- C. Miscellaneous:
 - 1. Construction details, fastening, tolerances and workmanship: AWI custom premium grade standards with exceptions indicated.

1.3 DEFINITIONS

- A. Architectural Cabinetwork: Millwork.
- B. Exposed Surfaces:
 - 1. All surfaces visible when doors and drawers are closed, inside of doors, and:
 - a. Door and drawer fronts and their edges.
 - b. Exposed end.
 - c. Countertop and backsplash and their exposed edges.
 - d. Face frame (if used).
 - e. Interior of open cabinets.
 - f. Toe strip not to be covered by separate base.
 - g. Wall mounted adjustable shelves.
 - h. Bottom of wall case over 4 FT above floor.
 - i. Top of wall and tall cases below 6 FT above floor.
- C. Concealed Surfaces:
 - 1. Surfaces not visible after installation, and:
 - a. Web frames.
 - b. Dust panels.

- D. Semi-Exposed Surfaces:
 - 1. All other surfaces not exposed or concealed.

1.4 SYSTEM DESCRIPTION

- A. Fabricated cabinets including all hardware, countertops, and finishing thereof.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Fabrication drawings and details showing compliance with this Specification.
- B. Miscellaneous Submittals:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Millwork fabricator experience qualifications.
 - 3. Listing of millwork fabricators projects within last two (2) years with similar scope.
- C. Samples:
 - 1. Solid Surfacing material color and finish samples for Contracting Officer's approval.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all millwork items to the Project Site and store in the area in which items will be installed.
 - 1. Building areas to receive millwork items shall be enclosed, weathertight and conditioned to a relative humidity between 25 percent and 55 percent before, during and after installation.
 - 2. Remove any plastic packaging or wrapping from millwork upon delivery to Project Site.
 - 3. Protect stored items from damage with vapor-permeable covering during storage.
 - 4. Allow material to acclimate to the surrounding environment a minimum of 96 HRS prior to installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, materials shall be equivalent to products provided by the following acceptable manufacturers:
 - 1. Solid Surfacing Material:
 - a. Formica Corp.
 - b. Nevamar Corp.
 - c. Wilsonart International.
 - d. DuPont Corian
 - 2. Cabinet hardware:
 - a. Epco.
 - b. Faultless.
 - c. Grant.
 - d. Ives.
 - e. Knappe & Vogt.
 - f. McKinney.
 - g. National Lock Co.
 - h. Rockford Process Control, Inc.
 - i. Stanley.
 - j. Stylmark.
 - k. Webber-Knapp.
 - 3. Sealants: See Section 07900.

2.2 MATERIALS

- A. Solid Surfacing:
 - 1. Solid homogeneous fully densified composite of modified resin and mineral fiber.
 - 2. Countertops and backsplashes and their edges: 0.50 IN thick.
- B. Particleboard: Not allowed.
- C. Fiberboard: Not allowed.
- D. Hardboard:
 - 1. Tempered, smooth on both sides.
 - 2. AHA/ANSI A135.4: Class 1, S2S.
- E. Hardwood Plywood:
 - 1. Species: White oak.
 - 2. Rotary sliced.
 - 3. Veneer.
 - 4. HPVA HP-1, Grade AA.
 - 5. Hardwood plywood for drawer boxes:
 - a. Species: Alder or Birch.
 - b. HPVA HP-1, Grade A.
 - c. Similar to States Industries "Appleply".
- F. Plywood: Softwood plywood, A grade.
- G. Hardwood:
 - 1. Solid, S4S.
 - 2. AWI 300 premium grade, Grade I, for exposed surfaces.
 - 3. Exposed: Species to match veneer plywood unless noted otherwise on Drawings.
 - 4. Other locations: Any hardwood.
- H. Preservative Treated Lumber:
 - 1. Preservative: Waterborne, AWPA P5.
 - 2. Moisture content:
 - a. Prior to treatment: 25 percent.
 - b. Kiln-dry after treatment (KDAT), ASTM D4442, ASTM D4444: 19 percent maximum.
 - 3. Pressure treat material in accordance with AWPA C1, C2, C15 and C31.
- I. Sealant:
 - 1. Silicone.
 - 2. See Section 07900.

2.3 FABRICATION

- A. General:
 - 1. Cabinetwork: Custom shop built casework, complete with all hardware, accessories, countertops and bases in sizes and configurations indicated.
 - 2. Style: Reveal overlay doors and drawer fronts overlapping case body with uniform reveal at all edges.
 - 3. Case body:
 - a. All joints glued.
 - b. Top and bottom (and fixed horizontals):
 - 1) Lock jointed and screwed.
 - 2) Dadoed or rabbeted into ends/dividers.
 - 3) Doweled at approximately 2-1/2 IN OC.
 - c. Back: Dadoed into top, sides, and bottom.
 - d. Fixed small compartment dividers: Dadoed.
 - 4. Drawers (with subfront):
 - a. All joints glued.
 - b. All corners:
 - 1) Dovetailed or doweled.

- 2) Front corners dovetailed and back corners lock jointed.
 - 3) Sides dadoed for front and back and all joints nailed, stapled or screwed.
 - c. Bottom: Dadoed into all four sides.
 - d. Front: Screwed onto subfront.
 - e. Top edges of drawer box rounded.
 - 5. Solid Surfacing countertops:
 - a. Use maximum size sheet of laminate to eliminate joints in laminate.
 - b. Backsplash: Glued and screwed onto top, with edges scribed.
 - c. If joints in solid surfacing are required locate not closer than 24 IN to sinks.
 - d. Joints in counter length: Factory fitted, splined, glued, and mechanically fastened.
 - e. 3/4 IN thick, built up to 1-1/4 IN at edges.
 - f. Colors:
 - 1) Color of material on edges: Same as top.
 - 6. Use no blocking or fasteners in exposed or semi-exposed locations.
- B. Hardware:
- 1. Hardware for hinged doors:
 - a. Hinges: Fully concealed, spring loaded, self-closing and fully adjustable, chrome steel finished. Provide "snap-on" feature and allow for door movement through minimum of
 - 2. Hardware for drawers:
 - a. Slides: KV 8400 series; 100 LB capacity, precision steel ball bearings, positive closing and pull out stops, drawer removable without use of tools; telescoping full extension slides, epoxy-coated with white finish.
 - b. Lock: Provide where indicated.
 - c. For file drawers: Label holder and file hanger frame.
 - 3. Pulls:
 - a. Stainless steel wire.
 - b. 4 IN centers.
 - c. 5/16 IN (8 mm) DIA.
 - d. Provide two (2) on drawers over 18 IN wide.
 - e. Finish:
 - 1) Stainless steel, BHMA 630
 - 4. Shelf supports (drilled hole type):
 - a. 5 mm holes drilled at 32 mm OC.
 - b. Shelf clips:
 - 1) Injection molded plastic.
 - 2) Two (2) 5 mm pins to interface with drilled holes.
 - 3) Anti-tip feature: Designed to retain either 3/4 IN or 1 IN thick shelf.
 - 4) Color: White.
 - 5) Similar to KV 339/340.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify dimensions at site.
- B. Verify locations of items furnished in other sections.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Use manufacturer's printed instructions or drawings in all cases where items or details are not indicated.
- C. Provide all trim, fillers, closures, stands, supports, sleeves, collars, escutcheons, brackets, braces or other miscellaneous items required for complete installation.

- D. Test and adjust for satisfactory operation.
- E. Seal components with silicone sealants in accordance with AWI Standards and as recommended by Solid Surface Materials manufacturer.
 - 1. Seal joints in countertops before assembly.
 - 2. Seal joints between backsplashes and endsplashes and countertops.
 - 3. Seal joints where backsplashes and endsplashes meet adjoining surfaces.
- F. Adjust hinges so doors hang straight.

END OF SECTION

SECTION 07190**UNDER SLAB VAPOR BARRIER****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Under slab vapor barrier.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 3 – Section 03002 - Concrete.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - b. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - c. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - d. E1643, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - e. E1745, Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- B. Miscellaneous Submittals: Manufacturer's recommendation on vapor retarder tape.
- C. Samples: Provide 6 IN x 6 IN sample of vapor barrier material and vapor barrier tape.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval :
 - 1. Vapor barrier:
 - a. Fortifiber Corporation.
 - b. Raven.
 - c. WR Meadows, Inc.
 - d. Atlas Construction Specialties Co.

2.2 MATERIALS

- A. Vapor Barrier: Polyolefin film or reinforced polyethylene or new generation resin.
- B. Vapor Barrier Tape: As recommended by vapor retarder manufacturers.

2.3 ACCESSORIES

- A. Pipe Boots: Manufacturer's standard boot fabricated to maintain the integrity of the vapor barrier system.

2.4 FABRICATION

- A. Vapor Barrier:
 - 1. ASTM E1745, Class A, minimum 15 mil thickness.
 - 2. Water vapor permeance: 0.03 maximum per ASTM E96.
 - 3. Puncture resistance: ASTM D1709, Method B, 2200 grams.
 - 4. Minimum tensile strength: 45 LBS/IN, ASTM D882.
- B. Vapor Retarder Tape: As recommended by vapor retarder manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and ASTM E1643.
- B. Place continuous vapor barrier above granular fill subgrade material where indicated on the Drawings.
- C. Lap vapor barrier 3 IN at ends and edges of sheets and seal with tape.
- D. Extend to extremities of area, turn up at perimeter to form bond breaker between slab and wall.
 - 1. Tape in place.
 - 2. Do not turn up at perimeter if slab is keyed into perimeter wall.
- E. Provide pipe boot for all pipes penetrating the floor slab.
- F. Trim off excess material even with top of slab after slab is placed.

3.2 FIELD QUALITY CONTROL

- A. Ensure proper precautions are implemented to prevent damage to installed vapor barrier membrane prior to and during pouring of concrete floor slab.
- B. Patch all punctures, tears, holes, etc., with additional layer of vapor barrier and seal entire patch with vapor barrier tape.

END OF SECTION

SECTION 07218**SPRAYED POLYICYNENE INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Sprayed polyicynene insulation applied to underside of metal deck.

1.2 QUALITY ASSURANCE

- A. Referenced Standards: Latest editions apply.
1. ASTM International (ASTM):
 - a. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - b. C518, Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - c. ASTM D2863, Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-like Combustion of Plastics (Oxygen Index).
ASTM E96- Test Method for Water Vapor Transmission Rate of Building Materials.
 2. Underwriters Laboratories, Inc. (UL).
- B. Qualifications:
1. Applicator shall have minimum of five (5) years' documented experience with minimum three (3) successfully completed projects of similar size, scope and complexity within past two (2) years.
- C. Miscellaneous:
1. Manufacturer shall inspect application equipment and certify in writing that equipment is acceptable for system specified.
 2. Comply with applicable code for non-combustibility.

1.3 DEFINITIONS

- A. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 2. Installer and applicator are synonymous.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- B. Miscellaneous Submittals:
1. See FP – 03, Subsection 104.03.
 2. Manufacturer's approval of application equipment.
 3. LEED Information: Indicate percentage of waste materials by weight diverted from landfill and recycled.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Toxicity/Hazardous Materials:
- a. Outgassing/Reactivity:
 - b. Formaldehyde: Products containing urea-formaldehyde will not be permitted.

- c. Chlorofluorocarbons (CFCs)/HCFCs: Products and equipment requiring or using CFCs or HCFCs during the manufacturing process will not be permitted.
- B. Airtightness: Meet specific standards of the Energy Star Program of 1.5 Air Changes/Hour at 50 Pa.

1.6 DELIVERY, STORAGE, AND HANDLING

- C. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- D. Store materials in an area protected from overheating damage and in accordance with manufacturer's instructions.
- E. Protect materials during handling and application to prevent damage and contamination.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Polyisocyanene Spray Insulation: Isocyanene; hydrophobic, low-density, open-cell modified polyisocyanene; conforming to the following:
 1. Thermal Resistance (R-Value/inch): ASTM C518; 3.6 hr/sq ft/degree F/BTU. In.
 2. Air Permeance (for 5.25 inches of material): ASTM E283; 0.0049 l/m²/second.
 3. Water Vapor Transmission (for 5 inches of material): ASTM E96; 10 perms.
 4. Corrosion: No significant corrosion when in contact with steel under 85 percent relative humidity.
 5. Bacterial or Fungal Growth: No growth; no material deterioration.
- B. Ignition Barrier Protective Coating: Equivalent to Aldocoat 757, sprayed –on, water-based intumescent ignition barrier coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that substrate is free of any foreign material that will impede application.
- C. Verify that other work on and within spaces to be insulated is complete prior to application.
- D. Notify Architect of conditions that would adversely affect the application.
- E. Beginning of installation means applicator accepts existing conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written installation instructions for preparing substrates indicated to receive insulation.
- B. Mask and protect adjacent surfaces from overspray or damage.

- C. Remove foreign materials, dirt, grease, oil, paint, laitance, efflorescence, and other substances that will affect application.

3.3 APPLICATION- ICYNENE

- A. Apply insulation in accordance with manufacturer's written instructions.
- B. Apply insulation to a reasonably uniform monolithic density without voids
- C. Apply insulation to fill voids around accessible service penetrations.

3.4 APPLICATION- IGNITION BARRIER

- A. Surface must be free of loose particles or other foreign material that may inhibit proper adhesion and affect performance of the coating.
- B. Apply ignition barrier using airless sprayer at a rate of 0.75 gallon per 100 SF for a minimum dry film thickness of 7.5 mils. Install as per manufacturer's recommendations.

3.5 FIELD QUALITY CONTROL

- A. Tolerances:
 - 1. Final thickness of foam insulation within minus 1/16 IN, plus 1/2 IN of specified thickness.

3.6 PROTECTION OF FINISHED WORK

- A. Do not allow subsequence of finished work to disturb finished work.

END OF SECTION

SECTION 07245**EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Finish coats of Exterior insulation and finish system (EIFS) applied to ICF concrete system..
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07600 - Flashing and Sheet Metal.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C150, Standard Specification for Portland Cement.
- B. Qualifications:
 - 1. Applicator shall be licensed or approved in writing by manufacturer.
 - 2. Applicator shall have minimum 15 years experience installing similar products on projects with similar scope.
 - 3. Applicator shall have successfully completed minimum of three (3) projects with similar scope during past three (3) years.

1.3 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.4 SYSTEM DESCRIPTION

- A. Project Design Wind Load: 140 mph.
- B. Design system for high impact resistance.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Scaled details of all joints, corners, terminations and flashings.
 - 1) Minimum scale of details: 1-1/2 IN = 1 FT.
 - c. Manufacturer's installation instructions.
- B. Miscellaneous Submittals:
 - 1. See Section FP – 03, Subsection 104.03.
 - 2. Applicator qualifications.
 - 3. Warranty.
 - 4. Letter from EIFS manufacturer stating insulation to be used is acceptable as substrate for system specified.
 - a. Provide certification that insulation has achieved minimum aging requirements.
- C. Samples:
 - 1. For initial color selection, provide manufacturer's full line color samples for Contracting Officer's finish and color selection.

2. After initial color selection, provide 12 x 12 IN sample of selected finish(es) and color(s).

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in original containers bearing manufacturer's name, identification of contents, written application instructions, and health, hazard and safety data.

1.7 WARRANTY

- A. Provide manufacturer's standard limited materials warranty signed by the manufacturer.
 1. Warranty period shall be three (3) years.
- B. Provide three (3)-year installation warranty signed by applicator against water intrusion, system or component loss of bond from substrate, peeling, flaking, chipping or cracking of surface as result of application defects.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
 1. Exterior insulation and finish system (EIFS):
 - a. Dryvit System, Inc.
 - b. STO Industries, Inc.
 - c. SYENERGY Wall Systems.
 - d. TEC, Inc.
 2. Sealant: See Section 07600.

2.2 MATERIALS

- A. Primer/Adhesive: Acrylic based material mixed with portland cement as recommended by manufacturer for use as an adhesive and for fabric embedment.
- B. Portland Cement: ASTM C150, Type 1 or II.
 1. Maximum size board: 2 x 4 FT.
- C. Reinforcing Fabric:
 1. Manufacturer's standard glass fiber field reinforcing fabric.
 2. Manufacturer is responsible for providing heavy-duty reinforcing fabric where required by project conditions.
- D. Finish Coat: Acrylic based, factory-mixed coating, having integral color and texture.
- E. Water: Potable.
- F. Primer, Adhesives, Levelers, Groundcoats: As recommended by EIFS manufacturer.
- G. Additives: Rapid binders, anti-freeze, accelerators etc., are NOT ALLOWED.
- H. Sealant: Polyurethane based material approved by EIFS manufacturer.
- I. Sheet Metal Drip: See Section 07600.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide metal lath over previously painted and/or other unsound surfaces or where indicated on Drawings or where required by EIFS manufacturer.
- C. Verify accessories are complete and sound.
- D. Provide expansion, control and/or aesthetic joints in accordance with manufacturer's guidelines and as shown on Drawings.
- E. Calk all control, expansion and other joints in accordance with manufacturer's instruction.
- F. Cure material in accordance with system manufacturer's recommendations.
- G. Provide galvanized sheet metal drip at head of all exterior openings and at bottom of wall above grade.

END OF SECTION

SECTION 07412
METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Standing seam metal roofing.
 2. Metal fascia and soffit systems.
 3. Prefinished gutters and downspouts.
 4. Vapor Barrier, roof underlayment and sheathing.
- B. Related Sections include but are not necessarily limited to:
1. Section 06100 - Rough Carpentry.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Architectural Manufacturer's Association (AAMA):
 - a. 621-02, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 2. ASTM International (ASTM):
 - a. A653, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. A792, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - c. C209, Standard Test Methods for Cellulosic Fiber Insulating Board.
 - d. C1289, Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - e. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - f. E1592, Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 - g. E1646, Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 - h. E1680, Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
 - i. F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 3. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
 - a. Architectural Sheet Metal Manual, Fifth Edition, 1993.
 - 1) Including Addendum No. 1 dated October 31, 1997.
 4. Underwriter's Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.
 - c. 580, Standard for Safety Tests for Uplift Resistance of Roof Assemblies.
 5. Building code:
 - a. Florida Building Code
 - 1) Florida Building Code and associated standards, 2004 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
1. Manufacturer shall have minimum of 10 years experience in the production of structural standing seam metal roofing.
 - a. All structural components of the roof system shall be designed and sealed by registered professional structural engineer licensed in the State of Florida.
 2. Installing contractor shall be licensed or approved in writing by manufacturer.

- 3. Contractor and installer shall have minimum of seven (7) years experience in the installation of structural standing seam metal roof systems similar to system specified.
- 4. Contractor and installer shall have successfully completed two (2) projects of similar size, scope and complexity within past two (2) years.
- 5. All roll forming performed on-site shall be supervised by personnel trained and employed by the roofing manufacturer.
 - a. Roofing manufacturer shall have been engaged in field roll forming for a minimum of 15 years with experience in roll forming long panels similar to panels being used.

C. Mock-Ups:

- 1. Prior to start of permanent roof construction construct mock-ups of roofing.
 - a. Mock-ups shall be of sufficient size to properly display all components required by the roofing and fascia system.
 - b. Mock-ups shall be a minimum 5 FT x 5 FT in size.
- 2. Mock-ups shall incorporate all components, specified and/or required but not specified, needed for a complete water and airtight roofing, fascia, system.
 - a. Components include, but are not limited to:
 - 1) Roofing panels, seaming, all eave, rake and top of roof flashing and counterflashing as well as roof/vertical wall intersection flashing and counterflashing conditions, all reglet conditions, all vertical fascia, gutter, and downspout conditions.
 - 2) All vapor barrierers, roof underlayment, sheathing, miscellaneous clips, angles, plates, brackets, closures, calking, roof penetration flashing, counterflashing.
- 3. Panels shall be same panels as specified or approved for Project.
 - a. Exact color is necessary.
- 4. Step construction to allow observation of all components.
- 5. Construct additional mock-ups or rework existing mock-ups until acceptable to Contracting Officer.
- 6. Maintain mock-ups at project site until Contracting Officer approves removal of mock-ups.
- 7. Approved mock-ups to constitute minimum acceptable standard of quality for actual construction.

D. Completed roof system to be inspected by roof manufacturer's authorized factory trained representative prior to issuance of roof warranty.

1.3 DEFINITIONS

A. Installer or Applicator:

- 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
- 2. Installer and applicator are synonymous.

B. Steep Slope: Having a pitch of 3:12 or greater.

C. PVDF: Polyvinylidene fluoride.

1.4 SYSTEM DESCRIPTION

A. Prefinished aluminum gutters and downspouts, prefinished aluminum soffit panels, fascia system and field-insulated standing seam roof system consisting of exterior panel, roofing underlayment, and vapor barrier over sheathing over metal roof deck.

- 1. Roof panel support and attachment system to be determined by standing seam roof manufacturer.

1.5 SUBMITTALS

A. Shop Drawings:

- 1. See FP – 03, Subsection 104.03.
- 2. Fabrication and/or layout drawings:
 - a. Manufacturer prepared computer generated Drawings showing anchorage, flashing, jointing and all other accessories required and all special detailing required by the system.
 - 1) Minimum plan scale: 1 IN = 8 FT.

- 2) Minimum detail scale: 1-1/2 IN = 1 FT.
 - b. Provide complete erection plan for each building structure with all details and sections referenced, all penetrations shown, expansion joints shown, detailed and referenced, and all special conditions identified, referenced and detailed.
 - c. Erection plan to identify limits of each different substrate material (decking).
 - d. Provide distinction between factory and field assembled work.
 - 3. Product technical data including:
 - a. Manufacturer data sheets on each component used in the roof system.
 - b. Acknowledgement that products submitted meet requirements of standards referenced.
 - 1) Certification by manufacturer that roofing assembly being supplied has been successfully tested under UL 580 procedures and has achieved a Class 90 rating.
 - 4. Test results:
 - a. UL 580, Class 90 test data.
 - b. ASTM E1592 test results.
 - 1) Provide results of tests conducted in accordance with ASTM E1592 for panel size and gage and clip type and spacing similar to panels and clips being used.
 - c. ASTM E1646 and ASTM E1680 test results.
 - d. Concentrated load test data.
 - 1) Load test to be conducted on panel size, gage and with clip spacing as required.
 - 5. Qualifications:
 - a. Manufacturer: Provide structural engineer qualifications.
 - b. Contractor:
 - 1) Certification of approval or license to install product from manufacturer.
 - 2) Certification of experience.
 - 3) Listing of projects completed in the past 5 years.
 - 4) Completed projects information to include, square footage of roofing installed, dollar value of roofing installed, manufacturer and type of roofing installed and contact name and telephone number of building Owner.
 - c. Installer: Provide qualifications of all personnel expected to be working on the Project.
 - 6. Roofing manufacturer's letter of approval for insulation proposed for use.
 - 7. Warranty: Sample language of manufacturer's warranty to be provided on this Project.
 - 8. Structural Engineer's sealed and signed calculations certifying that system structural components meet the requirements for lateral, upward and downward loads specified.
- B. Miscellaneous Submittals:
- 1. SeeFP – 03, Subsection 104.03.
 - 2. Final warranty.
- C. Samples:
- 1. General: Tag, identify and provide statement regarding use for all fasteners, anchor clips, closures and sealants.
 - 2. Roof panel:
 - a. Two (2) samples, full width, 24 IN long.
 - b. Provide color selected or specified when possible.
 - 3. Fasteners.
 - 4. Anchor clips.
 - 5. Closures, (both metal and non-metallic).
 - 6. Masonry reglet.
 - 7. Factory and field applied sealants.
 - 8. Color samples:
 - a. For initial preliminary color selection, provide manufacturer's color chart showing all colors available.
 - b. For final color selection, provide two (2) 2 IN x 3 IN colored metal samples, for each color selected during the initial color selection.

1.6 WARRANTY

- A. Provide 20-year complete system warranty, including material, material substrate for air and weather tightness of entire roof assembly signed by manufacturer.
 - 1. Warranty limits shall meet the minimum load capacity requirements of ASTM E1592.

- B. Provide manufacturer's 20-year warranty on panel finish against fading, chipping, cracking and peeling of the panel exterior finish and/or erosion of substrate metal. J-167
1. Repair of panel finish shall be done using material, color and application method to match surrounding panel finish.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Metal roofing and fascia products specified and shown are manufactured by AEP Span. Designing around a specific manufacturer is not intended to limit other manufactures with equivalent products from bidding the work.
- B. Manufacturers listed and other manufacturers not listed, but capable of meeting these specifications, are expected to provide a system with similar profile, standing seam height, spacing, construction and factory applied finish.
- C. Subject to compliance with the Contract Documents, materials shall be equivalent to products provided by the following acceptable manufacturers:
 1. Metal roofing:
 - a. AEP Span
 - b. Centria
 - c. Other manufacturers capable of providing structural standing seam system and profiles similar to that specified will be considered.
 2. Vapor retarder:
 - a. Griffolyn Vaporguard
 3. PVDF coating:
 - a. Atofina Chemicals - KYNAR 500.

2.2 MATERIALS

- A. Roof Panels: Prefinished Galvalume® sheet, ASTM AZ50 made of 55% aluminum, 1.6% silicon and the balance zinc as described in ASTM specification A792, 22 ga.
- B. Perimeter Trim, Panel Closures, Flashing and Counterflashing:
 1. Material and factory applied finish to match roof panels.
- C. Fasteners: 300 series stainless steel, ASTM F593.
- D. Intermediate Support System:
 1. Galvanized steel: ASTM A653, SQ, Grade 50, G90 coating.
- E. Sealant: Manufacturer's standard.
- F. Sheathing: See Section 06100.

2.3 ACCESSORIES

- A. Gutters and Downspouts:
 1. Aluminum-zinc coated steel, ASTM A792, SQ, Grade 50B.
 - a. Minimum thickness: 22 GA.
 - b. Galvanized G90 coating.
 - 1) Meet requirements of AAMA 621-02.
 2. Gutters:
 - a. Profile shown on drawings.
 - 1) Seamless except for expansion joints.
 - b. All exposed surfaces to have finish and color to match roofing metal.
 - c. Gutter straps and eave closure flashing: Minimum 22 GA to match gutter material, finish and color.
 3. Downspouts:
 - a. Profile shown on drawings.
 - 1) Seam on concealed side of downspout.

- 2) Provide gutter to downspout connection similar to SMACNA Figure 1-33B, Detail 1.
 - b. Downspout straps: Minimum 22 GA with finish and material to match downspout.
 - c. Finish: To match roof panels.
 - d. Color: To match roof panels..
- B. Vapor Barrier (Non-Fire Rated):
 1. Water vapor permeance: 0.00 maximum.
 2. Tensile strength: ASTM D 882: 100lbs/2,200 psi
 3. Puncture resistance: ASTM D 4833: 42 lbs.
 4. Similar to Griffolyn Vaporguard.

Roof Underlayment

1. Roof underlayment shall be equivalent to Grace Ice and Water Shield, 40 mil, 36" wide.
- C. Roof Penetration Flashing:
 1. Round penetrations: Premolded EPDM boot with metal collar similar to "DEK-TITE" by Buildex.
 - D. Flashing Curb:
 1. Provided by metal roofing manufacturer.
 2. One-piece completely seal welded prefabricated roof curb, including vertical flashing, and counter flashing, cricket on high side of penetration and flat pan fabricated to replace standing seam metal roof panel.
 3. Size as required for penetration.
 4. Bottom sloped to match roof.
 - a. Level on top.
 5. Minimum 16 GA galvanized metal finished to match roof panel.
 - E. Foam and metal closures, calking, gaskets, fasteners, washers, clips, angles, and all miscellaneous trims shall be provided by roofing manufacturer, fabricated for the specific condition as required.

2.4 FABRICATION

- A. General:
 1. Fabricate with square, true corners, mitered and welded.
 2. Fabricate trim, flashings and closure pieces to match panel profile and finish.
 3. Hem all edges.
 4. Fabricate panels with sufficient thickness to meet specified UL 90 wind uplift requirements.
 5. Factory fabricated panel with integral continuous overlapping seams suitable for continuous locking or crimping by mechanical means during installation. Field rollformed panel profiles will not be acceptable.
- B. Standing Seam Metal Roof Panels:
 1. Profile: AEP Span Span-Lok Galvalume steel warranted for 20 years.
 2. Height of standing seam: 2 IN.
 3. Gage: 22.
 4. Width: 16 IN.
 - a. Longitudinal stiffening elements to minimize oil canning.
 5. Provide factory installed, high grade, hot-melt elastomeric sealant, within the confines of female seam flange, on bottom edge of female seam flange, designed to seal against adjacent male panel leg.
 5. Finish:
 - a. PVDF based with minimum 70 percent resin.
 - b. Three-coat system having minimum 0.8 mil epoxy primer coat on both sides of panel with a 0.8 mil PVDF resin color coat and a 0.8 mil PVDF resin clear top coat on the exterior side of the panel.
 - c. Meet or exceed requirements of AAMA 621-02.

- d. Smooth finish.
- e. Similar to Kynar 500".
- f. Color:
 - 1) To be selected from manufacturers full range of colors.
 - 2) Low gloss finish: Maximum 10 percent gloss rating.
- 6. Concealed fasteners:
 - a. Provide concealed fasteners in all locations.
 - b. If exposed fasteners are required by the roof panel manufacturer, because of location, constructability issues or other critical design requirement, finish of fastener shall match roof panel finish.
 - 1) Exposed fasteners are to be approved by Contracting Officer.
 - c. The use of deflection limiter devices is not allowed.
- C. Intermediate Support System:
 - 1. Roof panel anchor clips:
 - a. Manufacturer's standard one-piece clip suitable for condition.
 - 1) Two-piece clips are acceptable if required by roofing manufacturer.
 - b. Minimum 16 GA.
 - c. Galvanized G90 coating.
 - d. ASTM A653, Grade 50.
- D. Flush Metal Fascia System:
 - 1. 22 gage metal to match roof material and finish. Use maximum lengths possible on straight runs and preformed corners.
- E. Perforated Metal Soffit System:
 - 1. Profile:
 - a. Galvalume steel perforated ventilating panels providing 17 square inch of free air space per linear foot of panel.
 - b. All panels, exposed fasteners, retaining angles, etc., shall be finished with material and color to match roof panels.

2.5 SOURCE QUALITY CONTROL

- A. Structural Testing
 - 1. Structural-uniform uplift load capacity of the panel system shall be determined in accordance with ASTM E1592.
 - a. The factor of safety on the test results shall be 1.65 for the panel, batten or clip ultimate loads with no increase for wind.
 - b. The factory of safety for fasteners shall be 3.0 for one (1) single fastener per clip, 2.25 for two (2) fasteners per clip and 4.0 in masonry.
 - c. Design uplift capacity for conditions of gage, span or loading other than those tested may be determined by interpolation of test results.
 - 1) Extrapolation of conditions outside the range of the tests is not acceptable.
 - d. Deflection shall be L/180 for positive loading.
- B. Water penetration: No uncontrollable leakage at minimum 6.4 psf when tested in accordance with ASTM E1646.
- C. Air infiltration: Maximum 0.00 scfm/SF when tested at 4.0 psf differential pressure when tested in accordance with ASTM E1680.
- D. The panel system shall have a UL 580, Class 90 rating.
- E. The panels shall withstand a 250 LB concentrated load applied to a 4 SQ IN area at the center of the panel at mid span between supports with no panel deformation, rib buckling, or panel sidelap separation which will adversely affect the weather tightness of the system.
- F. Support roofing panels on top of roof insulation using bearing plates attached to the structural frame or connect to manufacturer-provided intermediate support system.
 - 1. Bearing plate and standing seam roof panel anchor clip attachment is to be determined by the roofing manufacturer and shall take precedent over this Specification.

- a. Provide attachment to roof structural frame or deck as required for loading criteria specified.
- 2. Roof panel anchor clips shall be designed to allow thermal movement of the panels except where specific fixed points are indicated.
 - a. Roof panel manufacturer shall be responsible for determining fixed point locations unless otherwise indicated.
 - b. Wood blocking shown at roof edge is strictly for attachment of miscellaneous flashings and shall not be used for any structural value.
- 3. Maximum spacing of roof clips shall be determined by manufacturer.
- G. Roof panel manufacturer shall be responsible for designing and installing all necessary expansion joints in the roof system.

2.6 MAINTENANCE MATERIALS

- A. Provide Owner with 4 OZ of touch-up paint to match each different color used in the system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide all closures, trim, angles, plates, calking, gaskets, fasteners, washers, etc., as required for a complete water and air tight installation.
- B. Install all soffit panels in accordance with manufacturer's recommendations using concealed fasteners when possible.
 - 1. Exposed fasteners to be painted to match soffit finish.
- C. Install products in accordance with manufacturer's instructions, SMACNA (where referenced) and details shown on Drawings.
- D. Attachments shall allow for thermal expansion and contraction.
- E. Seal all joints as required for watertight installation.
- F. Install panels in one (1) continuous length from ridge to eave.
- G. Touch-up paint all damaged surfaces.
- H. Install vapor barrier in accordance with manufacturer's recommendations.
 - 1. Repair all tears and tape all joints with tape recommended by vapor barrier manufacturer.
 - 2. Lap joints minimum 4 IN.
- I. Install roof underlayment per manufacturer's recommendations.
 - 1. Provide underlayment from eave line to a point that is a minimum of 36 IN horizontally inside the interior face of the exterior wall.
 - 2. Provide at all ridges, hip ridges and hip valley lines extending minimum 36 IN up the slope at valleys and down the roof slope each side of the ridge line.
- J. Gutters:
 - 1. Install gutters using gutter straps in accordance with SMACNA Table 1-8 and Figure 1-12 and per roofing manufacturer's recommendations.
 - a. Provide gutter brackets or hangers at 24 IN OC maximum.
 - b. Provide expansion joints in gutters per SMACNA and at expansion joint locations shown on Drawings.
 - c. Install gutters to provide positive drainage to downspout locations.
 - d. Seal all joints in gutters to provide completely water tight system.
 - e. Provide 1/4 x 1/4 IN stainless steel mesh debris screen continuous on top of gutter.
 - 1) Screen shall be mounted in stainless steel frame which will allow replacement of screen without damage to gutter, screen or screen frame.
- K. Downspouts:
 - 1. Install downspouts in locations shown on the Drawings.
 - 2. Provide gutter to downspout connection per SMACNA Figure 1-33B, Detail 1.

3. Seal all joints in downspout for a complete watertight system.
 4. Angle bottom of downspout out away from building.
- L. Install sheathing to meet wind uplift rating requirements specified.

END OF SECTION

SECTION 07600**FLASHING AND SHEET METAL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Architectural flashing and sheet metal work.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07900 - Joint Sealants.
 - 2. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. B32, Standard Specification for Solder Metal.
 - 2. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
 - a. Architectural Sheet Metal Manual, Fifth Edition, 1993.
 - 1) Including Addendum No. 1 dated October 31, 1997.
- B. Qualifications:
 - 1. Sheet metal fabricator shall have minimum 10 years experience in fabrication of sheet metal items similar to items specified.
 - 2. Sheet metal installer shall have minimum five (5) years experience installing sheet metal items specified.

1.3 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- B. PVDF: Polyvinylidene fluoride.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Fabrication and/or layout drawings.
 - a. Scaled drawing showing expansion joint locations, special conditions, profile, fastening and jointing details.
 - 1) Minimum plan scale: 1/8 IN = 1 FT.
 - 2) Minimum detail scale: 1-1/2 IN = 1 FT.
 - 4. Fabricator qualifications.
 - 5. Installer qualifications.
- B. Samples:
 - 1. Finish and color samples for each product specified for Engineer preliminary color selection.
 - 2. For final color selection, provide two (2) 2 IN x 3 IN colored metal samples for each color selected during the initial color selection.
- C. Miscellaneous Submittals:

1. See Section 01340 for requirements for the mechanics and administration of the submittal process.
2. Warranty: Manufacturer's sample warranty language.

1.5 WARRANTY

- A. Furnish five (5) year warranty on sheet metal work, signed jointly by Contractor and sheet metal installer.
 1. Agree to repair or replace work which leaks water or, where applicable, air or deteriorates excessively, including color failure, or otherwise fails to perform as watertight and, where appropriate, airtight flashing.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Flashing: .032 Kynar aluminum.
- B. Fasteners: Non-ferrous compatible with sheet metal.
- C. Retainer Clips and Continuous Cleats: Galvanized steel or stainless steel.
- D. Solder: ASTM B32.
- E. Dissimilar Metal Protection: Comply with Section 09905.

2.2 ACCESSORIES

- A. Accessories as required to form a complete water and airtight system.

2.3 FABRICATION

- A. Retainer Clips and Continuous Cleats:
 1. Use 16 GA galvanized steel, G60 coating minimum with ferrous steel flashing, coping and counterflashing and standing seam metal roofing wall trim.
 2. Use 0.050 IN stainless steel with aluminum or stainless steel.
- B. Shop fabricate items to maximum extent possible.
 1. Fabricate true and sharp to profiles and sizes indicated on Drawings.
 - a. Shop fabricate and weld or solder all corners.
- C. All exposed flashing shall be shop finished with Kynar 500 type coating and unless otherwise noted, shall be finished to match the adjacent component (such as roof, window).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide items to be built into other construction to Contractor in time to allow their installation.
- B. If such items are not provided in time for installation, sheet metal fabricator cut in and install.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions, SMACNA, and as indicated on Drawings.
- B. Solder steel and weld aluminum to achieve weathertight joints and required details; do not solder or weld slip joints and prefinished items.
- C. Set top edges of membrane flashing and sheet metal flashing into reglets.
- D. Fasten materials at intervals recommended by SMACNA.

- E. Install slip joints to allow for thermal movement as recommended by SMACNA and manufacturer.
 - 1. Maximum spacing: 10 FT OC.
 - 2. Provide slip joint 24 IN from corners.
 - 3. Provide slip joint at each vertical expansion joint location in wall.
 - a. Provide break in continuous cleat at each vertical expansion joint.
- F. Caulk slip joints with two (2) beads of sealant on each side of slip joint overlap.
 - 1. Refer to Section 07900 for sealant.
- G. Caulk all exposed joints of coping with sealant to match color of metal being sealed.
- H. Form flashings to provide spring action with exposed edges hemmed or folded to create tight junctures.
- I. Provide dissimilar metals and materials protection where dissimilar metals come in contact or where sheet metal contacts mortar, concrete masonry or concrete.
 - 1. Refer to Section 09905 for dissimilar metals protection.
- J. Provide all components necessary to create watertight junctures between roofing and sheet metal work.
- K. Provide all miscellaneous sheet metal items not specifically covered elsewhere, as indicated or required to provide a weathertight installation.

END OF SECTION

SECTION 07813**SKYLIGHT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Skylights.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Aluminum Association (AA):
 - a. 45, Designation System for Aluminum Finishes.
 2. Occupational Safety and Health Administration (OSHA).
- B. Qualifications:
1. Installer shall have minimum five (5) years experience installing similar products.

1.3 DEFINITIONS

- A. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the project site.
 2. Installer and applicator are synonymous.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
 2. Scaled plan of roof showing location of each unit and anchoring details.
 - a. Minimum scale of plan: 1 = 96.
 - b. Minimum scale of details: 1 = 8.
 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 4. Installer qualifications.
- B. Operation and Maintenance Manuals:
1. See Section 01785
- C. Miscellaneous Submittals:
1. See FP – 03, Subsection 104.03.
 2. Warranty.

1.5 WARRANTY

- A. Provide five (5) year written warranty on skylight, glazing, safety screen, calking, flashing and installation.
- B. Warranty to cover repair or replacement in event of leakage; defective design, materials and construction.
- C. Warranty jointly signed by Contractor, installer and supplier.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, materials shall be equivalent to products provided by the following acceptable manufacturers:
1. Skylights:
 - a. Kalwall.

2.2 MATERIALS

- A. Face Sheets
1. Translucent faces: Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use. Facings shall be high-impact resistant material in accordance applicable codes.
 - a. Thermoplastic (e.g. polycarbonate, acrylic) faces are not acceptable.
 2. Flammability of interior face sheets:
 - a. Flamespread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flamespread rating no greater than 50 (20) and smoke developed no greater than 250 (200) when tested in accordance with UL 723.
 - b. Burn extent by ASTM D-635 shall be no greater than 1".
 - c. Face sheets shall not deform, deflect or drip when subjected to fire or flame.
 - d. Face sheets shall not delaminate when exposed to 200°F for 30 minutes per IBC and NBC (300°F for 25 minutes per UBC and SBC).
 3. Weatherability of exterior face sheets:
 - a. Color stability: Full thickness of the exterior face sheet shall not change color more than 3.0 CIE Units DELTA E by ASTM D-2244 after 5 years outdoor South Florida weathering at 5 degrees facing south, determined by the average of at least three (3) white samples with and without a protective film or coating to ensure long-term color stability. Color stability shall be unaffected by abrasion or scratching.
 - b. Erosion barrier: Exterior face shall have a permanent glass erosion barrier embedded beneath the surface to provide long-term resistance to reinforcing fiber exposure. Exterior face surface loss shall not exceed .7 mils and 40 mgs when tested in accordance with ASTM D-4060 employing CS17 abrasive wheels at a head load of 500 grams for 1000 cycles. Sacrificial surface films or coatings are not acceptable erosion barriers.
 4. Appearance:
 - a. Exterior face sheets: Smooth, 0.070" thick and translucent in color.
 - b. Interior face sheets: Smooth, 0.045" thick and translucent in color.
 - c. Face sheets shall not vary more than +/- 10% in thickness and be uniform in color.
 5. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact equal to 70 (230) ft. lbs. without fracture or tear when impacted by a 3-1/4" diameter, 5 lb. free-falling ball per UL 972.
- B. Grid Core
1. Thermally broken (aluminum) I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and perimeter. Width of I- beam shall be no less than 7/16". The I-beam grid shall be machined to tolerances of not greater than +/- .002".
 2. Thermal break: Minimum 1".
- C. Laminate Adhesive
1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council "Acceptance Criteria for Sandwich Panel Adhesives."
 2. Minimum tensile strength of 750 PSI when the panel assembly is tested by ASTM C-297 after two (2) exposures to six (6) cycles each of the aging conditions prescribed by ASTM D-1037.
 3. Minimum shear strength of the panel adhesive by ASTM D-1002 after exposure to five (5) separate conditions:
 - a. 50% Relative Humidity at 73° F: 540 PSI

- b. 182° F: 100 PSI
- c. Accelerated Aging by ASTM D-1037 at room temperature: 800 PSI
- d. Accelerated Aging by ASTM D-1037 at 182° F: 250 PSI
- e. 500 Hour Oxygen Bomb by ASTM D-572: 1400 PSI

2.3 FABRICATION

- A. Curb:
 - 1. Integral 9 IN high.
 - 2. Minimum 0.032 IN outer skin and 0.025 IN inner skin.
 - 3. Insulated.
 - 4. Thermally broken.
 - 5. Integral counter flashing.
 - 6. Curb and curb framework shall be manufactured as complete unit.
 - a. Built-up units not acceptable.
- B. Curb Framework:
 - 1. Minimum 0.063 IN extruded aluminum.
 - a. 6063T5 alloy.
 - 2. Built in condensation gutter and weeps.
 - 3. Welded corners.
 - 4. Thermally broken.
- C. Fasteners: 300 series stainless steel.
- D. Glazing:
 - 1. Exterior:
 - a. Minimum thickness as required to meet impact resistivity based on 140 mph design wind load.
 - b. Flat shaped.
 - c. White acrylic.
 - 2. Interior:
 - a. Minimum thickness 0.125 IN.
 - b. White acrylic.
- E. Finish: AA-M10C22A21 clear anodized or manufacturer's equivalent finish.
- F. Design: Support live load of {40} psf and wind load of 40 psf.
- G. Fabricate to sizes indicated on the Drawings.
 - 1. Completely shop assemble, to assure proper assembly in field.
 - 2. Disassemble for shipment, and properly label each component for accurate field assembly.
- H. Construct using gasket glazing system.
 - 1. Provide continuous extruded aluminum frame.
- I. Weld by heliarc process.
 - 1. Grind exposed welds to a minimum of 100 grit finish.
- J. Waterproof with continuous glazing strip.
 - 1. Allow no direct acrylic to metal contact.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
 - 1. Attach to roof structure with fasteners at maximum 12 IN OC.
- B. Provide all periphery items as required for complete weathertight installation.

END OF SECTION

SECTION 07840**FIRESTOPPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Firestopping.
- B. Related Sections include but are not necessarily limited to:
 - 1. Firestopping of mechanical and electrical penetrations: Refer to Divisions 15 and 16.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
 - b. C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - c. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - d. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 2. National Fire Protection Association (NFPA).
 - a. 220, Standard on Types of Building Construction.
 - 3. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data, including:
 - a. Acknowledgement that products meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
 - d. Detailed drawings of special conditions.
 - e. Data sheet on each type of firestopping assembly being used:
 - 1) Provide certification that assembly is UL listed.
- B. Samples:
 - 1. Cured samples of available colors for Engineer's color selection.
 - 2. Color chart not acceptable.
- C. Miscellaneous Submittals:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
 - 3. Certification of applicator qualification.
 - 4. UL certification.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver material in manufacturer's original, unopened containers with labels intact:
1. Labels shall indicate contents and expiration date on material.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
1. Safing insulation:
 - a. Thermafiber LLC.
 - b. Owens-Corning.
 2. Expanding silicone elastomer:
 - a. Any manufacturer UL listed for system used.
 3. Firestop sealant:
 - a. Dow Corning.
 - b. 3M Company.
 - c. U. S. Gypsum.
 4. Moldable putty:
 - a. 3M Company.

2.2 MATERIALS

- A. Safing Insulation:
1. Inorganic mineral fibers and binders formed into semi-rigid blankets.
 - a. Density: 4.0 lb/CF.
 - b. ASTM C665, Type 1.
 - c. Rated noncombustible as defined by NFPA 220.
 2. ASTM E84 flame spread: 15 maximum, smoke developed 0.
 3. ASTM E119 tested for assembly and rating indicated.
 4. Thickness as required to maintain fire rating of assembly.
 5. Retainer: Minimum 20 GA, galvanized steel closure, ASTM A653, G60.
- B. Expanding Silicone Elastomer:
1. Two part, liquid silicone elastomer.
 2. UL listed as "Fill, Void or Cavity Material (ZCPY)" for use in "Wall or Floor Opening Protective, Multiple Cable Systems (ZCOR)."
 3. Forming materials as described in applicable UL system.
 4. Similar to 3M "Fire Barrier 2001 Silicone RTV Foam."
- C. Firestop Sealant:
1. One-part silicone.
 2. Capable of providing up to a 4 HR fire rating.
 3. Provide self-leveling grade for all horizontal slab conditions.
 4. Similar to 3M "Fire Barrier 2000, 2000+ and 2003" sealants.
 5. UL listed.
- D. Moldable Putty:
1. 100 percent solids material, single component.
 2. Intumescent and endothermic.
 3. UL listed.
- E. Plastic Pipe Fire Barrier:
1. UL listed for floor or wall penetrations.
 2. Capable of providing up to 2 HR fire rating on a 4 IN pipe (outside diameter).

3. Factory made, single component, ready to use device similar to "3M Fire Barrier Plastic Pipe Device."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Firestop all openings and penetrations through fire-rated floors, walls, ceilings, etc., in accordance with UL "Wall or Floor Opening Protective, Multiple Cable Systems (ZCOR)" latest edition, or as indicated on the Drawings.
 1. Install products in accordance with manufacturer's instructions.
- B. Expanding Silicone Elastomer:
 1. Remove all combustible form materials after installation.
 2. Thickness required to maintain fire rating indicated or required.
- C. Firestop Sealant:
 1. Completely seal opening to obtain required rating.
- D. Moldable Putty:
 1. Install in accordance with manufacturer's recommendations.
 2. Trowel to smooth finish, remove excess putty from surrounding surfaces.

3.2 FIELD QUALITY CONTROL

- A. Provide Owner with written statement that all fire-rated penetrations have been sealed using products specified in accordance with UL requirements for required rating.

END OF SECTION

SECTION 07900**JOINT SEALANTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Sealant work.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07840 - Firestopping.
- C. Work included consists of but is not necessarily limited to:
 - 1. Sealing all joints which will permit penetration of dust, air or moisture, unless sealing work is specifically required under other sections.
 - a. Work may include the following:
 - 1) Flashing reglets and retainers.
 - 2) Exterior wall joints.
 - 3) Masonry control joints, exterior and interior and between masonry and other materials.
 - 4) Flooring joints.
 - 5) Isolation joints.
 - 6) Joints between paving or sidewalks and building.
 - 7) Concrete construction, control and expansion joints, exterior and interior.
 - 8) Sawed joints in interior concrete slabs.
 - 9) Joints between precast roof units, between precast roof units and walls, and all exterior and interior joints between precast wall panels.
 - 10) Joints at penetrations of walls, floors and decks by piping and other services and equipment.
 - 11) Exterior and interior perimeters of exterior and interior door and window frames, louvers, grilles, etc.
 - 12) Thresholds at exterior doors.
 - 13) Sealing of plumbing fixtures to floor or wall.
 - 14) Sealing around piping, duct or conduit penetrations through roof, floors, interior and exterior walls.
 - a) See Section 07840 for firestopping these penetrations.
 - 15) Sealing perimeter and penetrations of sound insulated walls.
 - 16) Other joints where calking, sealant, expanding foam sealant or compressible sealant is indicated.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 302.1R, Guide for Concrete Floor and Slab Construction.
 - 2. ASTM International (ASTM):
 - a. C834, Standard Specification for Latex Sealants.
 - b. C920, Standard Specification for Elastomeric Joint Sealants.
 - 3. National Sanitation Foundation International (NSF).
 - 4. Underwriters Laboratories, Inc., (UL).
- B. Qualifications: Sealant applicator shall have minimum five (5) years experience using products specified on projects with similar scope.
- C. Mock-Ups:
 - 1. Before calking work is started, a mock-up of each type of joint shall be calked where directed by the Engineer.

- a. The approved mock-ups shall show the workmanship, bond, and color of calking materials as specified or selected for the work and shall be the minimum standard of quality on the entire project.

1.3 DEFINITIONS

- A. "Caulk(ing)," "calk(ing)," and "sealant": Joint sealant work.
- B. "Interior wet areas": Toilets and similar areas.
- C. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- D. Finish sealant: Sealant material per this specification applied over face of compressible sealant or expanding foam sealant specified, to provide a finished, colored sealant joint.
- E. Defect(ive): Failure of watertightness or airtightness.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
 - 3. Warranty.
 - 4. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
 - 5. Certification of applicator qualification.
- B. Samples:
 - 1. Cured sample of each color for Engineer's color selection.
 - 2. Color chart not acceptable.
- C. Miscellaneous Submittals: See FP – 03, Subsection 104.03.
- D. Specifier: Identify special packing, shipping, and storage requirements. Normal requirements for delivery, storage, and handling are defined in Section 01600. Review Section 01600. This Article is infrequently used.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in manufacturer's original unopened containers with labels intact: Labels shall indicate contents and expiration date on material.

1.6 WARRANTY

- A. Material and Labor Warranty:
 - 1. Sealant work free of defects for a period of three (3) years from date of final acceptance.
 - 2. Remove any defective work or materials and replace with new work and materials.
 - 3. Warranty signed jointly by Applicator and sealant manufacturer.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval :
 - 1. Polyurethane sealants:

- a. Pecora.
- b. Sika Chemical Corp.
- c. Sonneborn - Rexnord.
- d. Tremco.
2. Silicone sealants:
 - a. General Electric.
 - b. Dow Corning Corp.
 - c. Tremco.
3. Compressible sealant:
 - a. Polytite Manufacturing Corporation.
 - b. Emseal.
 - c. Norton.
 - d. Sandell.
4. Fire-resistant sealant: See Section 07840.
5. Acoustical sealant:
 - a. Pecora.
 - b. Sonneborn.
 - c. Tremco.
6. Polysulfide rubber sealant:
 - a. Pecora.
 - b. Sonneborn.
 - c. Morton Polymer Systems.
7. Expanding foam sealant:
 - a. Macklanburg Duncan.
 - b. Convenience Products.
 - c. FAI International, Inc.
 - d. Power Fasteners.
8. Polyurea joint filler:
 - a. Dayton Superior Specialty Chemical Corporation.
 - b. Euclid Chemical Co.
 - c. L & M Construction Chemicals, Inc.
 - d. Sonneborn.
9. Backer rod, compressible filler, primer, joint cleaners, bond breaker: As recommended by sealant manufacturer.

2.2 MATERIALS

- A. Sealants - General:
 1. Provide colors matching materials being sealed.
 2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
 3. Nonsagging sealant for vertical and overhead horizontal joints.
 4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.
- B. Polyurethane Sealant:
 1. One (1) or two (2) components.
 2. Paintable.
 3. Meet ASTM C920 Type S or Type M, Grade NS or P, Class 25, Use NT, T, M, A and O.
 - a. Pecora Dynatrol-IXL, Dynatrol II, Urexpam NR-200, NR-201.
 - b. Sika Chemical Corporation Sikaflex-1a, Sikaflex-2C NS/SL.
 - c. Sonneborn Sonolastic NP-1, NP-II, SL-1 SL-2.
 - d. Tremco Dymonic or Dymeric, Vulkem 116,227,45,245.
- C. Silicone Sealant:
 1. One (1) component.
 2. Meet ASTM C920, Type S, Grade NS, Class 25, Use NT, G, A, O.
 - a. General Electric: Silpruf, Silglaze II.

- b. General Electric: Sanitary 1700 sealant for sealing around plumbing fixtures.
 - c. Dow Corning: 786 for sealing around plumbing fixtures.
 - d. Dow Corning: 790, 795.
 - e. Tremco: Spectrem 1, Spectrem 3, Tremsil 600.
3. Mildew resistant for sealing around plumbing fixtures.
- D. Compressible Sealant:
- 1. Size so that width of material is twice joint width.
 - 2. Foamed polyurethane strip saturated with polymerized polybutylene waterproofing coated on front face with nonreactive release agent that will act as bond breaker for applied sealant.
 - a. Polytite Manufacturing Corp. "Polytite-B."
 - 3. Fire rated where required.
- E. Joint Cleaner, Primer, Bond Breaker: As recommended by sealant manufacturer.
- F. Sealant Backer Rod and/or Compressible Filler:
- 1. Closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, nonbituminous material recommended by sealant manufacturer to:
 - a. Control joint depth.
 - b. Break bond of sealant at bottom of joint.
 - c. Provide proper shape of sealant bead.
 - d. Serve as expansion joint filler.
- G. Adhesive, Compressible Sealant: As recommended by sealant manufacturer.
- H. Fire-Resistant Sealant: See Section 07840.
- I. Expanding Foam Sealant:
- 1. One (1) or two (2) component fire rated moisture cured expanding urethane.
 - 2. Shall not contain formaldehyde.
 - 3. Density: Minimum 1.5 pcf.
 - 4. Minimum 70 percent closed cell content.
 - 5. R-value minimum 5.0/IN.
 - 6. Flame spread: Less than 25.
 - 7. Smoke developed: Less than 25.
- J. Acoustical Sealant:
- 1. One (1) component siliconized acrylic latex sealant.
 - 2. Non-staining, non-bleeding.
 - 3. Compatible with paints specified for adjoining materials.
 - a. See Section 09905.
 - 4. Meet ASTM C834.
 - a. Pecora - AC20+.
 - b. Sonneborn - Sonolac.
 - c. Tremco - Tremflex 834.
- K. Polysulfide Rubber Sealant:
- 1. One (1) or two (2) component.
 - 2. Meet ASTM C920.
 - a. Pecora Synthacalk GC2+.
 - b. Sonneborn - Sonolastic - two-part polysulfide sealant.
 - c. Morton Polymer Systems - Thiokol Sealants.
- L. Polyurea Joint Filler:
- 1. Two (2) component, semi-rigid material for filling control, sawcut and construction joints in interior concrete floors.
 - a. Dayton Superior Specialty Chemical Corp. "Joint Fill, Joint Seal, Joint Saver II" as required for condition and recommended by manufacturer.
 - b. Euclid Chemical Co. "EUCCO QWIK" joint.
 - c. L & M Construction Chemicals, Inc. "Joint Tite 750".
 - d. Sonneborn "TF-100" control joint filler.

2. Comply with ACI 302.1R performance recommendations regarding control and construction joints.
3. Color: Gray.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before use of any sealant, investigate its compatibility with joint surfaces, fillers and other materials in joint system.
- B. Use only compatible materials.
- C. Where required by manufacturer, prime joint surfaces.
 1. Limit application to surfaces to receive calking.
 2. Mask off adjacent surfaces.
- D. Provide joint depth for joints receiving polyurea joint filler in accordance with manufacturer's recommendations.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and UL requirements.
- B. Clean all joints.
- C. Make all joints water and airtight.
- D. Make depth of sealing compounds, except expanding foam and polyurea sealant, not more than one-half width of joint, but in no case less than 1/4 IN nor more than 1/2 IN unless recommended otherwise by the manufacturer.
- E. Provide correctly sized backer rod, compressible filler or compressible sealant in all joints to depth recommended by manufacturer:
 1. Take care to not puncture backer rod and compressible filler.
 2. Provide joint backer rod as recommended by the manufacturer for polyurea joint filler.
- F. Apply bond breaker where required.
- G. Tool sealants using sufficient pressure to fill all voids.
- H. Upon completion, leave calking with smooth, even, neat finish.
- I. Where piping, conduit, ductwork, etc., penetrate wall, seal each side of wall opening.
- J. Install compressible sealant to position at indicated depth.
 1. Take care to avoid contamination of sides of joint.
 2. Protect side walls of joint (to depth of finish sealant).
 3. Install with adhesive faces in contact with joint sides.
 4. Install finish sealant where indicated.
- K. Install expanding foam sealant to minimum 4 IN depth or thickness of wall being penetrated if less than 4 IN or as indicated on Drawings.
 1. Provide adequate fire rated backing material as required.
 2. Hold material back from exposed face of wall as required to provide backer rod and finish sealant to finish the joint.
 - a. Allow expanding foam sealant to completely cure prior to installing backer rod and finish sealant.
 3. Material shall be minimum of 70 DegF prior to and during installation.
 4. Trim off excess material flush with surface of the wall if not providing finished sealant.

3.3 SCHEDULE

- A. Furnish sealant as indicated for the following areas:

1. Exterior areas: Polyurethane.
2. Interior wet areas: Silicone.
3. Interior nonwet, noncorrosive areas: Paintable white latex.
4. Fire-rated construction: See Section 07840.
5. Compressible sealant: Where indicated.
6. Penetrations exterior wall above grade:
 - a. For non-corrosive areas, provide expanding urethane foam, with polyurethane finish sealant.
 - b. finish sealant on corrosive side with polyurethane finish sealant on non-corrosive side.
7. Interior concrete floor control joints or sawed joints: Polyurea joint filler.
8. Sealing around plumbing fixtures: Silicone.
9. Solid surface materials: Silicone.

END OF SECTION

SECTION 08110**METAL DOORS AND FRAMES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 1. Metal doors and frames.
 2. Grouting of door frames.
- B. Related Sections include but are not necessarily limited to:
 1. Section 08700 - Finish Hardware.
 2. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 1. ASTM International (ASTM):
 - a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 2. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. Hollow Metal Manufacturers Association (HMMA).
 3. Steel Door Institute (SDI):
 - a. 117, Manufacturing Tolerances Standard Doors and Frames.
 - b. All SDI publications.
 4. Steel Door Institute/American National Standards Institute (SDI/ANSI):
 - a. A250.6, Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
 - b. A250.7, Nomenclature for Standard Steel Doors and Steel Frames.
 - c. A250.8 (formerly SDI 100), Recommended Specifications for Standard Steel Doors and Frames.
 - d. A250.10, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
 - e. A250.11, Recommended Erection Instructions for Steel Frames.
 5. Building code:
 - a. Florida Building Code (FBC):
 - 1) Florida Building Code and associated standards, 2005 Edition including all amendments and supplements, referred to herein as Building Code.
- B. Qualifications: Manufacturer must be current member of SDI, and NAAMM (HMMA).
- C. Wipe coat galvanized steel is not acceptable as substitute for galvanizing finish specified.

1.3 DEFINITIONS

- A. As identified in SDI/ANSI A250.7.

1.4 SUBMITTALS

- A. Shop Drawings:
 1. See Section FP – 03, Subsection 104.03.
 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 3. Schedule of doors and frames using same reference numbers as used on Drawings.
 4. SDI certification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store doors and frames in accordance with SDI/ANSI A250.11.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
 - 1. Metal doors and frames :
 - a. CECO Corporation.
 - b. Steelcraft Manufacturing Co.
 - c. Curries Company.

2.2 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel, ASTM A653, A60 coating.
- B. Frames: Hot-dipped galvanized steel, ASTM A653, A60 coating.
- C. Supports and Reinforcing: Hot-dipped galvanized steel, ASTM A653, A60 coating.
- D. Inserts, Bolts and Fasteners: Manufacturer's standard.
- E. Primer: Manufacturer's standard coating meeting SDI/ANSI A250.10.
- F. Galvanized Coating Repair: See Section 09905.
- G. Grout: As specified in Section 04110.
- H. Thermal Insulation: Polyurethane, CFC free.

2.3 ACCESSORIES

- A. Frame Anchors:
 - 1. Jamb anchors:
 - a. Masonry wire anchors: Minimum 0.1875 IN wire, galvanized.
 - b. Existing wall anchor: Minimum 18 GA, galvanized.
 - c. Stud partition and base anchors: Minimum 18 GA, galvanized.

2.4 FABRICATION

- A. General:
 - 1. SDI/ANSI A250.8.
 - 2. Fabricate rigid, neat in appearance and free from defects.
 - 3. Form to sizes and profiles indicated on Drawings.
 - a. Beveled edge.
 - 4. Fit and assemble in shop wherever practical.
 - 5. Mark work that cannot be fully assembled in shop to assure proper assembly at site.
 - 6. Continuously wire weld all joints, dress exposed joints smooth and flush.
 - 7. Fabricate doors and frames to tolerance requirements of SDI 117.
 - 8. Fit doors to SDI and NFPA 80 clearances.
 - 9. All doors shall be handed.
 - 10. Hinge cut-out depth and size on doors and frames shall match hinge specified in Section 08700.
 - 11. Design and fabricate doors to requirements of the Building Code.
- B. Hollow Metal Frames:
 - 1. Door frames:
 - a. Provide 2 IN face at all heads, jambs and mullions for frames in stud walls.
 - b. Provide 4 IN face at head where noted on Drawings or required by wall construction.
 - c. 26 GA galvanized steel boxes welded to frame at back of all hardware cutouts.

- d. Steel plate reinforcement welded to frame for hinge, strikes, closers and surface-mounted hardware reinforcing.
 - 1) All plate reinforcement shall meet size and thickness requirements of SDI/ANSI A250.8.
 - 2) Galvannealed per ASTM A653, minimum A60.
 - e. Split type frames not acceptable.
 - 1) All horizontal and vertical mullions and transom bars shall be welded to adjacent members.
 - f. Conceal all fasteners.
 - g. Frames shall be set up, all face joints continuously wire welded and dressed smooth.
 - h. Interior: 16 GA steel galvannealed per ASTM A653, A60.
 - i. Provide removable spreaders at bottom of frame.
- C. Prepare for finish hardware in accordance with hardware schedule, templates provided by hardware supplier, and SDI/ANSI A250.6.
 - 1. Locate finish hardware in accordance with SDI/ANSI A250.8.
 - 2. See Section 08700 for hardware.
 - D. After fabrication, clean off mill scale and foreign materials, repair damaged galvannealed surfaces, and treat and prime with rust inhibiting primer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install doors and frames in accordance with SDI/ANSI A250.11, the Building Code and manufacturer's instructions.
- B. Where applicable, place frames prior to construction of enclosing walls and ceilings.
- C. Plumb, align, and brace securely until permanently anchored.
- D. After completion of walls, remove temporary braces and spreaders.
- E. Use plastic plugs to keep silencer holes clear during construction.
- F. Immediately after erection, sand smooth rusted or damaged areas of prime and galvannealed coating.
- G. Touch-up prime and galvannealed coating in accordance with Section 09905.
- H. Where indicated to be painted leave finish smooth for finish painting.
- I. Install three silencers on strike jamb of single door frame and two on head of double door frame.
- J. Number and location of anchors shall be in accordance with frame manufacturer's recommendation with minimum of three anchors per jamb.
- K. Protect doors and frames during construction.

END OF SECTION

SECTION 08120**ALUMINUM DOORS AND FRAMES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Aluminum doors and frames.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 08700 - Finish Hardware.
 - 2. Section 08800 - Glass and Glazing.
 - 3. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. 45, Designation System for Aluminum Finishes.
 - 2. American Hardboard Association/American National Standards Institute (AHA/ANSI):
 - a. A135.4, Basic Hardboard.
 - 3. ASTM International (ASTM):
 - a. A123, Standards Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - c. B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
 - 4. Door and Hardware Institute/American National Standards Institute (DHI/ANSI):
 - a. A115.1, Preparation of Mortise Locks in 1-3/8 IN and 1-3/4 IN Standard Doors and Frames.
 - 5. National Builders Hardware Association (NBHA):
 - a. Recommended Location for Builders Hardware.
- B. Qualifications: Door and frame fabricator must have minimum 10 years experience in fabrication of aluminum doors and frames.

1.3 DEFINITIONS

- A. PVDF: Polyvinylidene fluoride.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Complete hardware schedule for all hardware items provided by aluminum door manufacturer.
 - a. Data sheet for each item of hardware provided by aluminum door manufacturer.
 - 4. Schedule of doors and frames using same reference numbers as indicated on Drawings.
- B. Samples:
 - 1. 6 x 6 IN sample of door section showing edge construction, core, impact reinforcement and face sheet with finish as specified.
 - 2. 6 x 6 IN sample of door frame specified, in color specified, showing weatherstripping, anchoring device, stops and all parts of the frame necessary for complete installation.

C. Operation and Maintenance Manuals:

1. See Section 01785.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store doors and frames under protective covering.

1. Place units on wood skids providing a minimum 4 IN air space above the ground.
2. Do not store units flat, set frames and doors on edge providing minimum 1/2 IN air circulation space between each unit.
3. Provide covering which will ensure air flow around each unit to prevent trapping of moisture.
4. If door wrapper becomes wet immediately remove and provide dry protection equivalent to wrapper removed.

B. Storage recommendations by unit manufacturer shall take precedent over the above requirements.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval :

1. Aluminum doors and frames:
 - a. Commercial Door Systems.
 - b. Kawneer.
 - c. Special-Lite Inc.
 - d. Tubelite.
 - e. Vistawall.
2. PVDF coating:
 - a. PPG - DURANAR.
 - b. Valspar - FLUROPON.
 - c. Atofina Chemicals - KYNAR 500.
 - d. Solvay Solexis - HYLAR 5000.

2.2 MATERIALS

A. Doors:

1. Face:
 - a. Aluminum sheet ASTM B209.
 - b. Alloy 5005 architectural quality.
2. Impact reinforcement: Tempered hardboard, AHA/ANSI A135.4.
3. Insulation:
 - a. Closed cell urethane or polyisocyanurate.
 - b. CFC and HCFC free.
 - c. Ozone depletion potential: 0.
4. Fasteners: Stainless steel.
5. Reinforcement: Aluminum or stainless steel.

B. Frames: Aluminum ASTM B221 6063T5.

C. Frame Anchors: Stainless steel.

D. Frame Reinforcement: Steel.

2.3 FABRICATION

A. General:

1. Fabricate rigid, neat in appearance and free from defects.
2. Form to indicated sizes and profiles.

3. Fit and assemble in shop wherever practical.
 4. Mark work that cannot be fully assembled in shop to assure proper assembly at site.
 5. Factory prepare for finish hardware, in accordance with hardware schedule, templates provided by hardware supplier, DHI/ANSI A115.1, and NBHA.
 - a. Locate hardware in accordance with "Recommended Location for Builders Hardware," by NBHA.
 - b. See Section 08700 for hardware.
 6. Conceal fastenings wherever practical.
 - a. Exposed fasteners to be countersunk Phillips or Jackson flat head screws and bolts.
- B. Doors:
1. Nominal 1-3/4 IN thick.
 2. Face: Minimum 0.062 IN smooth aluminum sheet.
 3. Provide minimum 0.125 IN thick impact reinforcement on each face of all doors.
 - a. Impact reinforcement shall extend full height and width of door.
 4. Core: Insulated.
 - a. Minimum R 5.8.
 - b. Density: Minimum 5.0 pcf.
 5. Reinforce hinges using continuous bar in hinge stile, tapped for hinges.
 6. Reinforce for hardware using plate screwed to tubular frame.
- C. Frames:
1. Tubular design.
 - a. Frame site-line to be minimum of 1-3/4 IN and maximum of 2-1/4 IN.
 - b. Frame depth to be minimum of 4 IN and maximum of 5 IN unless required otherwise by manufacturer.
 2. Reinforce for hinge using 1/4 IN thick bar in hinge side of frame, tapped for hinges.
 3. Reinforce for all other hardware using 1/4 IN thick plate screwed to frame.
 - a. Wood blocking is not acceptable.
 4. Stops integral with frame or field applied.
 5. Minimum thickness of frame to be .070 IN.
 6. Frames to be vertically reinforced at jambs.
 - a. Reinforcement:
 - 1) Steel:
 - a) Hot-dip galvanized after fabrication, ASTM A123.
 - b) Provide dissimilar metals protection, see Section 09905.
 - c) All reinforcement sizes shall be determined by the frame manufacturer.
- D. Louvers:
1. Louver frames and blades shall be 6063-T5 aluminum alloy with a minimum 0.62" thickness. All exposed fasteners to be stainless steel.
 2. Insect screen shall be provided and shall be 14-18 mesh, 0.11" diameter alclad aluminum set in a .050" extruded frame.
- E. Finish: PVDF finish.
1. Door and frame finishes shall match.
 - a. PVDF based with minimum 70 percent resin.
 - b. Three-coat system having minimum 0.8 mil epoxy primer coat on both sides of panel with a 0.8 mil PVDF resin color coat and a 0.8 mil PVDF resin clear top coat on the exterior side of the panel.
 - c. Meet or exceed requirements of AAMA 621-02.
 - d. Smooth finish.
 - e. Similar to Kynar 500".
 - f. Color:
 - 1) Color shall match roof.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions.
- B. Hardware: Refer to Section 08700 for all hardware items.
- C. Plumb, align, and brace securely until permanently anchored.
- D. After completion of walls, remove temporary braces and spreaders.
- E. In steel stud partitions, attach anchors with self-tapping screws.
- F. Provide factory applied dissimilar materials protection on all steel reinforcement.
- G. Number and location of anchors shall be in accordance with frame manufacturer's recommendation with minimum of three anchors per jamb.
- H. On doors not required to be provided with specified weatherstripping, provide manufacturer's standard weatherstripping to act as silencer when door closes against frame.
- I. Manufacturer's standard pile or brush type weatherstripping is not acceptable as final exterior door weatherseal.
 - 1. Manufacturer's standard vinyl bulb type weatherseal is acceptable or see Section 08700 for acceptable weatherseal.

3.2 FIELD QUALITY CONTROL

- A. Repair all damaged finishes or replace framing member or door as directed by Contracting Officer.
 - 1. Use only materials and finishes as recommended or furnished by door and frame manufacturer.
 - 2. Final repaired finish shall match surrounding original finish or item being repaired shall be replaced with new item.

3.3 CLEANING

- A. Clean doors and frames as recommended by manufacturer prior to acceptance by the Government.

3.4 PROTECTION

- A. Protect doors and frames during construction.

END OF SECTION

SECTION 08210**WOOD DOORS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Factory finished flush wood doors.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 06200 - Finish Carpentry.
 - 2. Section 08110 - Metal Doors and Frames
 - 3. Section 08700 - Finish Hardware.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. E2074, Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
 - 2. Architectural Woodwork Institute (AWI):
 - a. Quality Standards of the Architectural Woodwork Institute.
 - 3. Window and Door Manufacturer's Association/American National Standards Institute (WDMA/ANSI):
 - a. I.S. 1-A, Architectural Wood Flush Doors.
 - 4. Building code:
 - a. Florida Building Code (FBC):
 - 1) Florida Building Code and associated standards, 2004 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Door manufacturer must have minimum 10 years experience in manufacturing of wood veneer doors.
 - 2. Manufacturer shall be current member of Architectural Woodwork Institute.
- C. All doors to be provided by same manufacturer.
- D. All doors to be fabricated using Hot Press 5 Ply construction.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Schedule of doors using same reference numbers as indicated on Drawings.
 - 1) Schedule shall include size, type, swing, rating, frame type and size, and hardware set required.
 - d. Available wood species.
- B. Miscellaneous Submittals:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Certification of AWI membership.
 - 3. Warranty.
- C. Samples:
 - 1. Provide actual samples of each factory applied finish for initial finish selection.

2. After initial finish selection, provide two (2) 12 IN x 12 IN samples showing door construction in veneer and finish selected.

1.4 DELIVERY STORAGE AND HANDLING

- A. Store and protect doors in accordance with manufacturers recommendations and WDMA/ANSI.

1.5 WARRANTY

- A. Warrant doors in writing for life of installation against defects including:
 1. Veneer delamination.
 2. Bow or twist of 1/4 IN or more.
 3. Telegraphing of any part of core through face veneer.
 4. Surface variation exceeding 1/100 IN in 3 IN span.
 5. Any other defect which may impair or affect performance of door for purpose for which it is intended.
- B. Warranty to include:
 1. Removal and replacement of defective door(s).
 2. Removal of existing hardware and refitting to new door.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Doors specified are based on products manufactured by Algoma Hardwoods, Inc. Other manufacturers offering equivalent products may submit for approval
- B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Flush wood door:
 - a. Algoma Hardwoods, Inc.
 - b. Eggers Industries.
 - c. Marshfield Door Systems.
 - d. VT Industries.

2.2 MATERIALS

- A. Face Veneer:
 1. White oak plain sliced, both faces.
 2. Minimum thickness: 0.020 IN at 12 percent moisture content.
 3. All faces to be per WDMA/ANSI I.S. 1-A face grades
- B. Core:
 1. Non-fire-rated doors:
 - a. Solid particle core (PC-5), ANSI A208.1.
 - b. Grade: LD-2.
 - c. Density: 30-35 LBS/CF.
 - d. Provide solid wood reinforcing at all hardware locations and around all cut-outs.
- C. Hardwood Edges:
 1. Match face veneer species.
- D. Adhesives:
 1. Type 1 water resistant glue.

2.3 FABRICATION**A. General:**

1. All doors shall be fabricated in accordance with and shall meet requirements of WDMA/ANSI I.S. 1-A Premium Grade standards.
2. Hardware preparation:
 - a. Factory machine doors for application of hardware specified.
 - b. Bevel vertical edges 1/8 IN in 2 IN.
 - c. Clearance at bottom of door: 1/2 IN.
 - d. Clearance at top of door: 1/8 IN.
 - e. Tolerances:
 - 1) Width: +1/32 IN.
 - 2) Height: +1/16 IN.
 - 3) Thickness: +1/16 IN.
 - 4) Hardware location: +1/32 IN.
 - 5) Locks and hinges: +1/32 IN.
 - f. Refer to Section 08700 for hardware requirements and template provided by hardware manufacturer.
3. Cut-outs.
 - a. Make all cut-outs in the factory.
 - b. Seal edges of all openings.
4. All doors shall be 1 3/4 IN thick unless indicated otherwise.

B. Finish:

1. AWI 1500, Finish System TR-6 or OP-6 as required.
 - a. Stain: To be selected from manufacturer's full line of colors.

C. "Hot Press" bond hardwood veneer cross-banding to core using Type II glue.

D. Identify doors for proper location.

2.4 SOURCE QUALITY CONTROL

A. Inspect finished door units at factory and repair damage in accordance with AWI

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Correct defects or conditions which may interfere with or prevent a satisfactory installation.
- B. Condition doors to prevailing humidity for minimum 72 HRS prior to handling.

3.2 INSTALLATION

- A. Condition doors to prevailing climactic conditions for 72 HRS prior to installation.
- B. Install doors in hollow metal frames in accordance with manufacturer's instructions and WDMA/ANSI I.S. 1-A.
 1. See Section 08110 for door frames.

3.3 FIELD QUALITY CONTROL

- A. Remove and replace defective units.
- B. Repair damage to finish in accordance with AWI recommendations.

3.4 ADJUSTMENT

A. Prior to Project startup, make final adjustments to doors.

END OF SECTION

SECTION 08308**ROLLING COUNTER SHUTTER****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Rolling counter shutter.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. ASTM International (ASTM):
 - a. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - b. A924, Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- B. Qualifications:
1. Installer shall be licensed or approved in writing by shutter manufacturer.

1.3 DEFINITIONS

- A. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 2. Installer and applicator are synonymous.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
 2. :
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Schedule of shutters using same reference number for openings indicated on Drawings.
- B. Miscellaneous Submittals:
1. See FP – 03, Subsection 104.03.
 2. Certification of installer.
- C. Operation and Maintenance Manuals:
1. See Section 01785:

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
1. Rolling counter shutter:
 - a. The Cookson Company.
 - b. Cornell Iron Works.
 - c. Wayne Dalton.
 - d. Overhead Door.
 - e. Raynor.

2.2 MATERIALS

- A. Curtain: Wood slats (white oak to match wood doors).
- B. Guides: Wood to match curtain..
- C. Hood: Aluminum. Covered with finished wood trim to match door slats.

2.3 FABRICATION

- A. General:
 - 1. Wind load: 20 psf minimum.
 - 2. Mounting: Face of wall.
 - 3. Operation: Crank.
- B. Curtain:
 - 1. Double rabbeted wood slats 1 3/4" high by 1/2" thick, interlocked by concealed, continuous aircraft cables, reinforced at the bottom with a 5 5/8" x 1 5/8" rail.
- C. Guides:
 - 1. Stainless steel, ASTM A240, type {304} {316} #4 finish.
 - 2. Wool pile lined for quiet operation.
- D. Hood:
 - 1. Minimum 24 GA aluminum.
- E. All Trim Pieces: Material and finish to match curtain.
- F. Counterbalance Assembly:
 - 1. Counterbalancing by helical torsion springs enclosed in a pipe shaft which is to rotate in sealed ball bearings supported by a bracket plate.
- G. Locking: Slide Bolt.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Installation: By factory-authorized installer.
- C. Adjust torsion springs for proper counterbalancing.
- D. Seal along bottom of vertical track (guides), seal the vertical joint between the two (2) separate track angles (if not filled by welding) and seal all holes in vertical track not being used for fasteners to provide a completely weather tight track and door system.

END OF SECTION

SECTION 08410**ALUMINUM ENTRANCES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Thermally broken storefront.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07900 - Joint Sealants.
 - 2. Section 08800 - Glass and Glazing.

1.2 SYSTEM DESCRIPTION

- A. Entrance Performance Requirements:
 - 1. Wind loads: Provide immediate door framing for swing doors, including anchorage, capable of withstanding wind loads of 140 mph per the Florida Building Code and as outlined in Components and Claddings design criteria shown on the structural drawings.
 - 2. Air infiltration: For single acting offset pivot hinged entrances in the closed and locked position, the test specimen shall be tested in accordance with Florida Building Code TAS202 and ASTM E 283 at a pressure differential of 1.57 psf for pairs of doors. A 6'-0" x 7'-0" entrance doors and frames shall not exceed 1.2 cfm per square foot.
 - 3. Structural: Corner strength shall be tested in a method equivalent to Kawneer duel moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity.
 - 4. Uniform Load: A static air design load of 85 psi shall be applied in a positive and negative direction in accordance with Florida Building Code TA202 and ASTM E 330. There shall be no deflection in excess of L/180 of the span on any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage shall occur.
 - 5. Hurricane Resistance: Large Missile, tested in accordance with Florida Building Code TAS201, TAS203 and ASTM E 1886/E 1996 at a door opening on 8'-0" x 8'-0".
 - 6. Forced Entry: Tested in accordance with SFBC 3603.2 (b) (5).

1.3 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. 45, Designation System For Aluminum Finishes.
 - 2. American Architectural Manufacturers Association (AAMA):
 - a. 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
 - 3. American Society of Civil Engineers (ASCE):
 - a. 7, Minimum Design Loads for Buildings and Other Structures.
 - 4. ASTM International (ASTM):
 - a. A653, Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. B221, Specification for Aluminum and Aluminum-Alloy, Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - c. C1363, Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.

- d. E283, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.
 - e. E330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - f. E331, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
5. American Welding Society (AWS):
- a. D1.2, Structural Welding Code Aluminum.
- B. Qualifications:
- 1. Qualify welders and welding process in accordance with AWS D1.2.

1.4 DEFINITIONS

- A. Installer or Applicator: Installer or applicator is the person actually installing or applying the product in the field at the Project site.
- 1. Installer and applicator are synonymous.
- B. All weather: Capable of operation from -50 to +120 DegF.
- C. PVDF: Polyvinylidene fluoride.

1.5 SUBMITTALS

- A. Shop Drawings:
- 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data for framing system and major accessories including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Elevation drawings indicating all frame and door dimensions and details.
 - 4. Warranty.
 - 5. Test reports.
- B. Samples:
- 1. Metal samples showing range of colors of anodized units.
 - 2. After initial color selection, provide minimum three (3) 2 x 3 IN samples of each color and finish selected.
- C. Operation and Maintenance Manuals:
- 1. See section 01785.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store units in vertical position off ground with wood spacers between each unit.
- 1. Store in accordance with manufacturer's instructions.

1.7 WARRANTY

- A. Written warranty signed jointly by fabricator, installer, and Contractor, agreeing to repair or replace any items of work performed under this Section which fail.
- 1. Failure includes defects in materials, installation, workmanship, water tightness of assembly, calking, glazing or any other defects in storefront system which affects its ability to perform as weathertight envelope.
 - 2. Warranty period is five (5) years from date of acceptance.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Aluminum entrances shall be equivalent to Kawneer 350 IR Entrances. Subject to compliance with the Contract Documents, equivalent products from the following manufacturers are acceptable:
 - 1. Entrance system:
 - a. United States Aluminum.
 - b. Vista Wall.
 - c. YKK-AP America.
 - d. Approved equal.

2.2 MATERIALS

- A. Storefront: Aluminum, ASTM B221, 6063-T5 alloy and temper.
- B. Door stile and rail face dimensions: Vertical Stile- 3.5"; Top Rail- 3.5"; Bottom Rail- 6.5".
- C. Major portions of the door members to be 0.125" nominal in thickness and glazing molding to be 0.05" thick.
- D. Tolerances: reference to tolerances for wall thickness and other cross-sectional dimensions of entrance members are nominal and in compliance with the Aluminum Standards and data, published by the Aluminum Association.
- E. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
- F. Thermal Barrier: Extruded copolymer.
- G. Fasteners: Stainless steel.
- H. Sealants: Structural silicone sealant to be Dow Corning 983, 995 or Tremco Proglaze SSG.
- I. Brackets, Anchors, Reinforcements: Stainless steel.

2.3 ACCESSORIES

- A. Glass:
 - 1. ASCE 7.
 - 2. See Section 08800.
- B. Flashing:
 - 1. Minimum 0.040 IN aluminum.
 - 2. Finish to match storefront if exposed.
 - 3. Mill finish if concealed.
- C. Sealant: See Section 07900 and manufacturer's recommendations.
- D. Fasteners:
 - 1. Finish exposed fasteners to match finish of system.
 - 2. Provide Phillips head screws where exposed.
- E. Standard Entrance Hardware
 - 1. Weatherstripping:
 - a. Meeting Stiles on pairs of doors shall be equipped with an adjustable astragal utilizing wool pile with polymeric fin.
 - b. The door weathering on a single acting offset pivot shall be equivalent to Kawneer Sealair weathering, comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
 - c. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners (Necessary to meet specified performance tests.)
 - d. Threshold: Extruded aluminum, one piece per door opening, with ribbed surface.
 - e. Offset pivots.
 - f. Push/Pull: Equivalent to Kawneer Paneline Copncealed Rod exit device and CPN pull.

- g. Closer: Surface
 - h. Security Lock/Dead Lock: MS 1850A lock with 3-point active stile locking and hurricane flushbolts.
 - i. Cylinders/Thumbturn: Manufactures standard
 - j. Cylinder Guard: Manufactures standard
- F. Related Materials
- 1. Glass:
 - a. Viracon- HRG-2, 9/16" infill.
 - b. Security Impact Glass- SAF-GLAS, 7/16" infill
 - c. 9/16" laminated infill with .090" interlayer
 - d. 9/16" laminated infill with Solutia Vanceva .075 interlayer, Dupont SGP .090" interlayer

2.4 FABRICATION

- A. General:
- 1. Fully degrease and clean members prior to assembly or application of protective coatings.
 - 2. Weld using methods recommended by manufacturer and AWS to avoid discoloration.
 - 3. Grind exposed welds smooth and restore finish.
 - 4. Ease corners of cut edges to a radius of approximately 1/64 IN.
 - 5. Conceal fasteners wherever possible.
 - 6. Fit and assemble work at shop to maximum extent possible.
 - 7. Maintain true continuity of line and accurate relation of planes and angles.
 - 8. Provide secure attachment and support at mechanical joint, with hairline fit of contacting members.
 - 9. Reinforce work as necessary to withstand wind loadings and to support system.
 - 10. Separate dissimilar metal with bituminous paint or preformed separators to prevent corrosion.
 - 11. Separate metal surfaces at moving joints with plastic inserts or other nonabrasive concealed inserts to permanently prevent freeze-up of joint.
 - 12. Frames to be structurally reinforced as required by frame manufacturer.
 - 13. Structural steel reinforcement:
 - a. Hot-dip galvanized after fabrication, ASTM A653, G90.
 - b. Provide dissimilar metals protection, see Section 09905.
 - c. All structural reinforcement sizes shall be determined by the frame manufacturer.
 - 14. Minimum wall thickness of 0.07 IN for all frame components.
- B. Entrances:
- 1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
 - 2. Complete extruded aluminum framing system:
 - a. Sidelights shall match entrance system.
 - 3. Include all sills, mullions, anchors, division bars, and flashing.
 - 4. Use no through metal connectors in thermally broken systems.
 - 5. Provide complete system under single responsibility.
- C. Fasteners:
- 1. Finish exposed fasteners to match finish of system.
 - 2. Provide Phillips flat head screws where exposed.
- D. Sealants:
- 1. Refer to Section 07900.
 - 2. Provide sealant color to match finish of system at exposed locations.
 - 3. Provide sealants compatible with aluminum system and recommended for use with this type of installation.

- E. Finishes:
1. High performance costing to match roof color.
 - a. PVDF based with minimum 70 percent resin.
 - b. Three-coat system having minimum 0.8 mil epoxy primer coat on both sides of panel with a 0.8 mil PVDF resin color coat and a 0.8 mil PVDF resin clear top coat on the exterior side of the panel.
 - c. Meet or exceed requirements of AAMA 621-02.
 - d. Smooth finish.
 - e. Similar to Kynar 500".
 - f. Color:
 - 1) Match roof color.

2.5 SOURCE QUALITY CONTROL

- A. General Test Requirements:
1. Utilize independent testing laboratories specifically qualified to conduct all performance tests required.
 2. Performance tests may be conducted in manufacturer's laboratories provided they are witnessed and certified by qualified independent testing laboratory personnel.
 3. Provide certification that proposed system has been tested in accordance with and meets the requirements of the standards identified in this Specification.
 4. Test air infiltration first, water resistance second.
 - a. Other tests may be in any order.
- B. Air Infiltration Tests (Storefront Framing):
1. Test in accordance with ASTM E283.
 2. Air infiltration: 0.06 cfm/SF of wall area when tested at a static air pressure differential of 6.24 psf.
- C. Water Resistance Test:
1. Test in accordance with ASTM E331.
 2. No leakage allowed at a minimum static air pressure differential of 8 psf.
- D. Uniform Load Test:
1. Uniform load:
 - a. A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E330.
 - b. There shall be no deflection in excess of $L/175$ of the span of any framing member.
 - c. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2 percent of their clear spans shall occur.
- E. Thermal Tests:
1. Perform all thermal tests on unit sized as required to produce representative areas of framing, vision glass, and spandrel glass.
 2. Provide test unit which reflects most restrictive situation on project (e.g., worst framing, glass, spandrel proportions for producing desired thermal results).
 3. Test in accordance with AAMA 1503.
 4. Thermal transmittance of insulated glass and framing areas: Average U-value of 0.65 BTUH/SF/DegF, maximum.
 5. Condensation resistance test:
 - a. Determine in accordance with ASTM C1363 and AAMA 1503.
 - b. Provide condensation resistance factor (CRF) not less than 50.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify suitability of substrate to accept installation.
 - 1. Correct defects.
 - 2. Installation assumes responsibility for performance.
- B. Install products in accordance with manufacturer's instructions.
- C. Set units plumb, level and true to line.
- D. Anchor securely in place.
- E. Separate metal surfaces from sources of corrosion or electrolytic action.
- F. Set sill and base members in a bed of sealant.
- G. Provide joint fillers or gaskets for weathertight construction.
- H. Calk all joints within and at perimeter of system.
 - 1. Do not calk joints intended to allow the framing system to drain.
- I. Install flashing where shown on Drawings and/or where required.
- J. Set thresholds in full bed of mastic and secure.

3.2 CLEANING

- A. Clean surface promptly after installation.
- B. Remove excess glazing, sealant compounds and dirt, and leave clean.
- C. Clean glass inside and out and apply cross streamers attached to frame.

END OF SECTION

SECTION 08525**ALUMINUM WINDOWS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Aluminum windows.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07900 - Joint Sealants.
 - 2. Section 08800 - Glass and Glazing.
 - 3. Section 09905 - Painting and Protective Coatings.

1.2 SYSTEM DESCRIPTION

- A. The windows shall be Architectural Aluminum Fixed and Top Hinged Project Out Windows in accordance with ANSI/AAMA 101 Voluntary Specifications for Aluminum and Poly Prime Windows and Glass Doors and AAMA 910, Voluntary "Life Cycle" Specifications and Test Methods for Architectural Grade Windows, Sliding Doors for a Class and Grade of &-HC70 and P-AW70.
- B. Test Units
 - 1. All test unit sizes and configurations shall conform to the minimum size in accordance with ANSI/AAMA 101 and AAMA 910.
 - 2. Units submitted for laboratory testing shall be units of manufacturer's standard construction glazed and assembled in accordance with the manufacturer's specifications and ANSI/AAMA 101.
- C. Performance Requirements
 - 1. Air Infiltration: When closed and locked, test specimen shall be tested in accordance with ASTM E283 at a minimum vent size of 5' x 3". The air infiltration rate shall not exceed 0.10 cfm/ft of vent perimeter at a static air pressure differential of 6.24 psf.
 - 2. Water Resistance: When closed and locked, the test test specimen shall be tested in accordance with ASTM E547 and ASTM E331 at a minimum vent size of 5' x 3". There shall be no leakage as defined in the test method at a static air pressure of 12 psf.
 - 3. Uniform Load Deflection: A minimum static air pressure difference of 70 psf shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member.
 - 4. Uniform Load Structural Test: A minimum static air pressure difference of 105 psf shall be applied in the positive and negative direction in accordance with ASTM E330. The unit shall be evaluated after each load.
 - 5. Component Testing: Window components shall be tested in accordance with procedures described in ANSI/AAMA 101.
 - 6. Condensation Resistance Test: (CRF) when tested in accordance with AAMA 1503.1, the condensation resistance factor shall not be less than 53.
 - 7. Thermal Transmittance Test: (U-Value): When tested in accordance with AAMA 1503.1, the thermal transmittance (U-Value) shall not be more than .59 BTU/hr/sf/°F.
 - 8. Life cycle testing for architectural grade windows when tested in accordance with AAMA 910, there shall be no damage to fasteners, hardware parts, supporting arms, actuating mechanisms or any other damage which would cause the window to be inoperable, and air infiltration and water resistance tests shall not exceed the primary performance specified herein.
 - 9. Forced Entry resistance: All windows shall conform to AAMA 1302.5.

10. Sound Performance: When tested in accordance with ASTM E90 and E413, the sound transmission loss (STL) shall not exceed less than 37.
11. Thermal Barrier Tests.
 - a. Testing shall be in general accordance with AAMA TIR-A8, Structural Performance Poured and Debridged Framing System.

1.3 QUALITY ASSURANCE

A. Referenced Standards:

1. American Architectural Manufacturers Association (AAMA):
 - a. 904, Voluntary Specification for Multi-Bar Hinges in Window Applications
 - b. 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
 - c. 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
2. ASTM International (ASTM):
 - a. A924, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - b. C1363, Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
 - c. E283, Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - d. E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - e. E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
3. American Welding Society (AWS):
 - a. D1.2, Structural Welding Code - Aluminum.

1.4 DEFINITIONS

A. Installer or Applicator:

1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
2. Installer and applicator are synonymous.

1.5 SUBMITTALS

A. Shop Drawings:

1. See FP – 03, Subsection 104.03.
2. Product technical data for framing system and major accessories including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Hardware being provided by window manufacturer.
 - c. Glass being provided by window manufacturer in factory glazed units.
 - d. Manufacturer's installation instructions.
3. Elevation drawings indicating window dimensions and details.
4. Color sample to match roof color.

B. Samples:

1. After initial color selection, provide 2 x 3 IN minimum sample of each color and finish selected.

C. Miscellaneous Submittals:

1. See FP – 03, Subsection 104.03.
2. Qualifications of testing laboratory.
3. Test results.
4. Warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store units in vertical position off ground with wood spacers between each unit.

1.7 WARRANTY

- A. Five (5) year warranty of weathertightness of installation.
 - 1. Air and water integrity and structural adequacy of units and hardware, including sealants and caulking within and around perimeter of installation.
 - 2. Signed jointly by fabricator, installer, and contractor.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the manufacturers supplying equivalent products to those as listed below are acceptable:
 - 1. Thermally broken windows:
 - a. Kawneer Company Inc., 8225TL ISOLOCK Series.

2.2 MATERIALS

- A. Extruded Aluminum: 6063T5 alloy and temper (ASTM B221 G.S. 10A-T5).
- B. Frame and Ventilator depth shall not be less than 2-1/4”.
- C. All frame and ventilator members shall have minimum wall thickness of 0.090” and shall provide the structural strength sufficient to meet the specified performance requirements. All references to dimensions for wall thicknesses and other cross-sectional dimensions of window members are nominal and in compliance with ANSI H35.2-1990.
- D. All ventilators shall be tubular.
- E. Ventilators shall be double weatherstripped with a resilient foam core clad with UV-resistant elastomer.
- F. All glass pockets shall be wept to provide positive drainage.
- G. Mullions and cover Plates: Shall be extruded aluminum of 6063-T5 alloy and temper of profile and dimensions indicated on the drawings. Mullions shall provide structural properties to resist wind pressure required by performance criteria and standards.
- H. Sealants: As specified in Section 07900.
- I. Thermal Insulator: Poured in place polyurethane, self-adhering to adjacent aluminum surfaces.
- J. Weatherstripping: Sponge neoprene.

2.3 ACCESSORIES

- A. Standard Hardware:
 - 1. Cast White Bronze Cam Locks.
 - 2. 4-Bar hinges
- B. Fasteners: Where exposed, shall be 300 series, Stainless Steel.
- C. Perimeter Anchors: Aluminum.
- D. Screens:
 - 1. 18 x 16 mesh aluminum wire screens.
 - 2. Secure to aluminum shapes with vinyl spline.
 - 3. Hold in place with spring loaded plungers.
 - 4. Removable to inside of building.

5. Finish same as window frames.

E. Flashing:

1. Minimum 0.040 IN aluminum.
2. Finish to match window frames.
3. Mill finish if concealed.

2.4 FABRICATION

A. General:

1. Windows shall be top-hinged, outward units combined with fixed units.
2. Fully degrease and clean members prior to assembly or application of protective coatings.
3. Weld by methods recommended by manufacturer and AWS D1.2 to avoid discoloration at welds.
4. Grind exposed welds smooth and restore finish.
5. Ease corners of cut edges to a radius of approximately 1/64 IN.
6. Conceal fasteners wherever possible.
7. Fit and assemble work at shop to maximum extent possible.
8. Maintain true continuity of line and accurate relation of planes and angles.
9. Provide secure attachment and support at mechanical joint, with hairline fit of contacting members.
10. Reinforce work as necessary to withstand wind loadings and to support system.
11. Separate dissimilar metal with paint or preformed separators to prevent corrosion.
 - a. See Section 09905.
12. Separate metal surfaces at moving joints with plastic inserts or other nonabrasive concealed inserts to permanently prevent freeze-up of joint.
13. Reinforce frames for hardware.
14. Structural steel reinforcement hot-dip galvanized after fabrication meeting G-90, ASTM A924, requirements.

B. Thermal Insulator: Provide minimum 1/4 IN separation between exterior and interior metal surfaces after bridge is removed.

C. Weatherstripping:

1. Thermally broken type windows:
 - a. Projected:
 - 1) Provide two (2) rows of fin type extruded neoprene weatherstrips extending around perimeter of sash at both inner and outer overlap contacts.
 - 2) Provide corners which are securely staked and joined.
 - 3) Provide units which are easily replaceable.

D. Window Hardware:

1. General:
 - a. Locking device and strikes: White bronze and/or non-magnetic stainless steel.
 - b. All hardware elements that bridge sash or frame thermal barrier: Reinforced nylon, deirin or suitable non-metallic, low conductivity material.
 - c. Custodial key operation: Secure sash in closed position and automatically lock in washing position.
 - d. Safety keys removable only in closed position.
2. Glass: See Section 08800 for types of glass to be installed under this Section.

E. Fasteners:

1. Finish exposed fasteners to match finish of system.
2. Provide Phillips flat head screws where exposed.

F. Finish: AAMA 2605 Fluoropolymer paint; color to match roof color.

2.5 SOURCE QUALITY CONTROL

A. General Test Requirements:

1. Utilize independent testing laboratories specifically qualified to conduct all performance tests required.
 2. Performance tests may be conducted in manufacturer's laboratories provided they are witnessed and certified by qualified independent testing laboratory personnel.
 3. Perform all tests on "Test Unit":
 - a. Full-sized window unit for project or a minimum 5 x 8 FT unit mounted in test chamber in exact accordance with job conditions including anchorage system caulking, sealing, etc.
 - b. Test unit to be completely assembled and glazed.
 - 1) Thermal tests may be conducted on 4 x 6 FT unit.
 4. Test air infiltration first, water resistance second.
 - a. Other tests may be in any order.
 5. Test data on vertical pivot windows will be accepted for fixed windows for condensation resistance, thermal, temperature exposure and acoustical tests provided the fixed windows are the same as the vertical windows tested in the following respects:
 - a. Same frame section (or same family of extrusions).
 - b. Same basic metal mass inside and outside.
 - c. Identical thermal break.
 - d. Same type of glazing.
- B. Test Requirements:
1. Air infiltration test:
 - a. With sash and ventilators closed and locked, test in accordance with ASTM E283.
 - b. Air infiltration, in CFM/FT of crack length, at pressure differential of 6.24 psf as follows:
 - 1) Fixed windows: 0.06 maximum, all others 0.10 maximum.
 2. Water resistance test:
 - a. Mount glazed unit in its vertical position, continuously supported around outside perimeter with sash and ventilators closed and locked.
 - b. Test in accordance with ASTM E331.
 - c. No uncontrolled leakage allowed, with pressure differential of 6.24 psf.
 3. Uniform load deflection test:
 - a. Test in accordance with ASTM E330.
 - b. Subject unit to load of 25 psf applied to outside of window and 25 psf applied to inside of window.
 - c. Maximum allowable deflection of any unsupported span: $L/175$.
 - d. No glass breakage, permanent damage to fasteners, hardware parts, support arms or activating mechanisms, or any other damage which would cause window to be inoperable will be allowed.
 4. Uniform load structural test:
 - a. Test in accord with ASTM E330.
 - b. Subject unit to loads indicated below.
 - c. Stabilize pressure and maintain it for minimum period of 10 seconds.
 - d. No glass breakage, permanent damage to fasteners, hardware parts, support arms or activating mechanisms or any other damage which would cause window to be inoperable will be allowed.
 - e. Maximum permanent deformation of any main frame, sash or ventilator member: 0.4 percent of its span.
 - f. After performing Uniform Load Structural Test, increase loads 1-1/2 times and perform safety test.
 - g. Design unit to withstand following design pressures acting normal to plane of wall, at applicable heights and locations.
 - 1) See Components and Cladding criteria on the Structural drawings. Design wind speed is 140 mph.
 5. Condensation resistance test:
 - a. Perform on "test unit," except size may be 3 x 4 FT, minimum.

- b. Test in accordance with AAMA 1503.
- c. CRF (Condensation Resistance Factor): 50, minimum.
- 6. Thermal test:
 - a. Perform on "test unit" except size may be 4 x 6 FT, minimum.
 - b. Test in guarded hot box ASTM C1363, with an exterior temperature of 18 DegF, an interior of 68 DegF and 15 mph fan-generated wind velocity on exterior.
 - c. "U" value: not to exceed 0.65 BTU/HR/SF/DegF.
 - d. Calculated "U" values from smaller units or data or theoretical assumptions will not be acceptable.
- 7. Temperature exposure test:
 - a. Perform on "test unit" except size may be 4 x 6 FT, minimum.
 - b. Maintain interior chamber temperature at 70 DegF.
 - c. Reduce exterior ambient temperature to minus 15 DegF.
- 8. Structural thermal barrier tension test:
 - a. Test urethane filled sections of aluminum.
 - b. Mechanically secure interior and exterior faces of 12 IN section in horizontal position.
 - c. Apply heat tape to exterior face to control surface temperature at 180 DegF 5 minutes before loading, as indicated by a thermocouple wire operated by an automatic controller.
 - d. Apply direct tension (pull) using a Universal testing machine set in 12,000 LB load range.
 - e. Test results: No loss of bond at 4000 LB IN/IN/MIN.
- 9. Structural thermal barrier shear test:
 - a. Test urethane filled sections of aluminum.
 - b. Mechanically secure interior face of 12 IN section in vertical position.
 - c. Apply heat tape to exterior face to control surface temperature at 180 DegF 5 minutes before loading, as indicated by a thermocouple wire operated by an automatic controller.
 - d. Apply load to exterior face by a bearing plate resting on top of exterior face, using Universal Testing machine set in 12,000 LB load range at a strain rate of 0.050 IN/IN/MIN.
 - e. Test results: No loss of bond at 5500 LB loading.
- 10. Structural thermal barrier combined torsion and shear test:
 - a. Test urethane filled sections of aluminum.
 - b. Secure interior face of 12 IN section in horizontal position.
 - c. Apply heat tape to exterior face to control surface temperature at 180 DegF 5 minutes before loading, as indicated by a thermocouple wire operated by an automatic controller.
 - d. Apply load to bearing plate centered on portion of glazing pocket to exterior side of thermal barrier, using a Universal Testing machine set in the 12,000 LB load range.
 - e. Test results: No loss of bond at 3900 LB load applied at strain rate of 0.05 IN/IN/MIN.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Set units plumb, level, and true to line.
- C. Anchor securely in place.
- D. Separate metal surfaces from sources of corrosion or electrolytic action.
 - 1. See Section 09905.
- E. Set sill and base members in a bed of sealant.
- F. Provide joint fillers or gaskets for weathertight construction.

- G. Calk all joints within and at perimeter of system.
- H. Provide sealant color to match finish of system at exposed locations.
- I. Provide sealants compatible with aluminum system and recommended for use with this type of installation.
- J. See Section 07900 for sealants.

3.2 FIELD QUALITY CONTROL

- A. Installation supervised or inspected by manufacturer's authorized representative.

END OF SECTION

SECTION 08610**WOOD WINDOWS****PART 1 - GENERAL****1.1 QUALITY ASSURANCE**

- A. Industry standard for wood windows: NWMAIS-2.

1.2 SUBMITTALS

- A. Shop drawings:
 - 1. Elevations, sections and details for review of support system to building frame.
- B. Product data:
 - 1. Test reports proving compliance with specifications.
- C. Samples:
 - 1. Samples of finishes.
- D. Contract closeout information:
 - 1. Warranty.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver units in sealed cardboard cartons.

1.4 WARRANTY

- A. Written warranty of weather tightness of installation to cover air and water integrity and structural adequacy of fixed and operable window units and hardware.
- B. Warrant sealants and caulking within and around perimeter of installation, and thermal integrity of frames and glazing.
- C. Warrant entire installation for a period of 10 years.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Acceptable manufacturers:
 - 1. Wood windows:
 - 1) Wood windows to be fabricated in millwork shop for interior application.
 - 2. Manufacturers desiring approval comply with Section 00440 and submit full test reports.
- B. Windows:
 - 1. White oak frames, complete with glazing.
 - 2. Type: Fixed.
 - 3. Finish to match cabinetwork, doors and trim.
- C. Glass:
 - 1. Single pane, clear float.
- D. Sealants: See Section 07900.
 - 1. Window trim: Inside stops and exposed interior trim; white oak. Finish to match cabinetwork, doors and trim.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that framed openings are correct for installation of units.
- B. Installation constitutes acceptance of responsibility for performance.

3.2 INSTALLATION

- A. Install units in prepared openings in accord with approved shop drawings and manufacturer's requirements.
- B. Shim and block as required.
- C. Insert insulation around perimeter to maintain thermal integrity.
- D. Perform perimeter caulking required to create weathertight installation.
- E. Re-calk if necessary.

3.3 FINAL CLEANING

- A. Clean windows and glass just prior to occupancy.
- B. Remove labels.

END OF SECTION

SECTION 08700**FINISH HARDWARE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Finish hardware.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 08110 - Metal Doors and Frames.
 - 2. Section 08120 - Aluminum Doors and Frames.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
 - 2. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
 - a. A156.1, Butts and Hinges.
 - b. A156.4, Door Controls (Closers).
 - c. A156.6, Architectural Door Trim.
 - d. A156.8, Door Controls - Overhead Holders.
 - e. A156.13, Mortise Locks and Latches.
 - f. A156.16, Auxiliary Hardware.
 - g. A156.18, Materials and Finishes.
 - h. A156.21, Thresholds.
 - 3. Steel Door Institute (SDI).
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - 5. Building code:
 - a. Florida Building Code (FBC):
 - 1) Florida Building Code and associated standards, 2004 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Installation shall be performed or inspected by certified Architectural Hardware Consultant (AHC).

1.3 DEFINITIONS

- A. AHC: Architectural Hardware Consultant.
- B. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- C. All weather: Capable of operation from -50 to +120 DegF.
- D. Active Leaf: Right-hand leaf when facing door from keyed side unless noted otherwise on Drawings.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.

2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 3. Schedule of all hardware being used on each door.
 - a. Number hardware sets and door references same as those indicated on Drawings.
 4. Technical data sheets on each hardware item proposed for use.
- B. Miscellaneous Submittals:
1. See FP – 03, Subsection 104.03.
 2. Architectural Hardware Consultant qualifications.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufactures who offer equivalent products may submit for approval:
1. Locksets and latchsets:
 - a. Corbin/Russwin.
 - b. Best Access Systems.
 2. Closers:
 - a. LCN.
 - b. Norton.
 - c. Corbin/Russwin.
 3. Hinges:
 - a. Stanley Works.
 - b. Hager Hinge Co.
 - c. McKinney Manufacturing Co.
 4. Door stops and holders:
 - a. Trimco.
 - b. Rockwood.
 - c. Ives.
 5. Weatherstripping and thresholds:
 - a. Pemko Manufacturing Co.
 - b. Reese Enterprises, Inc.
 - c. Zero Weatherstripping, Inc.
 - d. National Guard Products, Inc.
 6. Door bolts, coordinators and strikes:
 - a. Ives.
 - b. Trimco.
 - c. Rockwood.
 - d. Dorma.
 7. Other materials: As noted.

2.2 MATERIALS

- A. Fasteners: Stainless steel or aluminum.
- B. Locking, Latching and Retracting Mechanism and Lock Case:
1. Manufacturer's standard.
- C. Closers:
1. Shell: Aluminum or cast iron.
 2. Arms and piston: Forged steel.
- D. Thresholds: Aluminum.
- E. Wall Stops: Stainless steel.

- F. Keys: Brass or bronze.
- G. Weatherstripping and Smoke Seals: Polyprene, neoprene, or EPDM.
- H. Pulls, Push Plates, Bars: Stainless steel.

2.3 ACCESSORIES

- A. Closer Mechanism Covers:
 1. Match finish of adjacent hardware.
 2. Full cover.
- B. Arms, Brackets, and Plates: As required for complete installation of closers.
- C. Strikes:
 1. Stainless steel.
 2. Provide with curved lips.
 3. Extended lips when required.
 4. Furnish strike boxes.
 5. Appropriate for function and hardware listed.

2.4 FABRICATION

- A. Hardware - General:
 1. Generally prepare for Phillips head machine screw installation.
 2. Exposed screws to match hardware finish or, if exposed in surfaces of other work, to match finish of other work as closely as possible.
 3. For mineral core doors use screws which thread to head to apply butts.
 4. Provide concealed fasteners unless thru bolted.
 5. Through bolt closers on all doors.
 6. Furnish items of hardware for proper door swing.
 7. Furnish lock devices which allow door to be opened from inside room without a key or any special knowledge.
- B. Hardware:
 1. Fabricate hardware for fire rated openings in compliance with UL and NFPA 80.
 - a. This requirement takes precedence over other requirements for such hardware.
 - b. Provide only hardware which has been tested and listed by UL for types and sizes of doors.
 2. Provide integral serrated knurling on lever for doors leading to the following rooms or areas (grit covered tape applied to lever is not acceptable):
 - a. Mechanical rooms.
 - b. Storage rooms.
 - c. Janitor closet.
 3. Provide stainless steel dustproof strikes for all doors with automatic or manual flush bolts or other bolts into floor.
 4. Provide following ANSI/BHMA A156.18 finishes:
 - a. Locks: 630.
 - b. Butts: 630.
 - c. Door stops, dead locks, mortise bolts, and miscellaneous hardware: 630 if available, 626 if 630 not available.
 - d. All parts of closers (other than corrosion resistant closers): Provide special rust inhibiting pretreatment.
- C. Mortise Locks and Latches:
 1. ANSI/BHMA A156.13, Series 1000, Grade 1, Security Grade 1.
 2. Antifriction two-piece mechanical latchbolt with stainless steel anti-friction insert.
 - a. One-piece stainless steel deadbolt, minimum 1-1/4 IN x 9/16 IN thick with 1 IN throw.
 - b. 2-3/4 IN backset.
 - c. Cylinder: Brass, 6 pin, with interchangeable core.

- d. ADA compliant thumb turn lever.
- e. Corbin/Russwin:
 - 1) Trim design "NSP" for all doors.
- f. Functions as indicated in following table in accordance with ANSI/BHMA A156.13.

MORTISE LOCK NUMBERS		
ANSI	FUNCTION	CORBIN/RUSSWIN
	Half Dummy Trim	ML2050
F01	Passage	ML2010
F19	Privacy	ML2030
F05	Classroom	ML2055
F07	Storeroom	ML2057
F13	Entrance or Office	ML2065
F17	Deadlock	ML2013

D. Door Closers:

- 1. ANSI/BHMA A156.4, Grade 1.
- 2. Size door closers to comply with ANSI recommendations for door size and location.
- 3. Fabricate all closers with integral back check.
 - a. Provide all weather fluid for all closers used in exterior doors {and where otherwise indicated}.
- 4. Closers (other than corrosion resistant closers) similar to LCN 4040 Series or Norton 7500 Series or Corbin-Russwin 2000 Series.
- 5. Provide manufacturer's standard 10 year warranty.

E. Butts and Hinges:

- 1. ANSI/BHMA A156.1.
- 2. Hinge numbers:

	HAGER	STANLEY
Type 1 (Typical butts)	BB1199	FBB199

- 3. Flat button tips on all butts.
- 4. Butt types:
 - a. Type 1: Provide NRP (non-removable pin) on all exterior doors and where noted in the Schedule.
 - b. All other doors: Type 1.
- 5. Butt quantities:
 - a. Doors 61-90 IN in height: Three (3) butts.
- 6. Butt sizes:
 - a. 1.75 IN doors: 4.5 x 4.5 IN for all doors up to and including 36 IN wide.

F. Door Stops:

- 1. ANSI/BHMA A156.16.
 - a. Wall stops:

G. Door Pulls, Push Plates and Bars:

- 1. ANSI/BHMA A156.6.
- 2. Push plate: 4 x 16 IN, square corner, flat plate, with beveled edges.
- 3. Push bar: Round.
- 4. Push/Pull set:
 - a. 4 IN x 16 IN square corner flat plate with beveled edges and 3/4 IN DIA x 12 IN long pull.
 - b. Provide 2-1/2 IN clearance.
- 5. Provide cutouts as required for cylinders.

- H. Thresholds:
 - 1. ANSI/BHMA A156.21.
 - 2. One-piece unit:
 - a. Maximum 1/2 IN high.
 - b. 6 IN wide.
 - 3. Provide required bolt cutouts.
- I. Weatherstripping:
 - 1. Weather seal at jambs and head: Self-adhesive strip similar to Reese #797W.
 - 2. Sweep at bottom of doors: Similar to Reese 701C.
- J. Keying:
 - 1. Establish keying with Owner.
 - a. Provide and set up complete visible card indexed system with key tags and control slips.
 - b. Tag and identify keys.
 - c. Provide two (2) keys for each lock or cylinder.
 - d. Master key and key in groups as directed.
 - e. Provide construction master keys for all exterior doors.
- K. Bolts:
 - 1. ANSI 156.16.
 - 2. Surface bolts similar to Ives SB1630 Series with top and bottom strikes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's installation instructions, supervised or inspected by an AHC.
- B. Fit hardware before final door finishing.
- C. Permanently install hardware after door finishing operations are complete.
- D. Use SDI mounting heights for hardware.
- E. Mount closers on push side of doors unless noted otherwise.
 - 1. Provide extended arms and brackets as required.
 - 2. Provide full cover for each closer.
 - 3. Mount closers on pull side of the door for the following doors:
- F. Install closers with integral stop at all doors scheduled to receive closer unless noted otherwise.
 - 1. Do not install integral stop on closers mounted on pull side of door.
- G. Provide concealed overhead stop when corrosion resistant closer is specified.
- H. Where interior doors swing more than 105 degrees without encountering a wall and which do not have a closer scheduled, provide overhead stop.
 - 1. Provide concealed overhead stop on doors scheduled to receive closer mounted on pull side of door.
- I. Wall Mount Door Stops:
 - 1. Provide at all doors unless noted to receive overhead stop, closer with integral stop or as noted otherwise on Hardware Schedule.
 - 2. Floor mounted stops are not acceptable.
- J. Provide weather seal, door sweep and threshold at all exterior doors and where scheduled on interior doors.
 - 1. Set thresholds in a full bed of sealant.
 - 2. Mount door sweeps on exterior face of door.

3. Mount weather seal astragal at meeting edges of pairs of doors on the exterior face of the doors.

K. Mount kickplates on push side of doors.

3.2 FIELD QUALITY CONTROL

- A. Adjust and check each operating item of hardware to assure proper operation or function.
 1. Lubricate moving parts with lubricant recommended by manufacturer.
- B. During week prior to startup, make a final check and adjustment of all hardware items.
 1. Clean and lubricate as necessary to assure proper function and operation.
 2. Adjust door control devices to compensate for operation of heating and ventilating equipment.

3.3 SCHEDULES

A. Hardware Schedule:

HW-1: Butts
 Lockset F017
 Stop
 Push/Pull Plates
 Corrosion resistant closer
 12" high Kick plates

HW-2: Butts
 Lockset F07
 Stop
 Corrosion resistant closer

HW-3: Lock Cylinder
 Balance provided by Storefront manufacturer

HW-4: Butts
 Lockset F13
 Stop
 Closer

HW-5: Butts
 Latchset F01
 Stop

HW-6: Butts
 Lockset F19
 Closer
 Stop

HW-7: Butts
 Lockset F13
 Stops
 Corrosion resistant closer

END OF SECTION

SECTION 08800**GLASS AND GLAZING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Glass and glazing.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 1 - General Requirements.
 - 3. Section 07900 - Joint Sealants.
 - 4. Section 08120 - Aluminum Doors and Frames.
 - 5. Section 08210- Wood Doors
 - 6. Section 08410 - Entrances.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. Z97.1, Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
 - 2. ASTM International (ASTM):
 - a. C1036, Standard Specification for Flat Glass.
 - b. C1048, Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - c. E773, Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.
 - d. E774, Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units.
 - 3. Flat Glass Marketing Association (FGMA):
 - a. GM, Glazing Manual.
 - 4. National Fire Protection Association (NFPA):
 - a. 80, Standard for Fire Doors and Windows.
 - 5. Sealed Insulating Glass Manufacturer's Association (SIGMA).
 - 6. Building code:
 - a. Florida Building Code (FBC):
 - 1) International Building Code and associated standards, 2004 Edition including all amendments, referred to herein as Building Code.
- B. Safety glazing shall be provided in all hazardous locations as defined by the Building Code.

1.3 DEFINITIONS

- A. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.

- b. Manufacturer's installation instructions.
 - c. Certification that glass has been tested and approved for use in fire rated doors or walls.
 - 1) Copies of all test criterion.
- B. Samples:
- 1. 12 x 12 IN sample of each type, color, and thickness specified except clear glass (glass Type 1 and 2.)
- C. Miscellaneous Submittals:
- 1. See FP – 03, Subsection 104.03.
 - 2. Warranty.

1.5 WARRANTY

- A. Written five (5) year warranty signed by installer to cover air and weathertightness of installation.
- B. Written five (5) year warranty signed by manufacturer or fabricator of insulating glass units against failure of integrity of air space.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Manufacturers offering equivalent products may submit their products for approval:
 - 1. Clear glass - tempered, float and heat strengthened:
 - 2. Insulating glass units - clear:
 - a. Libbey-Owens-Ford.
 - b. PPG.
 - c. Viracon.
 - d. Visteon.
 - 3. Gaskets, glazing compounds, setting blocks, spacers, sealant, sealant tape, etc., as recommended by glass manufacturer, glass unit fabricator, or as required by NFPA.

2.2 MATERIALS

- A. Clear Float Glass:
 - 1. 1/4 IN thick.
 - 2. ASTM C1036.
 - 3. Clear glass:
 - a. Type I, Class I, Quality q3.
- B. Clear Tempered Float Glass:
 - 1. 1/4 IN thick.
 - 2. ASTM C1048.
 - a. Kind FT, Condition A, Type 1, Class I.
 - 3. ANSI Z97.1.
- C. Insulating, Impact Resistant Glass Units:
 - 1. ASTM E773, ASTM E774, Class A.
 - 2. High Impact resistant exterior pane per Building Code.
 - 3. Two (2) sheets of 1/4 IN thick glass separated by a 1/2 IN dehydrated air space hermetically sealed.
- D. Glazing Compounds:
 - 1. Non-sag, non-stain type.
 - 2. Pigmented to match frame units not requiring painting.
 - 3. Compatible with adjacent surfaces.
 - 4. One- or two-part polyurethane or silicone sealant for use in setting glass.

- a. Provide glazing compounds which will not be affected by chemicals stored in rooms where glazing compounds are used.
- E. Sealant Tape: Butyl rubber sealant tape or ribbon having a continuous neoprene shim.
- F. Gaskets:
 - 1. Flexible polyvinyl chloride or neoprene.
 - a. Provide gaskets which will not be affected by chemicals stored in rooms where gaskets are used.
 - 2. Extruded of profile and hardness required to receive glass and provide a watertight installation.
 - 3. Provide gaskets in accordance with NFPA in fire rated glazing.
- G. Setting Blocks and Spacers:
 - 1. Neoprene or EPDM, compatible with sealants used.
 - 2. Setting blocks: 70-90 durometer.
 - 3. Spacers: 40-50 durometer.
- H. Compressible Filler Stock: Closed-cell jacketed rod stock of synthetic rubber or plastic foam.
- I. Shims, Clips, Springs, Angles, Beads, Attachment Screws and Other Miscellaneous Items: As required by condition.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with recommendations of manufacturer, FGMA Glazing Manual and SIGMA Glazing Recommendations for Sealed Insulating Glass Units.
- B. Install setting blocks in adhesive or sealant.
- C. Install spacers inside and out, of proper size and spacing, for all glass sizes larger than 50 united inches, except where gaskets are used for glazing.
- D. Provide 1/8 IN minimum bite of spacers on glass.
- E. Spacer thickness to equal sealant width.
- F. Prevent sealant exudation from glazing channels of insulating glass which is more than 1/2 IN thick; colored, heat absorbing, coated or laminated glass sizes larger than 75 united inches; and other glass more than 9/32 IN thick or larger than 125 united inches.
 - 1. Leave void at heel (or install filler) at jambs and head.
 - 2. Do not leave void (or install filler) at sill.
- G. Miter cut and bond gasket ends together at corners.
- H. Immediately after installation, attach crossed streamers to framing held away from glass.
- I. Do not use silicone-based glazing sealants in window assembly or as perimeter sealant around frames in areas which may be exposed to chlorine gas or chlorine liquid splash or spillage.
 - 1. These exposure areas shall be sealed with polysulfide-based sealants.
 - 2. See Section 07900 for sealants.

3.2 FIELD QUALITY CONTROL

- A. Do not install glass with edge damage.
- B. Do not apply anything to surfaces of glass.
- C. Remove and replace damaged glass.

3.3 CLEANING

- A. Maintain glass reasonably clean during construction, so that it will not be damaged by corrosive action and will not contribute to deterioration of other materials.
- B. Wash and polish glass on both faces not more than seven (7) days prior to acceptance of work in each area.
 - 1. Comply with glass manufacturer's recommendations.

3.4 SCHEDULES

- A. Glass Type 1: Clear float glass.
- B. Glass Type 2: Clear, tempered float glass.
- C. Glass Type 3: Hurricane Resistant High Impact Glass
- D. Glass Type 4: Insulating glass.
 - 1. Outside glass: Type 3.
 - 2. Inside glass: Type 1 or 2.

END OF SECTION

SECTION 09110
NON-LOAD-BEARING WALL FRAMING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing wall framing construction.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 09250 - Gypsum Board.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. C645, Standard Specification for Nonstructural Steel Framing Members.
 - 2. Underwriters Laboratories, Inc.(UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.
 - 3. Building code:
 - a. Florida Code Council (FBC):
 - 1) Florida Building Code and associated standards, 2006 Edition including all amendments, referred to herein as Building Code.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's load tables for style indicated.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Manufacturers who offer equivalent products may submit their products for approval:
 - 1. Non-load-bearing framing components:
 - a. Dale/Incor.
 - b. G-P Gypsum Corp.
 - c. National Gypsum Co.
 - d. U.S. Gypsum Co.
 - e. The Steel Network Inc.
 - f. Fire Trak Corp.
 - g. Metal-Lite Inc.

2.2 MANUFACTURED UNITS

- A. Screw-Type Metal Studs:

1. ASTM C645.
 2. Roll-formed channel tracks and 'C' type studs.
 3. Flanges: Minimum 1-5/8 IN wide.
 4. ASTM A653 Grade A, G60 galvanized.
 5. Size indicated on Drawings.
- B. Wire Ties: 18 GA soft annealed, galvanized.
- C. Fasteners for Runners: Power-driven type to withstand minimum 190 LB shear when driven.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide 25 GA studs except as follows:
1. At jambs of openings, use two 20 GA studs.
 2. Where partition height requires provide heavier section to accommodate span within 1:360 deflection at load of 5 psf.
 - a. Provide minimum 20 GA studs at all walls with hanging loads such as wall cabinets, shelving, equipment.
- C. Provide continuous runner tracks sized to match studs.
1. Align runners accurately at both floor and top.
 2. Secure runner tracks to structure at maximum 24 IN OC.
 3. Secure at all corners, ends, and door openings.
 4. Provide fire rated assembly at all fire partition locations.
- D. Where partitions abut structural elements, allow for a minimum of 1/2 IN deflection of primary frame.
1. Provide vertical deflection device.
- E. Space studs maximum 16 IN OC.
1. Provide additional studs at corners, partition intersections, terminations each side of control joints, door and window openings and any other opening in partitions.
 2. Provide continuous stud backing at all gypsum board corners.
 3. Provide continuous 20 GA stud horizontal backing at all toilet accessory mounting locations.
 - a. Weld or screw horizontal stud backing to vertical wall studs.
 - b. Extend backing minimum one (1) full stud space beyond the toilet accessory fastener location in each direction.
- F. Use full length studs between runners.
- G. Friction fit studs to runners except at partition corners, intersections, behind wall supported casework or equipment and at openings.
1. At those locations, positively attach studs to runners with 3/8 IN self-tapping screws on both flanges of each stud, top and bottom.
- H. At all openings provide two full length studs, back to back, at each jamb.
1. For wall areas above and below openings, cut track to length, split flanges and bend webs at ends.
 2. Overlap and screw attach to jamb studs.
 3. Install cut to length intermediate studs between jamb studs at head and sill sections at same spacing as full length studs.
 4. To provide for control joints at openings, install additional stud, maximum 1/2 IN from jamb studs.
 - a. Do not fasten extra stud to track or jamb stud.

5. Securely attach jamb studs to door and window frames.
- I. Align stud openings to facilitate running of wires, conduit, and piping.

END OF SECTION

SECTION 09250**GYPSUM BOARD****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Gypsum board work.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07900 - Joint Sealants.
 - 2. Section 09110 - Non-Load-Bearing Wall Framing Systems.
 - 3. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. A108.11, Specification for Interior Installations of Cementitious Backer Units.
 - 2. ASTM International (ASTM):
 - a. A653, Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. C475, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - c. C840, Standard Specification for Application and Finishing of Gypsum Board.
 - d. C1396, Standard Specification for Gypsum Board.
 - 3. Gypsum Association (GA):
 - a. GA-214, Recommended Levels of Gypsum Board Finish.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - b. Fire Resistance Directory.

1.3 DEFINITIONS

- A. Wet Area: Toilets, showers, laboratories, janitor closets (or areas around janitor sink), and areas around emergency eye wash/showers.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Drawings of unusual conditions.
 - a. Control joint layout.
 - 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 4. Manufacturer's adhesive, sealer, joint treatment compound and tape recommendations.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Manufacturers who offer equivalent products may submit their products for approval:

1. Gypsum board and accessories:
 - a. Georgia - Pacific.
 - b. National Gypsum.
 - c. U.S. Gypsum Co.
2. Cement board and accessories:
 - a. U.S. Gypsum Co.
 - b. National Gypsum.
3. Gypsum board suspension system:
 - a. Chicago Metallic Corp.

2.2 MATERIALS

- A. Gypsum Board (GB):
 1. ASTM C1396.
 2. Furnish in lengths as long as practicable with tapered edges.
 3. Regular board: 5/8 IN thick.
- B. Water-Resistant (WR) Gypsum Board to be used in un-air-conditioned spaces:
 1. ASTM C1396.
 2. 5/8 IN thick.
- C. Orange peel sprayed on texture on all exposed gypsum wallboard surfaces.
- D. Adhesive: As recommended by board manufacturer.
- E. Sealers for Water Resistant Board: Recommended by board manufacturer.
- F. Joint Treatment Compound:
 1. ASTM C475.
 2. Recommended by manufacturer for specified board type and location.
 3. Do not use self-adhesive fiber mesh tape.
- G. Joint Tape:
 1. ASTM C475.
 2. Recommended by manufacturer for specified board type and location.

2.3 ACCESSORIES

- A. General:
 1. ASTM A653, galvanized G90.
- B. Corner Bead:
 1. Standard type with perforated flanges.
- C. Casing and Trim Bead: Manufacturer's standard product.
- D. Control and Expansion Joints: Manufacturer's standard product.
- E. Fasteners:
 1. Gypsum board:
 - a. Self-drilling Type S, corrosion-resistant bugle head screws.
 - b. Provide stainless steel fasteners in wet areas.
 2. Cement backer board:
 - a. Self-drilling, corrosion resistant wafer head screws with strip-out prevention ribs.
 - b. Do not use drywall screws.
- F. Foam Tape: PVC, 1/2 IN x 1/4 IN pressure sensitive.
- G. Tie Wire and Suspension Wire:
 1. Galvanized, soft annealed 12 GA minimum.
 2. Use soft stainless steel wire of same gage in all wet areas and/or exterior areas.
- H. Gypsum Board Suspension System:

1. Direct hung factory fabricated heavy duty rated, single web system.
2. Electro-galvanized.
3. Similar to Chicago Metallic "Fire Front 650 Drywall Furring System."

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

- a. Self-adhesive applied fire rated tape is not acceptable for use on board joints in fire rated walls.
- b. Tape all joints using conventional fire rated joint tape and joint treatment compound.
2. Erect all board vertically with edges over supporting members.
 - a. See Section 09110 for non-loading bearing metal studs.
3. Secure to each support or framing member with screws.
4. In areas having gypsum board ceilings and walls, install ceiling first.
5. Bring boards into contact, but do not force into place.
6. Fit neatly and carefully.
7. Stagger edge joints on opposite side of a partition so they occur on different framing members.
8. Hold board in firm contact with support while fasteners are being driven.
9. Proceed with attachment from center of board toward ends and edges.
10. Scribe board prior to cutting.
11. Seal ends, cutouts and screw penetrations with W/R sealant where type WR board is used.

B. Application:

1. Gypsum board:
 - a. Use 5/8 IN thick board for general and fire-rated construction.
 - b. Use non-rated gypsum board unless noted otherwise.
2. Gypsum board for use in ceilings:
 - a. Dry area ceilings: Provide 5/8 IN thick fire-rated board best suited and recommended by manufacturer for intended use.
3. Water-resistant (WR) gypsum board:
 - a. Use in wet locations such as janitor closets, toilet rooms, around emergency eye wash and deluge showers.
 - b. Provide fire-rated board in fire-rated walls.
4. Casing and trim bead:
 - a. Where bead abuts exterior window or other metal components, separate from other material using foam tape.
5. Fasteners:
 - a. Provide fasteners of sufficient length to penetrate framing member or stud not less than 3/8 IN.

C. Installation (Single-Layer System):

1. Set fasteners between 3/8 and 1/2 IN from edges and 2 IN in from board corner.
 - a. Space maximum of 12 IN on center at edges and in field of board.
 - b. Where board butts at wall/ceiling juncture, hold fasteners back 6 IN from edges.
 - c. Space fasteners closer if required by UL.
2. Install fasteners, in gypsum board, so that head rests in a slight dimple without cutting face paper or fracturing core or as recommended by board/panel manufacturer.
3. Install screws, in cement backer board, flush with board surface.
 - a. Do not countersink screws.

D. Control Joints:

1. Install prefabricated control joints to provide following maximum unjointed lengths or areas:
 - a. Control joints: #093 zinc coated control joint.

- b. Partitions: 30 FT, maximum straight run, and at lock side of jamb from head of each door opening to top of partition.
 - c. Ceilings: 50 FT maximum in one (1) direction, and at change of direction or irregular shapes.
 - d. Ceiling area: 2500 SF, maximum.
- 2. Calk control joints.
 - a. Use color to match wall or ceiling color as closely as possible.
 - 3. Where control or expansion joints occur in fire or sound rated assemblies, install suitable backing material to maintain required rating.
 - 4. Where a partition or ceiling abuts a structural element or dissimilar wall or ceiling, install corner bead, casing bead or other trim as required.
- E. Board Finishing:
- 1. Securely attach continuous corner beads to all external corners in accordance with manufacturer's recommendations.
 - 2. Provide the following minimum levels of gypsum board finish in accordance with GA-214.
 - a. Areas exposed to view:
 - 1) Surfaces to receive vinyl wall covering: Level #4.
 - 2) Surfaces to receive painted finish: Level #5.
 - b. Areas not exposed to view:
 - 1) Fire rated partitions: Level #2 unless a higher grade of finish is required by UL.
 - 2) Non-fire rated partitions: Level #2.
 - c. Provide additional coats of joint compound as required to completely conceal joints, fasteners and accessories.
 - 1) Joint photographing will not be acceptable.
 - 3. Sand each coat to remove excess joint compound.
 - a. Avoid roughing paper facing on board.
 - 4. Finish surface shall be smooth and free of tool marks and ridges.
 - 5. After primer has been applied to wall surface in accordance with Section 09905, repair and refinish all areas which show defects.
 - 6. Refer to ASTM C840 for additional finishing requirements.
- F. Install ceiling suspension system in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 09510**ACOUSTICAL CEILINGS****PART 1 - GENERAL****1.1 QUALITY ASSURANCE**

- A. Standard for suspension systems: ASTM-C635
- B. Standard for installation: ASTM-C636.
- C. Ceilings and Interior Systems Construction Association (CISCA).
 - 1. Seismic Zones as 0 through 2.

1.2 DESIGN PARAMETERS

- A. Suspension System Design Parameters:
 - 1. Comply with:
 - a. 2000 International Building Code (Chapter 1621).
 - b. CISCA Standard invoked by above.
 - 2. IBC Seismic Category: Category C.

1.3 SUBMITTALS

- A. Samples:
 - 1. Three samples of each material selected for verification.
- B. Contract Closeout Information:
 - 1. Maintenance data.
 - 2. Letter stating extra material has been delivered.
 - 3. Interior finish fire performance data:
 - a. Provide for each finish material and type specified:
 - 1) Manufacturer's printed information including:
 - a) Fire class.
 - b) NFPA test number.
 - c) Photograph.
 - 2) Proof of purchase.

1.4 JOB CONDITIONS

- A. Carefully coordinate ceiling layout with other work that penetrates acoustical ceiling systems.
- B. Specifically coordinate with sprinkler head spacing.
- C. Install acoustical material after floor and wall finishes.

PART 2 - PRODUCTS**2.1 MATERIALS - ACOUSTICAL SUSPENSION SYSTEMS**

- A. Suspension systems - General:
 - 1. Heavy duty systems, ASTM-C635.
 - 2. Main runner jointing by spliced, interlocking ends, tab locks, pin locks, or other suitable connections.
 - 3. Cross runners interlocking with main runners.
 - 4. Provide types indicated.

- B. Acceptable manufacturers (Suspension Systems):
 - 1. Acoustical suspension systems (steel):
 - a. Armstrong World Industries.
 - b. Chicago Metallic Corp.
 - c. Donn.
 - 2. Acoustical suspension systems (aluminum):
 - a. Armstrong World Industries.
 - b. Chicago Metallic.
 - c. Gordon Architectural Aluminum Specialties.
 - 3. Other manufacturers offering equivalent products may submit for approval.
- C. Hanger Wire:
 - 1. General:
 - a. Pre-stretched, with a yield stress load of at least 5 times design load, but not less than 2.05mm 0.080 IN (12 GA).
 - b. Utilize continuous lengths, without kinks and splices.
 - 2. Galvanized Steel (general use):
 - a. Galvanized, soft annealed steel wire, conforming to ASTM-A641.
- D. Trim: Provide moldings wherever ceiling meets walls, partitions, other vertical elements, and other types of ceilings or ceiling fixtures; where ceiling mounted fixtures have integral flange trim, no additional trim is required.
- E. Suspension systems - types:
 - 1. **CG-1:** Exposed grid, non-rated:
 - a. Description: Galvanized, double web steel, main and cross runners.
 - b. Face width: 23.8mm 15/16 IN.
 - c. Base Product:
 - 1) "Prelude XL", by Armstrong
 - d. Finish on exposed surfaces: Smooth, flat white.

2.2 MATERIALS - CEILING TILES

- A. Acceptable manufacturers (Ceiling Tiles):
 - 1. Ceiling tile - Wet formed mineral fiber:
 - a. Mineral fiber ceiling tile:
 - 1) Armstrong.
 - 2) Capaul.
 - 3) Celotex Corp.
 - 4) US Gypsum Co.
 - b. Other manufacturers offering equivalent products may submit for approval.
 - c. General performance description:
 - 1) Scheduled finishes to be factory applied.
 - 2) Light reflectance: Not less than 0.75.
 - 3) Noise reduction coefficient: 0.50 - 0.65.
 - 4) Class A incombustible units.
 - 5) Fire rated units (when used): UL labeled.
 - 6) Edges uniformly fabricated, true, square.
 - 7) Sizes as required to fit scheduled suspension system.
 - 8) Lay-in style: Minimum 16mm 5/8 IN thick.
 - 9) Standard tile size(s): See Reflected Ceiling Plan.
 - 10) Aluminum facing, if scheduled, to be 0.25mm 0.010 IN thick minimum aluminum sheet with white baked enamel or vinyl coating.

2.3 EXTRA MATERIAL

- A. Provide the Government with one carton of each type and pattern of material for maintenance purposes.
- B. Provide in sealed labeled boxes to facilitate identification.

PART 3 - EXECUTION**3.1 INSPECTION**

- A. Verify suitability of substrate to accept installation.
- B. Installation constitutes acceptance of responsibility for performance.

3.2 PREPARATION

- A. Consult other trades involved before start of ceiling work, to determine areas of potential interference.
- B. Do not start installation until interferences have been resolved.

3.3 INSTALLATION – GENERAL

- A. Design and install ceiling system per Cisca standards indicated in Part 1.

3.4 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM-C636 and manufacturers' instructions.
- B. Grid layout: See Reflected Ceiling Plans.
 - 1. Install grid square with room and with grid center lines or acoustical panel center lines coinciding with center lines of room, each direction.
 - a. Acoustical panel dimension at perimeter walls: Not less than 150mm 6 IN.
 - b. In case of conflict with lighting plan contact Architect.
- C. Do not use defective or damaged materials.
- D. Provide hangers and inserts necessary to support acoustical ceilings.
 - 1. Provide in time to avoid delay in progress of work.
 - 2. Locate and align hangers and inserts correctly.
 - 3. Coordinate location and alignment with work of other trades.
 - 4. Provide supplementary rough suspension system and trapeezing where necessary to support acoustical ceilings beneath pipes, ducts, equipment, etc.
 - 5. Do not suspend any part of suspension system or acoustical ceilings from ducts, pipes, conduit, equipment, etc.
- E. Space hangers to prevent loads from items in or on ceiling from causing eccentric deflection and rotation.
 - 1. Provide additional hangers to support lighting fixtures.
 - 2. Provide additional hangers within 150mm 6 IN of end of main runners.
 - 3. Do not bear runners on walls or partitions.
- F. Install moldings where ceilings meet walls, partitions, other vertical elements, and other types of ceilings.
 - 1. Support runners and border units on moldings.
 - 2. Secure moldings to wall construction by fastening through holes drilled in web.
 - 3. Space holes not more than 75mm 3 IN from each end and at each stud.
 - 4. Draw up fasteners tight against vertical surfaces.

5. Miter cut inside and outside corners.
6. Level to a tolerance not more than 1 in 1000.
7. Install with leg supporting bottom flange of runners.

G. Leave suspension system ready to accept installation of acoustic materials.

3.5 INSTALLATION - ACOUSTIC MATERIALS

- A. Install acoustic materials into suspension system in accordance with manufacturer's instructions.
- B. Field cut as required to fit materials to grid.
 1. Tegular and similar tiles articulated edges:
 - a. Machine field-cut edges to match profile of factory edges.
- C. Make cuts square and true.
- D. Do not install damaged units.
- E. Install access splines in concealed systems as directed and as required to provide access to concealed items.
- F. Identify access tile with a white headed thumb tack.
- G. Do not provide access splines for tiles in security areas.
- H. Provide hold down clips if UL rated ceiling requires.

3.6 CLEANING

- A. Perform cleaning and replacement of defective units in time to avoid delay in progress of work and before final completion of work.
- B. Carefully clean soiled surfaces.
- C. Remove and replace irregular, discolored, defective or damaged components at no additional expense to Owner.

END OF SECTION

SECTION 09678**RESILIENT BASE (RB)****PART 1 - GENERAL****1.1 QUALITY ASSURANCE**

- A. Resilient Base (RB):
 - 1. Reference Standard: ASTM-F1861.
 - a. Thermoplastic Rubber: Type TP per ASTM-F1861.
- B. Fire and smoke rating (RB):
 - 1. Critical Radiant Flux, per ASTM-E648 / NFPA 253:
 - a. Class I, not less than 0.45 W/cm².
 - 2. Smoke Developed: 450 or less per ASTM-E662 / NFPA 258.
 - 3. ASTM-E84 flame spread: Maximum, 75; smoke developed: Maximum, 250.

1.2 SUBMITTALS

- A. Samples:
 - 1. Resilient Base:
 - a. 3 samples of material and color selected for verification.
 - b. Field-fabricated corners: Construct sample base inside and outside corner:
 - 1) Include minimum 1220 mm 4 FT straight base each direction from corner.
 - 2) If not acceptable construct additional corners.
 - a) Stress whitening and cracking will not be acceptable.
 - b) Color and height variation will not be acceptable.
 - 3) Sample corners constitute standard of quality for actual construction.
 - 4) Maintain sample corners during construction.
 - 5) Remove when directed.
 - 6) Sample corners may be built into permanent construction provided sample area is readily identifiable during construction.
 - 7) Do not proceed with base installation until sample corners are approved by the Contracting Officer.
- B. Contract closeout information:
 - 1. Warranty.
 - 2. Maintenance data.
 - 3. Letter stating extra material has been delivered.
 - 4. Interior finish fire performance data:
 - a. Provide for each finish material and type specified:
 - 1) Manufacturer's printed information including:
 - a) Fire class.
 - b) NFPA test number.
 - c) Photograph.
 - 2) Proof of purchase.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened containers indicating name, brand, color and pattern.
- B. Store at minimum 21 degC 70 degF for 72 hours before installation.

1.4 JOB CONDITIONS

- A. Maintain work spaces at 18-30 degC 65-85 degF with maximum 75 percent humidity 72 hours prior, during, and after installation.

- B. Protect adjacent work from damage.
- C. Install after wall finishes.
- D. Install prior to carpet and acoustical material.
- E. Schedule installation to minimize accumulation of air contaminants that cannot be removed prior to occupancy.
- F. Air out construction with 100 percent outside air.
 - 1. Do not recirculate prior to occupancy.
 - 2. Ventilate during installation. Seal return air ducts and use direct exhaust to outdoors.

1.5 WARRANTY

- A. Remove and replace defective areas to satisfaction of Architect at no additional expense to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acceptable manufacturers:
 - 1. Resilient base (RB):
 - a. Base:
 - 1) Armstrong World Industries.
 - b. Optional:
 - 1) BurkeMercer.
 - 2) Azrock.
 - 3) Endura.
 - 4) Johnsonite.
 - 5) Roppe.
 - 6) VPI Floor Products.
 - 2. Other manufacturers offering equivalent products may submit for approval.
- B. Resilient base (RB):
 - 1. Rubber top set, coved type.
 - 2. 3 x 100 mm 1/8 x 4 IN, 6 mm 1/4 IN wide at bottom.
 - 3. Field formed external and internal corners.
 - 4. Provide continuous rolls, minimum 30 m 95 FT long.
- C. Resilient Base (RB) at carpet:
 - 1. Rubber top set, straight type.
 - 2. 3 x 100 mm 1/8 x 4 IN.
 - 3. Field formed external and internal corners.
 - 4. Provide continuous rolls, minimum 30 m 95 FT long.
- D. Leveling compound: As recommended by manufacturer, compatible with adhesives.
- E. Adhesives and primers:
 - 1. As recommended by manufacturer.
 - 2. Comply with EPA VOC regulations.

2.2 EXTRA MATERIAL

- A. 6 m 20 LF of each color and type of base for maintenance.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that substrates are clean, free from moisture, or materials which may affect adhesion.
- B. Carefully examine surfaces for defects and irregularities.
- C. Installation constitutes acceptance of surfaces.

3.2 PREPARATION

- A. Fill cracks, joints, etc., with water resistant non-crumbling patching compound.
- B. Trowel to smooth and proper level.

3.3 INSTALLATION

- A. Do not start work until work of other trades has been completed.
- B. Coordinate with floor and wall work.
- C. Apply primer and adhesive as recommended by manufacturer.
- D. Install base after wall material has dried out thoroughly.
 - 1. Provide base at intersections of floor and vertical surfaces in areas scheduled to receive base, where intersection is exposed to view.
 - 2. Set base straight and true.
 - 3. Fit base neatly into breaks and recesses.
 - 4. Install corners as recommended by manufacturer.
 - 5. Scribe to trim at doors and door frames.
 - 6. Make joints tight.
 - 7. Install with top and bottom edges in firm contact with wall and floor.

3.4 CLEANING

- A. Immediately after application and rolling remove surplus adhesive.
- B. When materials have sufficiently seated, clean in accordance with manufacturer's recommendations.
- C. Leave smooth and clean.

END OF SECTION

SECTION 09905**PAINTING AND PROTECTIVE COATINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. High performance industrial coatings (HPIC).
 2. Architectural paints (AP).
 3. Special coatings (SC).
 4. Any other coating, thinner, accelerator, inhibitor, etc., specified or required as part of a complete System specified in this Section.
 5. Minimum surface preparation requirements.
- B. Related Sections include but are not necessarily limited to:
1. Section 03002 - Concrete Finishing and Repair of Surface Defects.
 2. Section 03002 - Concrete Masonry.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. ASTM International (ASTM):
 - a. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - b. D4259, Standard Practice for Abrading Concrete.
 - c. D4261, Standard Practice for Surface Cleaning Concrete Unit Masonry for Coating.
 - d. D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
 - e. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - f. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 2. American Water Works Association (AWWA).
 3. NACE International (NACE).
 4. National Bureau of Standards (NBS):
 - a. Certified Coating Thickness Calibration Standards.
 5. National Fire Protection Association (NFPA):
 - a. 101, Life Safety Code.
 6. National Sanitation Foundation International (NSF).
 7. Steel Door Institute/American National Standards Institute (SDI/ANSI):
 - a. A250.10, Test Procedure and Acceptance Criteria For Prime Painted Steel Surfaces for Steel Doors.
 8. The Society for Protective Coatings (SSPC):
 - a. PA 2, Measurement of Dry Paint Thickness with Magnetic Gages.
 - b. SP 1, Solvent Cleaning.
 - c. SP 2, Hand Tool Cleaning.
 - d. SP 3, Power Tool Cleaning.
 9. The Society for Protective Coatings/NACE International (SSPC/NACE):
 - a. SP 5/NACE No. 1, White Metal Blast Cleaning.
 - b. SP 6/NACE No. 3, Commercial Blast Cleaning.
 - c. SP 7/NACE No. 4, Brush-off Blast Cleaning.
 - d. SP 10/NACE No. 2, Near-White Blast Cleaning.
 - e. SP 12/NACE No. 5, Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultrahigh Pressure Water Jetting Prior to Recoating.
 - f. SP 13/NACE No. 6, Surface Preparation of Concrete.
- B. Qualifications:

1. Coating manufacturer's authorized representative shall provide written statement attesting that applicator has been instructed on proper preparation, mixing and application procedures for coatings specified.
 2. Applicators shall have minimum of 10 years experience in application of similar products on similar project.
 - a. Provide references for minimum of three (3) different projects completed in last five (5) years with similar scope of work.
 - b. Include name and address of project, size of project in value (painting) and contact person.
- C. Miscellaneous:
1. Furnish paint through one (1) manufacturer unless noted otherwise.
 2. Coating used in all corridors and stairways shall meet requirements of NFPA 101 and ASTM E84.
- D. Deviation from specified mil thickness or product type is not allowed without written authorization of Engineer.
- E. Material shall not be thinned unless approved, in writing, by paint manufacturer's authorized representative.

1.3 DEFINITIONS

- A. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 2. Installer and applicator are synonymous.
- B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the section where the product is specified.
- C. Exposed Exterior Surface:
1. Surface which is exposed to weather but not necessarily exposed to view as well as surface exposed to view.
 2. Exterior surfaces are considered corrosive environment.
- D. Finished Area: One that has finish called for on Room Finish Schedule or is indicated, on Drawings, to be painted.
- E. Paint includes the following:
1. High performance industrial coatings (HPIC) include: Epoxies, urethanes, vinyl ester, waterborne vinyl acrylic emulsions, acrylates, silicones, alkyds, acrylic emulsions and any other coating listed as a HPIC.
- F. Surface Hidden from View: Surfaces such as those within pipe chases, and between top side of ceilings (including drop-in tile ceilings) and underside of floor or roof structure above.
- G. AP: Architectural paints.
- H. HPIC: High performance industrial coatings..
- I. SC: Special coatings.
- J. VOC: Volatile organic compounds.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's application instructions.

- c. Manufacturer's surface preparation instructions.
 - d. If products being used are manufactured by Company other than listed in Article 2.2, provide complete individual data sheet comparison of proposed products with specified products including application procedure, coverage rates and verification that product is designed for intended use.
 - e. Contractor's written plan of action for containing airborne particles created by blasting operation and location of disposal of spent contaminated blasting media.
 - f. Coating manufacturer's recommendation on abrasive blasting.
 - g. Manufacturer's recommendation for universal barrier coat.
 - 3. Manufacturer's statement regarding applicator instruction on product use.
 - 4. Applicator experience qualifications.
 - a. No submittal information will be reviewed until Contracting Officer has received and approved applicator qualifications.
 - 5. Certification that coating systems proposed for use have been reviewed and approved by Senior Corrosion Specification Specialist employed by the coating manufacturer.
- B. Samples:
- 1. Manufacturer's full line of colors for Contracting Officer's color selection.
 - 2. After initial color selection by Contracting Officer provide two 3 x 5 IN samples of each color selected.
- C. Miscellaneous Submittals:
- 1. See FP – 03, Subsection 104.03.
 - 2. Approval of application equipment.
 - 3. Applicator's daily record:
 - a. Submit daily record at end of each week in which painting work is performed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver in original containers, labeled as follows:
- 1. Name or type number of material.
 - 2. Manufacturer's name and item stock number.
 - 3. Contents, by volume, of major constituents.
 - 4. Warning labels.
 - 5. VOC content.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, only the following manufacturers are acceptable:
- 1. Coatings:
 - a. Benjamine Moore
 - b. Sherwin Williams.
 - c. Pittsburg Paint
 - d. Other manufacturers offering equivalent products may submit for approval.

2.2 MATERIALS

- A. All materials used must contain not more than 2.08 LBS/GAL VOC unless noted otherwise.
- B. For unspecified materials such as thinner, provide manufacturer's recommended products.
- C. Paint Systems - General:
- 1. P = prime coat.
 - 2. F1, F2 . . . Fn = first finish coat, second finish coat . . . nth finish coat, color as shown on drawings

3. If two (2) finish coats of same material are required, Contractor may, at his option and by written approval from paint manufacturer, apply one (1) coat equal to mil thickness of two (2) coats specified.
4. AP SYSTEM #39 - Architectural Paints (AP).
 - a. Cross Linked Acrylic, PPG Manor Hall "Timeless" Series.
 - b. Prime coat:
 - 1) P1 = 1 coat, 3 mils, Interior PVA Drywall Primer.
 - c. Finish coat:
 - 1) Interior:
 - a) F1 = 1 coat, 1.5 to 2.5 mils, PPG Manor Hall "Timeless" Series, Pearl finish.
 - b) F2 = 1 coat, 1.5 to 2.5 mils, PPG Manor Hall "Timeless" Series, Pearl finish as needed for complete coverage.

PART 3 - EXECUTION

3.1 ITEMS TO BE PAINTED

- A. Interior Finished Areas:
 1. Refer to Room Finish Schedule on Drawings.
 2. If schedule requires wall surfaces to be painted in a particular space, the space is considered to be a finished area, therefore, paint all appurtenant surfaces within the space unless specifically noted not to be painted in the Contract Documents.
 - a. Appurtenant surfaces include:
 - 1) Concrete columns, equipment pads, pipe supports, and equipment supports, underside of overhead concrete slabs which are exposed, semi-exposed or concealed from view but still exposed to the adjacent atmosphere.
 - a) If walls do not require paint, the above listed surfaces do not require paint unless specifically noted otherwise.
 - 2) Piping, valves, fittings and hydrants {except when covered by pipe jacketing} {and supports}.
 - a) All bituminous coated ductile iron pipe to have coating completely removed prior to painting.
- B. Surfaces in Areas Not Considered Finished:
 1. Paint following surfaces in areas not considered as finished area:
 - a. Hollow metal doors and frames.

3.2 ITEMS NOT TO BE PAINTED

- A. General: Do not paint items listed in Article 3.2 unless specifically noted in the Contract Documents to be painted.
- B. Items with Approved Factory Finish.
- C. Electrical Equipment:
 1. Do not field paint electrical equipment except where painting is specifically stated elsewhere in these Contract Documents, or where the equipment is subject to a corrosive environment.
- D. Surfaces Hidden from View except when in a corrosive or highly corrosive area, including:
 1. When not in a corrosive or highly corrosive area:
 - a. Concrete, concrete masonry units.
 - b. Conduit.
 - c. Ducts.
 - d. Insulation.
 - e. Galvanized metal surfaces.
 - f. Note: Manufacturer's standard coatings, if any, may remain.
- E. Other Items:

1. Stainless steel surfaces except:
 - a. Piping where specifically noted to be painted.
 - b. Banding as required to identify piping.
2. Aluminum surfaces except:
 - a. Where specifically shown in the Contract Documents.
 - b. Where in contact with concrete.
 - c. Where in contact with dissimilar metals.
3. Interior of pipe, ductwork, and conduits.
4. Moving parts of mechanical and electrical units where painting would interfere with the operation of the unit.
5. Code labels and equipment identification and rating plates.
6. Prefinished metal. Steel deck, unless specifically noted to be painted in these Contract Documents.
7. Standing seam metal roof, fascia and/or trim.
8. Contact surfaces of friction-type connections.
9. Metal soffit.
10. Bituminous coated ductile iron pipe.
 - a. See Paragraph 3.1B.
11. Galvanized steel items, unless specifically noted to be painted.

3.3 SCHEDULE OF ITEMS TO BE PAINTED AND PAINTING SYSTEMS

- A. Interior gypsum board surfaces:
SYSTEM #14.

3.4 PREPARATION

- A. General:
1. Prepare surfaces to be painted in accordance with coating manufacturer's instructions and this Section unless noted otherwise in the Specification.
 2. Remove all dust, grease, oil, compounds, dirt and other foreign matter which would prevent bonding of coating to surface.
- B. Protection:
1. Protect surrounding surfaces not to be coated.
 2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.
- C. Prepare and Paint Before Assembly: Where component is subject to corrosive or highly corrosive environment, prepare and paint, before assembly, all surfaces which may be subject to environment which are inaccessible after assembly.
- D. Wood:
1. Sandpaper smooth, then dust.
 2. Seal all knots, pitch and resinous sapwood after priming coat has dried.
 3. Putty nail holes and minor defects to match wood color.
- E. Ferrous Metal:
1. Prepare ductile iron pipe in accordance with pipe manufacturer's recommendations and AWWA.
 2. Complete fabrication, welding or burning before beginning surface preparation.
 - a. Chip or grind off flux, spatter, slag or other laminations left from welding.
 - b. Remove mill scale.
 - c. Grind smooth rough welds and other sharp projections.
 3. Solvent or water jet and detergent clean in accordance with SSPC SP 1 or SSPC SP 12/NACE No. 5 all surfaces scheduled to receive additional SSPC surface preparation.

4. Surfaces subject to corrosive or highly corrosive environment and all surfaces subject to immersion service:
 - a. Near-white blast clean in accordance with SSPC SP 10/NACE No. 2.
 5. All interior and exterior surfaces:
 - a. Minimum commercial blast clean in accordance with SSPC SP 6/NACE No. 3.
 6. Surfaces subject to high temperatures.
 - a. Heat in excess of 600 DegF: SSPC SP 10/NACE No. 2.
 - b. Heat in excess of 200 DegF but less than 600 DegF: SSPC SP 6/NACE No. 3.
 7. Surfaces of steel joists and steel trusses:
 - a. Commercial blast clean the major portion of the truss in accordance with SSPC SP 6/NACE No. 3.
 - b. Power tool or hand tool clean tight connection areas and other difficult to access areas in accordance with SSPC SP 2 or SSPC SP 3.
 8. Steel surfaces scheduled to receive SYSTEM #24 or #35:
 - a. White metal blast in accordance with SSPC SP 5/NACE No. 1.
 - b. Provide 2-1/2 to 3 mil anchor profile for SYSTEMS #24 and #35.
 9. Restore surface of field welds and adjacent areas to original surface preparation.
- F. Hollow Metal:
1. Clean in accordance with SSPC SP 1 or SSPC SP 12/NACE No. 5 and in accordance with hollow metal manufacturer.
- G. Galvanized Metal:
1. Solvent clean in accordance with SSPC SP 1 followed by abrasive brush blast to uniform profiled surface removing zinc oxide and other foreign contaminants.
 - a. Provide 1 mil profile.
- H. Abrasive blast clean the following equipment or surfaces regardless of previous finish, if any.
- I. Gypsum Wallboard
1. Repair minor irregularities left by finishers.
 2. Avoid raising nap of paper face on gypsum wallboard.
 3. Verify moisture content is less than 8 percent before painting.

3.5 APPLICATION

- A. General:
1. Thin, mix and apply coatings by brush, roller, or spray in accordance with manufacturer's installation instructions.
 - a. Application equipment must be inspected and approved in writing by coating manufacturer.
 2. Temperature and weather conditions:
 - a. Do not paint surfaces when surface temperature is below 50 DegF unless product has been formulated specifically for low temperature application and application is approved in writing by Contracting Officer and paint manufacturer's authorized representative.
 - b. Avoid painting surfaces exposed to hot sun.
 - c. Do not paint on damp surfaces.
 3. Provide complete coverage to mil thickness specified.
 - a. Thickness specified is dry mil thickness.
 - b. All paint systems are "to cover." In situations of discrepancy between manufacturer's square footage coverage rates and mil thickness, mil thickness requirements govern.
 - c. When color or undercoats show through, apply additional coats until paint film is of uniform finish and color.
 4. If so directed by Contracting Officer, do not apply consecutive coats until Contracting Officer has had an opportunity to observe and approve previous coats.
 5. Apply materials under adequate illumination.
 6. Evenly spread to provide full, smooth coverage.

7. Work each application of material into corners, crevices, joints, and other difficult to work areas.
 8. Avoid degradation and contamination of blasted surfaces and avoid intercoat contamination.
 - a. Clean contaminated surfaces before applying next coat.
 9. Smooth out runs or sags immediately, or remove and recoat entire surface.
 10. Allow preceding coats to dry before recoating.
 - a. Recoat within time limits specified by coating manufacturer.
 - b. If recoat time limits have expired reprepare surface in accordance with coating manufacturer's printed recommendations.
 11. Allow coated surfaces to cure prior to allowing traffic or other work to proceed.
 12. Coat all aluminum in contact with dissimilar materials.
 13. When coating rough surfaces which cannot be backrolled sufficiently, hand brush coating to work into all recesses.
 14. Backroll gypsum board surfaces with a roller if paint coatings are spray applied.
- B. Prime Coat Application:
1. Prime all surfaces indicated to be painted.
 - a. Apply prime coat in accordance with coating manufacturer's written instructions and as written in this Section.
 2. Ensure field-applied coatings are compatible with factory-applied coatings.
 - a. Employ services of coating manufacturer's qualified technical representative.
 - 1) Certify through material data sheets.
 - 2) Perform test patch.
 - b. If field-applied coating is found to be not compatible, require the coating manufacturer's technical representative to recommend, in writing, product to be used as barrier coat, thickness to be applied, surface preparation and method of application.
 - c. At Contractor's option, coatings may be removed, surface reprepared, and new coating applied using appropriate paint system listed in Paragraph 2.2E.
 - 1) All damage to surface as result of coating removal shall be repaired to original condition or better by Contractor at no additional cost to the Government.
 3. Prime ferrous metals embedded in concrete to minimum of 1 IN below exposed surfaces.
 4. Back prime all wood scheduled to be painted, prior to installation.
 5. After application of primer to gypsum board surfaces, inspect surface and repair in accordance with Article 3.4.
 - a. Re-prime repaired surfaces to uniform finish before application of finish coat(s).
 6. Apply zinc-rich primers while under continuous agitation.
 7. Ensure abrasive blasting operation does not result in embedment of abrasive particles in paint film.
 8. Brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over entire surface.
 9. Touch up damaged primer coats prior to applying finish coats.
 - a. Restore primed surface equal to surface before damage.
 10. All surfaces of steel lintels and steel components of concrete lintels used in wall construction shall be completely painted with both prime and finish coats prior to placing in wall.
- C. Finish Coat Application:
1. Apply finish coats in accordance with coating manufacturer's written instructions and in accordance with this Section; manufacturer instructions take precedent over these Specifications.
 2. Varnish:
 - a. Apply first coat of varnish: Gloss.
 - 1) Allow to dry a minimum of 48 HRS.
 - b. Apply second and third coats of varnish: Satin.
 - 1) Allow a minimum of 48 HRS between each coat.
 - c. Lightly sand between coats as required then dust clean.

3. Touch up damaged finish coats using same application method and same material specified for finish coat.
 - a. Prepare damaged area in accordance with Article 3.4.
4. SC application:
 - a. For new gypsum board surfaces:
 - 1) Apply at rate recommended by manufacturer and approved by mock-up panel.

3.6 FIELD QUALITY CONTROL

- A. Maintain Daily Record:
 1. Provide the following information for each coat of paint applied:
 - a. Date, starting time, end time, and all breaks taken by painters.
 - b. For exterior painting:
 - 1) Sky condition.
 - 2) Wind speed and direction.
 - c. Air temperature.
 - d. Relative humidity.
 - e. Moisture content of substrate prior to each coat.
 - f. Provisions utilized to maintain work area within manufacturer's recommended application parameters.
 - g. Surface temperature of substrate to which paint is being applied.
 2. Format for daily record to be computer generated.
- B. Measure wet coating with wet film thickness gages.
- C. Measure coating dry film thickness in accordance with SSPC PA 2 using Mikrotest gage calibrated against NBS "Certified Coating Thickness Calibration Standards."
 1. Contracting Officer may measure coating thickness at any time during project to assure conformance with Specifications.
- D. Measure surface temperature of items to be painted with surface temperature gage specifically designed for such.
- E. Measure substrate humidity with humidity gage specifically designed for such.
- F. Provide wet paint signs.

3.7 CLEANING

- A. Clean paint spattered surfaces.
 1. Use care not to damage finished surfaces.
- B. Upon completion of painting, replace hardware, accessories, plates, fixtures, and similar items.
- C. Remove surplus materials, scaffolding, and debris.
 1. Leave areas broom clean.

END OF SECTION

SECTION 09986**CORAL PATTERN WALL PANELS****PART 1 - GENERAL****1.1 SCOPE:**

- A. Coral Pattern Wall Panels for both exterior and interior use.
 - 1. Accent wall panels on exterior
 - 2. Interior surfaces of toilet rooms.
 - 3. Countertops.

1.2 QUALITY ASSURANCE

- A. ASTM Standards:
 - 1. ASTM-E84.

1.3 SUBMITTALS

- A. Product data:
 - 1. Manufacturer's technical data.
- B. Samples:
 - 1. Furnish two 300 mm 12 IN square samples of selected color.
- C. Contract closeout information:
 - 1. Maintenance data.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Schedule delivery of anchorage components as required for installation.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Acceptable manufacturers:
 - 1. Materials listed:
 - a. Coral-Light Stone Products
1020 SW 10th Ave., Suite 2
Pompano Beach, FL 33069
 - 2. Other manufacturers with equivalent products may submit for approval.

2.2 WALL PANELS

- A. Coral Pattern Wall Panels (Faux Coral):
 - 1. Panel thickness
 - a. 3/4".
- B. Moldings:
 - 1. Manufacturer's standard trim.

PART 3 - EXECUTION**3.1 INSPECTION**

- A. Verify suitability of substrate to accept installation.
- B. Correct unsatisfactory conditions.

- C. Start of installation indicates acceptance of responsibility for performance.

3.2 INSTALLATION - WALL PANELS

- A. Install in accordance with manufacturer's recommendations.
- B. Attach panels to ICF wall system with corrosion resistant screws to meet applicable wind loads.
- C. Fill screw holes with product recommended by panel manufacturer..

3.3 CLEANING

- A. Remove excessive sealant and adhesive with cleaner recommended by panel manufacturer.
- B. Clean entire surface prior to closeout.

END OF SECTION

SECTION 10162**SOLID PHENOLIC TOILET PARTITIONS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Solid Phenolic toilet partitions.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 09110 - Non-Load-Bearing Wall Framing Systems.
 - 2. Section 10800 - Toilet and Bath Accessories.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A385, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
 - b. A480, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
 - c. D2092, Standard Guide for Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting.
 - d. E-84, Fire resistance Standards

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's anchorage device and structural backing recommendations.
- B. Samples: Provide three (3) each actual metal samples of color in Drawings for Contracting Officer's final approval.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
 - 1. Toilet partitions:
 - a. Accurate Partitions Corp.
 - b. Bradley.
 - c. Bobrick
 - d. Global Steel Products Co.
 - e. Knickerbocker.
 - f. Metpar.
 - g. Sanymetal Products Co.

2.2 MATERIALS

- A. Toilet Partition Panels:

1. ½” Solid Phenolic material constructed of solidly fused plastic laminate with matte-finish melamine surfaces, colored face sheets, and black phenolic-resin core that that are integrally bonded. Edges shall be black. See drawings for color selection.
 2. Solid phenolic material shall meet NFPA Class B, ASTM E-84 Fire Resistance Rating Standards: flame spread 69, smoke density 93.
 3. Toilet compartments shall be floor and overhead braced as shown on the Drawings.
- B. Urinal Screens
1. ½” Solid Phenolic material constructed of solidly fused plastic laminate with matte-finish melamine surfaces, colored face sheets, and black phenolic-resin core that that are integrally bonded. Edges shall be black. See drawings for color selection.
 2. Solid phenolic material shall meet NFPA Class B, ASTM E-84 Fire Resistance Rating Standards: flame spread 69, smoke density 93.
 3. Urinal shall be floor braced as shown on the Drawings.
- C. Stiles
1. ¾” Solid Phenolic material constructed of solidly fused plastic laminate with matte-finish melamine surfaces, colored face sheets, and black phenolic-resin core that that are integrally bonded. Edges shall be black. See drawings for color selection. Solid phenolic material shall meet NFPA Class B, ASTM E-84 Fire Resistance Rating Standards: flame spread 69, smoke density 93.
- D. Doors
1. ¾” Solid Phenolic material constructed of solidly fused plastic laminate with matte-finish melamine surfaces, colored face sheets, and black phenolic-resin core that that are integrally bonded. Edges shall be black. See drawings for color selection. Solid phenolic material shall meet NFPA Class B, ASTM E-84 Fire Resistance Rating Standards: flame spread 69, smoke density 93.

2.3 COMPONENTS

- A. Hardware:
1. All hardware to be 18-8, type-304 stainless steel with satin finish.
 2. All hardware shall be concealed inside compartments with the exception of out-swinging doors.
 3. Hardware of chrome-plated “Zamac” is unacceptable.
- B. Latch (Vandal-Resistant):
1. Sliding door latch shall be 14 gauge (2mm) and shall slide on nylon track.
 2. Sliding door latch shall require less than 5-lb force to operate. Twisting latch operation will not be acceptable.
 3. Latch track shall be attached to door by flathead machine screws into factory-installed threaded brass inserts.
 4. Latch handle shall have rubber bumper to act as door stop.
 5. Latch shall allow door to be lifted over 8-gauge (4.4mm) keeper for emergency access.
 6. Metal-to-metal connection shall withstand a direct pull of over 1000lb. per screw.
- C. Hinges (Vandal-Resistant):
1. Hinge shall be 16-gauge (1.6mm) continuous piano hinge.
 2. All doors shall be equipped with self-closing hinge.
 3. Continuous piano hinge shall be attached to door and stile by theft-resistant, one-way, stainless steel machine screws into threaded brass inserts.
 4. Door shall be furnished with two 11-gauge (3-mm) vinyl-coated door stops to resist door from being kicked out of compartment.
 5. Door stops and keeper shall be secured with stainless steel, one-way, machine screws from inside of compartment to threaded brass inserts.
- D. Mounting Brackets:

1. Vandal Resistant: Mounting brackets shall be 18-gauge (1.2mm) stainless steel and extend full height of panel. U-channels shall be furnished for panel to stile mounting. Angle brackets shall be furnished for stile to wall and stile to panel mounting. Angle brackets shall be furnished for panel to wall mounting.
- E. Leveling Device:
1. Leveling Device shall be 3/16" (5-mm) hot rolled steel bar, chromate-treated and zinc-plated, through-bolted to base of solid phenolic stile.
- F. Stile Shoe:
1. Stile Shoe shall be one-piece 4" (102-mm) high, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Top shall have 90 return to stile. Patented one-piece shoe capable of adapting to 3/4" or 1" stile thickness and capable of being fastened (by clip) to stiles starting at wall line.
- G. Headrail Overhead braced):
1. Headrail (Overhead Braced) shall be satin finish, extruded anodized aluminum (.125"/5-mm thick) with anti-grip profile.

2.4 ACCESSORIES

- A. Bumper-Coat Hook: Rubber-tipped combination bumper and coat hook for each compartment. Coat hook shall be secured with theft resistant, one-way stainless steel screws.
- B. Paper Holders: As specified in Section 10800.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in a rigid, straight, plumb, and level and secure manner with layout as indicated on Drawings.
- C. Clearances:
1. Between pilasters and panels: 1/2 IN maximum.
 2. Between panels and walls: 1 IN maximum.
- D. Secure to walls with stirrup brackets near top and bottom of panel.
1. Locate brackets so holes occur in masonry or tile joints.
 2. Use manufacturer's recommended anchoring devices.
- E. Floor Supported-Floor Braced Partitions:
1. Secure pilasters to floor with manufacturer's recommended anchorage devices.
 2. Set tops of closed doors level with tops of pilasters.
 3. Set anchors with minimum 2 IN penetration into concrete substrate.
- F. Wall-Mounted Screens:
1. Attach with concealed anchoring devices.
 2. Verify that adequate structural backing has been provided in wall as recommended by manufacturer to suit wall construction.
 - a. See Section 09110.
 3. Mount screens with top of screen at 60 IN above floor.

3.2 ADJUSTMENT

- A. Adjust and lubricate hardware for proper operation after installation.
 - 1. Set hinges on in-swing doors to hold unlatched doors open approximately 30 degrees.
 - 2. Set hinges on out-swing doors to return to fully closed position.
- B. Repair all scratches in finish with material provided by and using application methods recommended by partition manufacturers.

END OF SECTION

SECTION 10200**LOUVERS & VENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Louvers and vents.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 07600 - Flashing and Sheet Metal.
 - 2. Section 07900 - Joint Sealants.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. 45, Designation System for Aluminum Finishes.
 - 2. Air Movement and Control Association (AMCA).
 - 3. ASTM International (ASTM):
 - a. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Drawing showing location of each louver or vent, indicating size and arrangement of blank-off plates if required.
 - 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Color chart showing manufacturer's full line of colors including exotic and special colors for color selection by Contracting Officer.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
 - 1. Louvers:
 - a. Airolite Co.
 - b. Construction Specialties, Inc.
 - c. Ruskin Manufacturing.
 - d. Industrial Louvers, Inc.
 - e. American Warming.

2.2 MANUFACTURED UNITS

- A. Louvers:
 - 1. 4 IN deep.
 - 2. Drainable with blades at 37-1/2 degrees.
 - 3. Continuous blade appearance.

4. ASTM B221 extruded aluminum, alloy 6063T5, minimum 0.081 IN thick.
 5. Minimum free area: 8.58 SF for 4 x 4 FT louver.
 6. Maximum pressure drop: 0.10 IN of water at 700 fpm.
 7. Water penetration: 0.01 OZ/SF at 873 fpm.
 8. AMCA certified.
 9. Similar to Ruskin "ELF 375DX".
 10. Insect screen:
 - a. 18-16 mesh aluminum.
 - b. Install in standard aluminum frame.
- B. Anchors, Fasteners, Reinforcing: Aluminum or stainless steel.
- C. Finish:
 1. PVDF.
 - a. Kynar 500 type finish to match roof color..
- D. Size: Refer to Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchoring and bracing accessories as required.
- C. Seal around perimeter on exterior and interior.
 1. See Section 07900.
- D. Install 0.040 IN aluminum flashing at sill to match louver
 1. See Section 07600.

END OF SECTION

SECTION 10444**SIGNAGE****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Room identification signs.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Americans with Disabilities Act (ADA):
 - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).

1.3 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Color charts for Contracting Officer's color selection.
 - 1) Color selection shall be made from manufacturer's complete color line including all premium and special colors.
 3. Schedule of all signs indicating text and graphics.
 4. Layout of room identification signage and installation detail.
- B. Samples:
1. Sample of room identification signage finish.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
1. Room identification signs:
 - a. Andco.
 - b. ASE - Architectural Signs and Engraving.
 - c. ASI Sign Systems.
 - d. Best Manufacturing Co.
 - e. Mohawk Engraving Co., Inc.
 - f. Nelson-Harkins.
 - g. Southwell.
 - h. The Supersine Co.
- B. Submit request for substitution in accordance with Specification Section 01640.

2.2 MATERIALS

- A. Room Identification Signs:
1. Interior: Melamine plastic suitable for raised lettering and Braille.
 2. Exterior: Aluminum or fiberglass suitable for raised lettering and Braille.

2.3 FABRICATION

- A. Room Identification Signs:
 - 1. General:
 - a. Raised text, border and graphics.
 - 1) Minimum 1/32 IN height.
 - 2) Provide international graphic symbology for all toilet,rooms or combinations thereof, and for unisex toilet rooms and stairs.
 - 3) Provide handicap symbol on all signs for rooms meeting handicap requirements.
 - b. Grade 2 Braille.
 - c. Finish: Eggshell.
 - 1) Color: To be selected.
 - d. Text: Minimum 3/4 IN high.
 - e. Text as indicated in Article 3.2 of this Specification Section.
 - f. Exterior signs shall be rated for exterior use.
 - g. All signage shall comply with requirements of ADA.
 - h. Similar to ASI Sign Systems "ADA Ready Sign Systems".

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Room Identification Signs:
 - 1. Install signs on walls adjacent to the latch side of doors using foam tape for interior signs.
 - a. Stainless steel screws shall be painted to match sign color.
 - 2. Where no adjacent wall space is available, mount signs on nearest adjacent wall.
 - a. Mounting of signage shall be such that a person may approach to within 3 IN of sign without encountering any protruding objects or standing in swing of door travel.
 - 3. Mount 60 IN above finish floor to centerline of sign.

3.2 SCHEDULE

- A. Room Identification Signage:

Room W TOI 101- Door #01	WOMEN	(ADA compliant)
Room M TOI 102- Door #04	MEN	(ADA compliant)
Room F TOI 103- Door #02	FAMILY RESTROOM	(ADA Compliant)
Room TOI 111- Door #11	RESTROOM	(ADA Compliant)
Doors #08 & 09	STAFF ONLY	

END OF SECTION

SECTION 10520**FIRE EXTINGUISHER & CABINETS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Fire extinguishers and cabinets.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
 - 2. National Fire Protection Association (NFPA):
 - a. 10, Standard for Portable Fire Extinguishers.
 - 3. Underwriters Laboratories, Inc. (UL):
 - a. Building Materials Directory.
 - 4. Warnock Hersey.
- B. All cabinets must meet projection limitations per ADA.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and install filled and charged extinguishers just prior to building occupancy.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
 - 1. Fire extinguishers, cabinets:
 - a. Amerex Corporation.
 - b. Ansul Fire Protection.
 - c. Walter Kidde.
 - d. Potter - Roemer Inc.
 - 2. Fire extinguisher signs:
 - a. Seton.

2.2 MANUFACTURED UNITS

- A. Fire Extinguisher Cabinet (FEC):
 - 1. Recessed mounting, with narrow flat trim.
 - 2. 22 GA epoxy-coated steel box.

3. Epoxy coated steel door and trim.
 - a. Door to have narrow, vertical, 1/4 IN clear acrylic glazing panel.
 4. Provide FIRE EXTINGUISHER decal, color as selected.
 5. Provide all required closures.
 6. Provide 20 LB 20A:120BC extinguisher.
 7. Similar to J L Industries "Ambassador" series.
- B. Wall Brackets:
1. Bracket type to fit specified extinguisher, with correct mounting accessories to fit substrate.
 2. Furnish bracket for each extinguisher not in cabinet.
 3. Bracket to be finished in red or black enamel.
- C. Fire Extinguisher (FE):
1. Steel bodied, all metal top (head) and valves.
 2. Multi-purpose dry chemical, UL rated 20A-120BC
 3. Provide hose and horn on each.
 4. Furnish one extinguisher for each fire extinguisher (FE and FEC) location.
 5. Finish: Red with epoxy finish coat.
 6. Provide "FIRE EXTINGUISHER" sign for each extinguisher location.
 - a. Similar to SETON #21999 for single face and #22001 for double-faced signs.
 7. Meeting NFPA 10.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install units with extinguisher top not over 48 IN above floor.
- C. Install FEC with top of unit at 60 IN above floor.
- D. Fire extinguisher locations shown on Drawings are approximate locations. Verify all extinguisher mounting locations with local Fire Marshal.
- E. Mount "FIRE EXTINGUISHER" sign above or adjacent to each extinguisher as directed by the Engineer.

END OF SECTION

SECTION 10800**TOILET AND BATH ACCESSORIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Toilet and bath accessories.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 10162 - Metal Toilet Partitions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Americans with Disabilities Act (ADA):
 - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
 - 2. ASTM International (ASTM):
 - a. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - b. A480, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendation on fasteners.
 - 3. Schedule of items being provided for each room. Reference rooms using room number designated on Drawings.
 - 4. Catalog cut sheet of each item proposed.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785.

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Product numbers scheduled are manufactured by Bobrick.
- B. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
 - 1. American Specialties, Inc.
 - 2. Bobrick.
 - 3. Bradley Corp.
- C. Provide equipment from one manufacturer.
- D. Submit request for substitution in accordance with specification Section 01640.

2.2 MATERIALS

- A. Toilet Accessories:
 - 1. General: ASTM A480, stainless steel.
 - 2. Grab bars: ASTM A269, stainless steel.
- B. Anchoring Devices: Manufacturer's standard.

2.3 FABRICATION

- A. Toilet Accessories:
 - 1. General:
 - a. Satin finish.
 - b. Items shall meet design requirements of ADA.
 - 2. Grab bars:
 - a. Concealed mounting.
 - b. 3 IN DIA flange.
 - c. Integral non-slip gripping surface.
 - d. 1-1/2 IN OD.
- B. Anchoring Devices:
 - 1. Designed to withstand minimum concentrated load of 250 LB applied at any point on grab bar.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify adequate backing has been provided in wall or toilet partition.
- B. See Section 10162.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instruction and in accordance with ADA.
- B. Mount all items with manufacturer's standard anchorage devices.
- C. Install in locations indicated on Drawings.

3.3 SCHEDULE

- A. See Drawings for locations.
 - 1. TP: Toilet Tissue Dispenser (double non-controlled) - B-2740.
 - 2. SD: Liquid Soap Dispenser - B-5050.
 - 3. US: Mop and Broom Utility Shelf/Rack - B-223 x 36 IN.
 - 4. M1, M2, M3: Mirror - B-290 x size indicated on Drawings.
 - 5. GB36: Grab Bar - B-6806 x 36".
 - 6. GB48: Grab Bar - B-6806 x 48
 - 7. HD: Hand Dryer - B-740 115V
 - 8. BCT: Baby Changing Table - Global Industrial
 - 9. TSC: Toilet Seat Cover- B-221

END OF SECTION

SECTION 12500**WINDOW TREATMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Window treatments.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE**1.3 SUBMITTALS**

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Color chart for Engineer's color selection.
 - 3. Window schedule using window numbers established on Drawings showing window treatment utilized.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785

PART 2 - PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable. Other manufacturers offering equivalent products may submit for approval:
 - 1. Horizontal louver blinds:
 - a. Hunter Douglas.
 - b. Levolor Lorentzen.
 - c. Bali Graber.

2.2 MANUFACTURED UNITS

- A. Horizontal Louver Blinds:
 - 1. Adjustable blinds with head rail, blades, bottom rail, lift cord, cord lock, tilter, all hardware and installation brackets:
 - a. Blades tiltable to any angle.
 - b. Blades capable of being fully raised and fully lowered.
 - c. Blades capable of being locked in any intermediate position.
 - d. Provide with tilter at left, lift cord at right.
 - e. Headrail and bottom rail.
 - 1) Extruded PVC tubular design with minimum 0.0625 IN wall thickness.
 - 2) On windows with intermediate mullions provide single headrail with individual tilter, cord lock, lift cord, bottomrail and blade assembly for each individual window panel.
 - f. Blades: Natural finished white oak to match cabinetry.
 - a) 2 IN x 0.020 IN thickness.

- g. Operating hardware: Manufacturer's standard.
- h. Units similar to Hunter Douglas Country Wood Select Blinds..

2.3 FABRICATION

- A. Fabricate such that all components do not require lubrication during normal expected life.
- B. Fabricate units to completely fill openings indicated on Drawings.
- C. For continuous window wall installations, fabricate units so that ends occur only over mullions or other defined vertical separations.
- D. Space louver blades to provide minimum overlap of 3/8 IN when in fully closed position.
- E. Gear all operating equipment so that blinds will operate easily and can be set accurately and smoothly.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify actual opening dimensions by site measurements.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Position units plumb and true.
- C. Anchor securely in place.
- D. Provide adequate clearance between sash and blinds.
- E. Utilize Dissimilar Metals Protections: See Section 09905.

END OF SECTION

SECTION 13100
LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lightning protection for buildings.
- B. Drawings and general provisions of the Contract apply to the Section.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is certified by LPI as a Master Installer/Designer.
- B. Listing and Labeling: As defined in NFPA 780, "Definitions" Article.

1.3 SUBMITTALS

- A. Product Data: For air terminals and mounting accessories.
- B. Shop Drawings: Detail lightning protection system, including air-terminal locations, conductor routing and connections, and bonding and grounding provisions. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding and isolated metal bodies.
- C. Qualification data for firms and persons specified in "Qualifications Assurance" Article to demonstrate their capabilities and experience. Include data on listing or certification by an NRTL or LPI.
- D. Certification, signed by Contractor, that roof adhesive for air terminals is approved by manufacturers of both the terminal assembly and the single-ply membrane roofing material.
- E. Field inspection reports indicating compliance with specified requirements.

1.4 COORDINATION

- A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.
- B. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2.2 LIGHTNING PROTECTION SYSTEM COMPONENTS

- A. Comply with UL 96.

- B. Roof-Mounting Air Terminals: Aluminum, unless otherwise indicated.
- C. Ground Rods, copper clad steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install lightning protection components and systems according to UL96A and NFPA 780.
- B. Install conductors with direct paths form air terminals to ground connections. Avoid sharp bends and narrow loops.
- C. Conceal the following conductors:
 - 1. Down conductors.
 - 2. Interior conductors.
 - 3. Notify contracting officer at least 48 hours in advance of inspection before concealing lightning protection components.
- D. Cable Connections: Use approved exothermic-welded connections for all conductor splices and connections between conductors and other components.
- E. Bond extremities of vertical metal bodies exceeding 60 feet in length to lightning protection components.
- F. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60-foot intervals.

3.2 CORROSION PROTECTION

- A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.
- B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

3.3 FIELD QUALITY CONTROL

- A. UL Inspection: Provide inspections as required (UL Master Label is required) to obtain a UL Master Label for system.
- B. Provide an inspection by an inspector by an inspector certified by LPI to obtain an LPI Certification (LPI certification is required).

END OF SECTION

SECTION 13448**CONTROL PANELS AND ENCLOSURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
 - 1. Control panels and enclosures for the following pump station:
 - a. Packaged Positive Displacement Grinder Pumps.
- B. This Section is applicable to panels furnished with Division 11 equipment packages when so stated in the applicable Division 11 Specification Section.
- C. This Section is applicable to panels housing Division 16 specified equipment (e.g., motor starters, lighting controls, etc.) when so stated in the applicable Division 16 Specification Section.
- D. Related Sections include but are not necessarily limited to:
 - 1. Division 16 - Electrical.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI).
 - 2. ASTM International (ASTM):
 - a. B75, Standard Specification for Seamless Copper Tube.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 4, Industrial Control and Systems: Terminal Blocks.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electric Code (NEC).
 - 5. Underwriters Laboratories, Inc. (UL):
 - a. 508A, Standard for Safety Industrial Control Panels.
- B. Miscellaneous:
 - 1. Approved supplier of Industrial Control Panels under provisions of UL 508A.
 - a. Entire assembly shall be affixed with a UL 508A label "Listed Enclosed Industrial Control Panel" prior to shipment to the jobsite.
 - b. Control panel(s) without an affixed UL 508A label shall be rejected and sent back to the Contractor's factory.

1.3 DEFINITIONS

- A. The term "panel" refers to control panels or enclosures listed in the schedule included in this Specification Section.
- B. Foreign Voltages: Voltages that may be present in circuits when the panel main power is disconnected.
- C. Intrinsically Safe:
 - 1. A device, instrument or component that will not produce sparks or thermal effects under normal or abnormal conditions that will ignite a specified gas mixture.
 - 2. Designed such that electrical and thermal energy limits inherently are at levels incapable of causing ignition.
- D. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- E. Instrumentation Cable:

1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
 2. Instrumentation cable is typically either TSP (twisted-shielded pair) or TST (twisted-shielded triad), and is used for the transmission of low current or low voltage signals.
- F. Ground Fault Circuit Interrupter (GFCI):
1. A type of device (e.g., circuit breaker or receptacle) which detects an abnormal current flow to ground and opens the circuit preventing a hazardous situation.
- G. Remote Terminal Unit (RTU):
1. An industrial data collection device designed for location at a remote site, that communicates data to a host system by using telemetry such as radio, dial-up telephone, or leased lines.
- H. Input/Output (I/O): Hardware for the moving of control signals into and/or out of a PLC or RTU.
- I. Uninterruptible Power Supply (UPS): A backup power unit that provides continuous power when the normal power supply is interrupted.
- J. Loop Calibrator: Portable testing and measurement tool capable of accurately generating and measuring 4-20ma DC analog signals.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
 2. Prepared with computer aided design (CAD) software.
 3. Printed on 11 by 17 IN sheets.
 4. Drawings shall include a title block containing the following:
 - a. Plant or facility name where panel(s) are to be installed.
 - b. Drawing title.
 - c. Drawing number.
 - d. Revision list with revision number and date
 - e. Drawing date.
 - f. Drawing scale.
 - g. Manufacturer name, address, and telephone number.
 5. Cover sheet for each Drawing set shall indicate the following:
 - a. Plant or facility name.
 - b. Project name.
 - c. Submittal description.
 - d. Revision number.
 - e. Issue date.
 6. Table of contents sheet(s) shall indicate the following for each Drawing in the set:
 - a. Drawing number.
 - b. Drawing title.
 - c. Sheet number.
 7. Legend and abbreviation sheet shall indicate the following:
 - a. Description of symbols and abbreviations used.
 - b. Panel construction notes including enclosure NEMA rating, finish type and color, wire type, wire color strategy, conductor sizes, and wire labeling strategy.
 - c. Confirmation that the panel(s) are to be affixed with a UL 508A label prior to shipment from the factory.
 8. Bill of Material for each panel shall include the following component information:
 - a. Instrument tag number.
 - b. Quantity.
 - c. Functional name or description.
 - d. Manufacturer.
 - e. Complete model number.
 - f. Size or rating.
 9. Panel exterior layout Drawings to scale and shall indicate the following:

- a. Panel materials of construction, dimensions, and total assembled weight.
 - b. Panel access openings.
 - c. Conduit access locations.
 - d. Front panel device layout.
 - e. Nameplate schedule:
 - 1) Nameplate location.
 - 2) Legend which indicates text, letter height and color, and background color.
 - f. Alarm annunciator window engraving schedule.
 - g. Layouts of graphic panels or mosaic displays.
10. Panel interior layout drawings shall be drawn to scale and shall indicate the following:
- a. Sub-panel or mounting pan dimensions.
 - b. Interior device layouts.
 - c. Wire-way locations, purpose, and dimensions.
 - d. Terminal strip designations.
 - e. Location of external wiring and/or piping connections.
 - f. Location of lighting fixtures, switches and receptacles.
11. Wiring diagrams shall consist of the following:
- a. Panel power distribution diagrams.
 - b. Control and instrumentation wiring diagrams.
 - c. Wiring diagrams shall identify each wire as it is to be labeled.
- B. Manufacturer catalog cut sheets for enclosure, finish, panel devices, control auxiliaries, and accessories.
- C. Electrical load calculations for each panel:
- 1. Total connected load.
 - 2. Peak electrical demand for each panel.
- D. Climate control calculations for each panel:
- 1. Verify that sufficient dissipation and/or generation of heat is provided to maintain interior panel temperatures within the rated operating temperatures of panel components.
- E. Miscellaneous:
- 1. Record Drawings:
 - a. Updated panel Drawings delivered with the panel(s) from the Contractor's factory.
 - b. Drawings shall be enclosed in transparent plastic and firmly secured within each panel.
- F. Operation and Maintenance Manuals:
- 1. See Section 01785.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturer's are acceptable:
- 1. Enclosures:
 - a. Hoffman Engineering Co.
 - b. Rittal.
 - c. Hammond Manufacturing.
 - d. Millbank Mfg. Co.
 - e. Approved equal, by Contracting Officer.
- B. Submit request for substitution in accordance with Specification Section 01640.

2.2 ACCESSORIES

- A. Type C - Phenolic Name Plates:
- 1. Materials: Phenolic.
 - 2. Size:

- a. Surface: As required by text.
 - b. Thickness: 1/16 IN.
 - 3. Fabrication:
 - a. Two layers laminated.
 - b. Legend engraved through top lamination into bottom lamination.
 - c. Two drilled side holes, for screw mounting.
 - 4. Color: Black top surface, white core, unless otherwise indicated.
- B. Type D - Self-Adhesive Tape Tags and Signs:
- 1. Materials: Vinyl tape or vinyl cloth.
 - 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 5 mils minimum.
 - 3. Fabrication:
 - a. Indoor/Outdoor grade.
 - b. Weather and UV resistant inks.
 - c. Permanent adhesive.
 - d. Preprinted legend.
 - e. Wire markers to be self-laminating.
 - 4. Color: White with black lettering or as specified.
 - 5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 1910.145.
- 6. Enclosure for instrumentation and control equipment, (e.g., lighting control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment name (e.g., "LIGHTING CONTROL PANEL LCPxxx").
 - 7. Components inside equipment enclosures (e.g., circuit breakers, fuses, control power transformers, control relays, contactors, timers, etc.):
 - a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "M-xxx", "CR-xxx" or "TR-xxx").
 - 8. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component tag number as indicated on the Drawings or as defined by contractor (e.g., "HS-xxx").
 - 9. Conductors in control panels and in pull or junction boxes where multiple circuits exist.
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Tag conductor at both ends.
 - d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings or as furnished with the equipment.

2.3 FABRICATION

A. General:

- 1. See Section 02733 for operational requirements of positive displacement grinder pumps.

2. Provide panel(s) with the required enclosure rating per NEMA 4X to meet classifications identified in the Contract Documents.
 3. Devices installed in panel openings shall have a NEMA enclosure rating at least equal to the panel enclosure rating.
 - a. Devices that cannot be obtained with an adequate NEMA rating shall be installed behind a transparent viewing window.
 - b. The window shall maintain the required NEMA rating of the enclosure.
 4. Panel(s) shall be completely assembled at the Contractor's factory.
 - a. No fabrication other than correction of minor defects or minor transit damage shall be performed on panels at the jobsite.
 5. Finish opening edges of panel cutouts to smooth and true surface conditions.
 - a. Panels fabricated from steel shall have the opening edges finished with the panel exterior paint.
 6. Panel shall meet all requirements of UL 508A.
 - a. If more than one disconnect switch is required to disconnect all power within a panel or enclosure, provide a cautionary marking with the word "CAUTION" and the following or equivalent, "Risk of Electric Shock-More than one disconnect switch required to de-energize the equipment before servicing."
 7. Provide control panel in accordance with NEC Article 409 - Industrial Control Panels.
 - a. In the event of any conflict between NEC Article 409 and UL 508A, the more stringent requirement shall apply.
 8. Furnish and install locally mounted automatic control panel at location shown on Drawings and rated for area classification.
 9. Include combination circuit breaker type controller with short circuit, overload, and three overload relays, interior-mounted motor starter(s), and transformer with disconnect and overload protection for control circuit of 24 V.
 10. Include a terminal board for connection of level sensors.
 11. Manufacturer to provide fully functional package system to include the following features:
 - a. NEMA 4X stainless steel watertight enclosure with continuous hinge, neoprene gasket in cover and continuous seam weld.
 - 1) Include locking mechanism complete with padlock.
 - b. Hand-Off-Automatic selector switches.
 - c. Automatic alternator.
 - d. High level alarm with silence, alarm horn, and alarm light.
 - e. Low level alarm light.
 - f. Pump running lights.
 - g. Elapsed time meters.
 - h. Moisture detector alarm light and pump shutdown.
 - i. GFCI protected convenience receptacle.
 - j. Power ON pilot light.
 - k. Normal/emergency power interlock.
 - l. Inner door in cabinet-mounted on a continuous vertical steel hinge; size to completely cover wiring and components mounted on the back panel; provide for mounting of controls and instruments on inner door.
 - m. Pedestal mounting.
 - n. Pole mounting bracket.
- B. Free-Standing Panels:
1. Welded construction.
 2. Completely enclosed, self-supporting, and gasketed dusttight.
 3. Rolled lip around all sides of enclosure door opening.
 4. Seams and corners welded and ground smooth to touch and smooth in visual appearance.
 5. Full height, fully gasketed flush pan doors.
 6. Full length piano hinges rated for 1.5 times door plus instrument weight.
 7. Doors with keyed alike locking handles and three point catch.
 8. Appropriate conduit, wiring, and instrument openings shall be provided.
 9. Lifting eyebolts to allow simple, safe rigging and lifting of panel during installation.

- C. Internal Panel Wiring:
1. Panel wire duct shall be installed between each row of components, and adjacent to each terminal strip.
 - a. Route wiring within the panel in wire-duct neatly tied and bundled with tie wraps.
 - b. Follow wire-duct manufacturer's recommended fill limits.
 - c. Wire-duct shall have removable snap-on covers and perforated walls for easy wire entrance.
 - d. Wire-duct shall be constructed of nonmetallic materials with rating in excess of the maximum voltage carried therein.
 2. Wiring shall be installed such that if wires are removed from one device, source of power will not be disrupted to other devices.
 3. Splicing and tapping of wires permitted only at terminal blocks.
 4. Wire bunches to doors shall be secured at each end so that bending or twisting will be around longitudinal axis of wire.
 - a. Protect bend area with sleeve.
 5. Arrange wiring neatly, cut to proper length, with surplus wire removed.
 - a. Arrange wiring with sufficient clearance.
 - b. Provide abrasion protection for wire bundles that pass through openings or across edges of sheet metal.
 6. AC circuits shall be routed separate from analog signal cables and digital signal cables.
 - a. Separate by at least 6 IN, except at unavoidable crossover points and at device terminations.
 7. Provide at least 6 IN of separation between intrinsically safe devices and circuits and non-intrinsically safe devices and circuits.
 8. Wiring to pilot devices or rotary switches shall be individually bundled and installed with a "flexible loop" of sufficient length to permit the component to be removed from panel for maintenance without removing terminations.
 9. Conductors for AC and DC circuits shall be type MTW stranded copper listed for operation with 600 V at 90 DegC.
 - a. Conductor size shall be as required for load and 16 AWG minimum.
 - b. Internal panel wiring color code:
 - 1) AC circuits:
 - a) Power wiring: Black.
 - b) Control interconnections: Yellow.
 - c) Neutral: White.
 - d) Ground: Green.
 - 2) Low voltage DC circuits:
 - a) Power wiring: Blue.
 - b) Control interconnections: Violet.
 - 3) Foreign voltage circuits: Pink.
 - 4) Annunciator circuits: Red.
 - 5) Intrinsically safe circuits: Orange.
 10. Analog signal cables shall be of 600 V insulation, stranded copper, twisted-shielded pairs.
 - a. Conductor size: 18 AWG minimum.
 - b. Terminate shield drain conductors to ground only at one end of the cable.
 11. High precision 250 ohm resistors with 0.25 percent accuracy shall be used where 4-20 mA DC analog signals are converted to 1-5 Vdc signals.
 - a. Resistors located at terminal strips.
 - b. Resistors terminated using individual terminal blocks and with no other conductors.
 - c. Resistor leads shall be un-insulated and of sufficient length to allow test or calibration equipment (e.g., HART communicator, loop calibrator) to be properly attached to the circuit with clamped test leads.
 12. Analog signals for devices in separate enclosures shall not be wired in series.
 - a. Loop isolators shall be used where analog signals are transmitted between control enclosures.
 13. Wire and cable identification:
 - a. Wire and cables numbered and tagged at each termination.

- b. Wire tags:
 - 1) Slip-on, PVC wire sleeves with legible, machine-printed markings.
 - 2) Adhesive, snap-on, or adhesive type labels are not acceptable.
 - c. Markings as identified in the Shop Drawings.
- D. Grounding Requirements:
- 1. Equipment grounding conductors shall be separated from incoming power conductors at the point of entry.
 - 2. Minimize grounding conductor length within the enclosure by locating the ground reference point as close as practical to the incoming power point of entry.
 - 3. Bond electrical racks, chassis and machine elements to a central ground bus.
 - a. Nonconductive materials, such as paint, shall be removed from the area where the equipment contacts the enclosure.
 - 4. Bond the enclosure to the ground bus.
 - a. It is imperative that good electrical connections are made at the point of contact between the ground bus and enclosure.
 - 5. Panel-mounted devices shall be bonded to the panel enclosure or the panel grounding system by means of locknuts or pressure mounting methods.
 - 6. Sub-panels and doors shall be bonded to ground.
- E. Termination Requirements:
- 1. Wiring to circuits external to the panel connected to interposing terminal blocks.
 - 2. Terminal blocks rigidly mounted on DIN rail mounting channels.
 - 3. Terminal strips located to provide adequate space for entrance and termination of the field conductors.
 - 4. One side of each strip of terminal blocks reserved exclusively for the termination of field conductors.
 - 5. Terminal block markings:
 - a. Marking shall be the same as associated wire marking.
 - b. Legible, machine-printed markings.
 - c. Markings as identified in the Shop Drawings.
 - 6. Terminal block mechanical characteristics, and electrical characteristics shall be in accordance with NEMA ICS 4.
 - 7. Terminal blocks with continuous marking strips.
 - a. Each terminal block shall be identified with machine printed labels.
 - 8. Terminals shall facilitate wire sizes as follows:
 - a. 120 Vac applications: Conductor size 12 AWG minimum.
 - b. Other: Conductor size 14 AWG minimum..
 - 9. Analog signal cable shield drain conductors shall be individually terminated.
 - 10. Install minimum of 20 percent spare terminals.
 - 11. Bladed, knife switch, isolating type terminal blocks where control voltages enter or leave the panel.
 - 12. Fused terminal blocks shall be used in the following circuits:
 - a. Control voltage is used to energize a solenoid valve.
 - b. DC power is connected to 2-wire, loop-powered instruments.
 - 13. Fused terminal blocks shall be provided with blown fuse indicators.
 - 14. When control circuits require more than one field conductor connected to a single wiring point, a sufficient number of terminal points shall be connected internally to allow termination of only one field conductor per terminal block.
 - 15. DIN rail mounting channels shall be installed along full length of the terminal strip areas to facilitate future expansion.
 - 16. Connections to devices with screw type terminals shall be made using spade-tongue, insulated, compression terminators.
- F. Power Distribution:
- 1. Main incoming power circuits shall be protected with a thermal magnetic circuit breaker.
 - a. Limit load to maximum of 80 percent of circuit breaker rating.

2. Component types listed below shall be individually fused so that they may be individually de-energized for maintenance:
 - a. Single-loop controllers.
 - b. Recorders.
 - c. Alarm annunciators.
 3. Equip each panel with necessary power supplies with ratings required for installed equipment and with minimum 25 percent spare capacity.
 4. Constant voltage transformers, balancing potentiometers, and rectifiers as necessary for specific instrument requirements.
- G. Internal Panel Lighting and Service Receptacles:
1. Panels less than or equal to 4 FT wide:
 - a. One electrical GFCI duplex receptacle.
 - b. One compact fluorescent light fixture with manual switch.
- H. Environmental Controls:
1. Outdoor panels:
 - a. Outdoor temperature range of 0 DegF through 120 DegF.
 - b. Thermostat controlled heaters to maintain temperature approximately 10 DegF above ambient for condensation prevention inside the panels.
 - c. Outdoor temperature range of 0 DegF through 120 DegF.
 - d. Thermostat controlled closed-loop heat exchangers or closed-loop air conditioners if required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the panel.
 - e. Internal corrosion inhibitors.
 2. Environmental control components:
 - a. Panel heaters:
 - 1) Thermostat controlled.
 - 2) Fan driven.
 - 3) Components mounted in an anodized aluminum housing.
 - 4) Designed for sub-panel mounting.
 - 5) Powered from 120 Vac and protected with a dedicated circuit breaker.
 - b. Cooling fans and exhaust packages:
 - 1) Cooling fan with louver or grill and replaceable filter.
 - 2) Designed to be mounted within a panel cutout to provide positive airflow through the panel.
 - 3) Cooling fan and exhaust louvers shall be designed and listed to maintain a NEMA 12 enclosure rating.
 - 4) Fitted with replaceable, high-density foam or synthetic fiber.
 - 5) Cooling fan controlled with a separately mounted thermostat with bi-metal sensor and adjustable dial for temperature setting.
 - 6) Powered from 120 Vac and protected with a dedicated circuit breaker.
 - c. Internal corrosion inhibitors:
 - 1) Contains chemical which vaporizes and condenses on surfaces in the enclosure.
 - 2) Inhibitor shall be applied in accordance with manufacturer instructions for the enclosure volume.
 - 3) Inhibitor shall be applied in the panel(s) prior to shipment from the Contractor's factory.

2.4 MAINTENANCE MATERIALS

- A. Extra Materials:
1. Quantity of 25 percent replacement lamps for each type installed (minimum of 12 of each type).
 2. Minimum 12 replacement filters for each type installed.
 3. One quart of exterior finish touch-up paint.
 4. One complete set of replacement corrosion inhibitors in sealed packages for each panel.

PART 3 - EXECUTION

3.1 FACTORY TESTING

- A. Scope: Inspect and test entire panel assembly to verify readiness for shipment.
- B. Location: Contractor's factory.
- C. Factory Tests:
 - 1. Tests shall be fully documented and signed by the Contractor's factory supervisor.
 - 2. The panel shop shall fully test the control panel for correct wiring.
 - a. Each I/O point shall be checked by measuring or connecting circuits at the field terminal blocks.
 - 3. Burn-in test: Panel(s) shall be fully energized for a minimum period of 48 HRS.
 - 4. Testing equipment (such as digital multi-meters and analog loop calibrators) shall be used as required for testing.
 - 5. The following functions shall be tested as a minimum:
 - a. Demonstrate functions of the panel(s) required by the Contract Documents.
 - b. Correctness of wiring from all panel field terminals to all I/O points and to all panel components.
 - c. Simulate and test each discrete signal at the field terminal strips.
 - d. Simulate and test each analog signal using loop calibrators.
 - e. The Contractor shall notify the Contracting Officer in writing a minimum of 15 calendar days prior to the Factory Tests.
 - 1) Contracting Officer has the option to witness all required tests.
 - 6. Make following documentation available to the Contracting Officer at test site during the tests:
 - a. Contract Documents.
 - b. Factory Demonstration Testing procedures.
 - c. List of equipment to be testing including make, model, and serial number.
 - d. Shop Drawing submittal data for equipment being tested.
 - 7. Deficiencies shall be corrected prior to shipment from the Contractor's factory.

3.2 INSTALLATION

- A. Install free-standing panels on 4 IN high concrete housekeeping pads.
- B. Anchor panels in a manner to prevent the enclosure from racking, which may cause the access doors to become misaligned.
- C. Obtain approved panel layouts prior to installation of conduits.
- D. Install products in accordance with manufacturer's instructions.

END OF SECTION

SECTION 13850
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Material and installation requirements for:
 - a. Fire Alarm Control Panel.
 - b. Signal Initiating Devices.
 - c. Notification Appliances.
 - d. Miscellaneous Devices.
- B. Related Sections include but are not necessarily limited to:
1. Section 16130 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Americans with Disabilities Act (ADA):
 - a. Accessibility Guidelines for Buildings and Facilities (ADAAG).
 2. FM Global (FM):
 - a. All applicable standards.
 - b. All components FM approved.
 3. National Electrical Manufacturers Association (NEMA).
 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 72, National Fire Alarm Code.
 5. Underwriters Laboratories, Inc. (UL):
 - a. 38, Standard for Safety Manually Activated Signaling Boxes.
 - b. 268, Standard for Safety Smoke Detectors for Fire Protective Signaling Systems.
 - c. 268A, Standard for Safety Smoke Detectors for Duct Applications.
 - d. 464, Standard for Safety Audible Signaling Appliances.
 - e. 497B, Standard for Safety Protectors for Data Communication and Fire Alarm Circuits.
 - f. 521, Standard for Safety Heat Detectors for Fire Protective Signaling Systems.
 - g. 864, Standard for Safety Control Units for Fire Protective Signaling Systems.
 - h. 1971, Standard for Safety Visual Signaling Appliances.
 6. Building code:
 - a. International Code Council (ICC):
 - 1) International Building Code and associated standards, {2006} Edition including all amendments, referred to herein as Building Code.
- B. Design Criteria:
1. Provide a complete fire alarm system as described in the Contract Documents and according to criteria of the Authority(ies) Having Jurisdiction (AHJ), NFPA and ADAAG.
 - a. Where system requirements described in the Contract Documents exceed those of the AHJ and/or NFPA, meet the requirements of both.
 2. The Contract Drawings indicate a preliminary layout of the type, location and quantity of devices based on NFPA.
 - a. At a minimum, make the following adjustments to the Contract Drawing as required by the AHJ and/or NFPA and/or ADAAG and the manufacturer:
 - 1) Location and spacing of notification appliances.
 - a) Candela of strobes associated with the spacing.
 - 2) Location and spacing of initiating devices.

3. Complete fire detection and alarm system design wiring diagrams, interface wiring diagrams, and operational details by system manufacturer or authorized technical representative.
 4. Submit documents after design has been approved by Authority Having Jurisdiction (AHJ).
- C. Design Criteria:
1. The fire alarm system shall be designed by a National Institute for Certification in Engineering Technologies (NICET) Level 3 or 4 fire alarm technician.
 - a. If required by state regulations, a professional engineer shall seal drawings submitted to the AHJ.
 2. Provide a complete fire alarm system as described below and according to criteria of the Authority(ies) Having Jurisdiction (AHJ), NFPA, ADAAG and Building Code.
 - a. Where system requirements described below exceed those of the AHJ and/or NFPA, meet the requirements of both.
 - b. Tamiami Trail Welcome Center:
 - 1) Master FACP as indicated on the Drawings.
 - 2) Automatic telephone dialing device for communicating supervisory, trouble and alarm conditions to off-site third party (2-lines required).
 - 3) Manual pull station adjacent to exit doors.
 - 4) Smoke and heat detector coverage as indicated
 - a) Electrical Rooms
 - 5) Alarm horns and/or strobe lights throughout the building.
 3. Complete fire detection and alarm system design wiring diagrams, interface wiring diagrams, and operational details by system manufacturer or authorized technical representative.
 4. Submit documents after design has been approved by Authority Having Jurisdiction (AHJ).
- D. Service Organization Qualifications:
1. Offer an annual maintenance contract including complete service and equipment costs for maintenance of complete system.
 2. Ten (10) years experience minimum serving fire alarm systems.
 3. Provide for 24 HR emergency service.

1.3 DEFINITIONS

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
1. Outdoor Area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
 2. Architecturally Finished Area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
 3. Non-architecturally Finished Area: Mechanical or electrical rooms and other similar process type rooms.
 4. Shop Fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

1.4 SYSTEM DESCRIPTION

- A. Automatic and manual, analog addressable, general alarm and non-coded evacuation alarm, supervised, closed-circuit, 24 Vdc microprocessor based fire detection and alarm system.
- B. Provide components including but not limited to following:
1. Main fire alarm control panel (FACP).
 2. Analog addressable heat sensors.
 3. Analog addressable smoke sensors.
 4. Combination fire alarm horns with strobe.
 5. General alarm strobes.
 6. Addressable manual pull station.
 7. Fire alarm system wire, with all wiring in conduit.

C. Basic Performance:

1. Signal Line Circuits (SLC) shall be wired Class B (NFPA Style 4).
2. Notification Appliance Circuits (NAC) shall be wired Class B (NFPA Style Y).
3. Each SLC shall be limited to only 80 percent of its total capacity at the time of initial installation.

1.5 SUBMITTALS

A. Shop Drawings:

1. See FP – 03, Subsection 104.03.
2. Product technical data:
 - a. Provide Submittal data for all products specified in PART 2 of this Specification.
 - b. Battery calculations.
 - c. Voltage drop calculations.
 - d. Description of system operation.
 - e. Name of local service organization.
 - f. Entire system approved by AHJ.
3. Fabrication and/or layout drawings:
 - a. Plan drawing(s) showing type and locations of all fire alarm devices.
 - 1) Indicate salient features of each device (e.g., weatherproof, strobe candela rating).
 - b. Wiring diagrams and riser diagrams.

B. Operation and Maintenance Manuals:

1. See Section 01785.

C. Miscellaneous:

1. Field test reports.

1.6 AREA DESIGNATIONS

A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.

1. Outdoor areas:
 - a. Wet.
 - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
2. Indoor areas:
 - a. Dry.
 - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Submit request for substitution in accordance with Specification Section 01640.

B. All Equipment:

1. UL listed as a product of a single manufacturer under appropriate category.
2. Equipment shall not be modified or installed to alter or void UL label or listing.
3. FM approved.
4. Approved by Fire Marshal, when required by state or local codes.
5. Manufacturer must have local service organization.

2.2 FIRE ALARM CONTROL PANEL (FACP)

A. FACP shall perform operations as described in Fire Alarm System Operation:

- B. The FA system shall have 100 point minimum initiating device capacity with the capability to add additional 100 point minimum initiating device control modules.

- C. Construction shall be modular with solid-state, microprocessor-based electronics.
 - 1. An 80-character LCD display shall indicate alarms, supervisory service conditions and any troubles.
- D. Keyboards or keypads shall not be required to operate system during fire alarm conditions.
- E. Provide necessary switches, relays, indicator lamps, wiring terminals, etc., to provide complete operation supervising, control, and testing facilities for entire system.
- F. FACP shall allow for loading or editing special instructions and operating sequences as required.
 - 1. System shall be capable of on-site programming to accommodate and facilitate expansion, building parameter changes or changes as required by local codes.
 - 2. All software operations shall be stored in a non-volatile programmable memory within FACP.
- G. System shall have provisions for disabling and enabling all circuits individually for maintenance and testing purposes.
- H. System shall be capable of logging and storing 300 events in an alarm log and 300 events in a trouble log.
 - 1. These events shall be stored in a battery protected random access memory.
 - 2. Each recorded event shall include time and date of that event's occurrence.
 - 3. System shall have capability of recalling alarms, trouble conditions, acknowledgments, silencing and reset activities in chronological order for purpose of recreating an event history.
- I. FACP shall be listed under UL 864.
- J. FACP shall be in an enclosed metal cabinet with glass door specifically designed for public areas.
 - 1. Mounting: Surface.
 - 2. Finish: Beige baked enamel.
- K. Each addressable device shall be represented individually in FACP.
 - 1. Indicate TROUBLE by a discreet LCD readout for each supervised circuit.
 - 2. Indicate ALARM by a discreet LCD readout for each alarm initiating addressable device.
 - 3. Include individual supervisory and alarm relays in each circuit arranged so that ground or open condition in any circuit or group of circuits, will not affect proper operation of any other device.
- L. FACP shall include the capability to report alarm and trouble conditions via a telephone line to a third party alarm reporting services.
- M. FACP shall include a system testing capability to help ensure that zoning and supervision have been maintained throughout system.
 - 1. Actuation of the enable walk test program at FACP shall activate "Walk-Test" mode of system which shall cause the following to occur:
 - a. City connection circuit shall be disconnected.
 - b. Control relay functions shall be bypassed.
 - c. FACP shall indicate a trouble condition.
 - d. Alarm activation of any initiation device shall cause audible signals to activate for 2 seconds.
 - e. FACP shall automatically reset itself after code is complete.
 - f. Any momentary opening of alarm initiating or alarm indicating circuit wiring shall cause audible signals to sound continuously for 4 seconds to indicate trouble condition.
 - g. System shall have 7 distinctive walk test groups such that only a portion of system need be disabled during testing and an alarm in any other area will be processed normally.
- N. General Alarm Circuits: Positive non-interfering type so that a second device can be annunciated simultaneously, or closely following first zone.
- O. Power Supply:
 - 1. Power limited operation per NFPA 70 Article 760.

2. 120 Vac dedicated circuit from panelboard to integral 24 Vdc regulated power supply in FACP and battery charger.
 - a. The power supply shall provide all panel and peripheral device power needs.
 3. If the FACP cannot provide power for the required number of notification appliances a power extender shall be used.
 - a. An additional 120 Vac dedicated circuit from a panelboard shall be used to power the power extenders power supply and battery charger.
- P. Battery:
1. Low maintenance sealed type, for fire alarm use with automatic battery charger.
 2. Batteries shall be capable of operating maximum normal load of system for 24 HRS and then capable of operating system for 5 minutes in alarm condition.
 3. Size batteries for the total maximum number of devices that can be connected to the FACP not the install number of devices.
 4. The notification appliance power extender shall have the same battery requirements as the FACP.

2.3 SIGNAL INITIATING DEVICES

- A. Addressable Manual Pull Stations:
1. Pull-type with handle which shall lock in a protruding manner to facilitate quick visual identification of activated station.
 - a. Key reset after operation.
 - b. Non-coded.
 - c. Single action.
 2. High impact red Lexan with operating directions in white letters.
 - a. Semi-flush mounted in architecturally finished areas.
 - b. Surface mounted in non-architecturally finished areas.
 - c. Surface mounted with clear Lexan weatherproof protective shield in areas designated as wet or in areas indicated in the schedules herein.
 3. Stations shall be keyed alike with FACP.
 4. Standards: UL 38.
- B. Addressable Sensor Base:
1. Plug-in arrangement:
 - a. Sensor and associated encapsulated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection.
 - b. The plug connection requires no springs for secure mounting and contact maintenance.
 - c. Terminals in the fixed base accept building wiring.
 - d. Sensor construction shall have a mounting base with a twist-lock detecting head that is lockable.
 - e. The locking feature must be field removable when not required.
 - f. Removal of the sensor head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the Control Unit.
 2. LED that will flash each time it is scanned by the Control Unit.
 - a. When the Control Unit determines that a sensor is in an alarm or a trouble condition, the Control Unit shall command the LED on that sensor's base to turn on steady indicating that abnormal condition exists.
 - b. Sensors which do not provide a visible indication of an abnormal condition at the sensor location shall not be acceptable.
 3. Magnetically actuated test switch to provide for easy alarm testing at the sensor location.
 4. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type.
 - a. The Control Unit shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.
 5. Addressability: Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP.

6. Provide auxiliary relays in base to provide local control of equipment as described under system operation.
 - a. Provide separate 24 volt supply to sensors with auxiliary relays to guarantee that sufficient power will be available to operate relays.
- C. Analog Addressable Heat Sensors:
 1. Fixed temperature type or combination rate-of-rise and fixed temperature type.
 2. Rated at 135 DegF for ordinary areas where normal ceiling temperatures do not exceed 100 DegF, or rated 190 DegF for up to 150 DegF ceiling temperatures.
 3. Self-restoring: Sensors do not require resetting or readjustment after actuation to restore them to normal operation.
 4. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
 5. Quantity and spacing:
 - a. Smooth ceilings: In accordance with UL rating.
 - b. Non-smooth ceilings: In accordance with State Fire marshal's requirements.
 - c. High hazard areas: As indicated.
 6. Layout is based on 30 FT spacing for fixed-type and 50 FT spacing for combination type for smooth ceiling.
 7. Standards: UL 521.
- D. Analog Addressable Smoke Sensors:
 1. Photoelectric type, dual chamber products of combustion sensors.
 2. An infrared sensor light with matching silicon cell receiver and actuated by the presence of visible products of combustion.
 3. Self-restoring: Sensors do not require resetting or readjustment after actuation to restore them to normal operation.
 4. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
 5. Standards: UL 268.

2.4 NOTIFICATION APPLIANCES

- A. Alarm Horns:
 1. Electric-vibrating polarized type, operating on 24 Vdc, with provision for housing the operating mechanism behind a grille.
 2. Horns produce a sound pressure level of 85 dB, measured at 10 FT.
 3. Housing: Red with white "FIRE" lettering.
 - a. Semi-flush or flush mounted in architecturally finished areas.
 - b. Surface-mounted in non-architecturally finished areas.
 4. Horns shall be weatherproof in areas designated as wet or in areas indicated in the schedules herein.
- B. Alarm Strobes:
 1. White tamper resistant lexan lens with 24 Vdc xenon strobe.
 2. Provide Candela rating as required per ADAAG and synchronize of multiple strobes when required.
 3. Housing: Red with white "FIRE" lettering.
 - a. Semi-flush or flush mounted in architecturally finished areas.
 - b. Surface-mounted in non-architecturally finished areas.
 4. Strobes shall be weatherproof in areas designated as wet or in areas indicated in the schedules herein.
- C. Combination Audio/Visual Devices:
 1. Shall be mounted in an integral unit and shall have the same features as the individual units specified herein.
- D. Standards: UL 464, UL 1971.

2.5 MISCELLANEOUS DEVICES

- A. Isolated Loop Circuit Protector (Transient Suppression):
 1. Hybrid solid state high performance suppression system.

- a. Do not use gas tubes, spark gaps or other suppression system components which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
2. Line-to-line response time of less than one (1) nanosecond capable of accepting a 2000 amps (8 x 20 usec pulse) at 28 V.
3. Line-to-ground response time of less than 1 nanosecond capable of accepting a 2000 amps (8 x 20 usec pulse) to earth.
4. Shield-to-ground shall be capable of accepting a 5000 amps (10 x 50 usec pulse) to earth.
5. Standard: UL 497B.

2.6 WIRING

- A. Conduit:
 1. 3/4 IN minimum.
 2. See Section 16130.
- B. Conductors:
 1. Insulation type per NEC 760.
 2. 120 Vac and power supply connections: 12 GA, minimum.
 3. Low-voltage general alarm circuits: 14 GA, minimum.
 4. Low-voltage signal initiating circuits: 18 GA, minimum.
 5. Annunciator and data communication circuits: As required by manufacturer, UL listed.
 6. Use larger wire sizes when recommended by equipment manufacturer and per voltage drop calculations.
- C. Outlet Boxes: See Section 16130.

2.7 SYSTEM OPERATION

- A. Activation of any signal initiating device, except tamper switches, shall cause the following:
 1. General audible horns and/or bells to sound, visual strobes to strobe and automatic control devices to operate.
 2. Alarm information shall be displayed at the FACP LCD displays.
 3. Signal sent to central monitoring station.
- B. All fire alarm signals are automatically locked in at FACP and remote LCD displayed annunciators until originating device is returned to normal and FACP is manually reset.
 1. Audible alarm signals shall be silence-able from FACP allowing for re-initiation following a subsequent alarm.
 - a. Silencing of alarm signals shall not impair ability of system to continue to perform as specified.
- C. Activation of any system trouble shall initiate the following:
 1. Common audible trouble signal shall sound and common trouble light shall illuminate at FACP
 2. FACP shall indicate specific device.
- D. Audible trouble signal shall be silenceable by FACP.
 1. Visual trouble indication remains until trouble condition is corrected.
 - a. A subsequent trouble condition received after manually silencing shall cause audible trouble signal to resound.
 - b. Restoration of system to normal causes audible trouble signal until silencing switch is returned to normal position.
 - c. Trouble signal will be initiated under following conditions:
 2. Open on an initiation or alarm indicating circuit.
 3. Open in wiring to remote LCD annunciator(s).
 4. Ground fault condition.
 5. Auxiliary manual control switch out of normal position.
 6. Loss of 120 volt operating power to FACP, transponders, or remote LCD annunciators.
 7. Low or no battery voltage condition.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install all fire alarm equipment and wiring in accordance with local and national codes and NFPA 72.
- B. Install all wiring in raceways:
 - 1. Install raceways and boxes in accordance with Section 16130.
 - 2. The inside of all boxes are to be painted red.
- C. Install all components as indicated and in accordance with manufacturer's wiring diagrams, instructions and recommendations.
- D. Make all fire alarm wiring continuous from terminal to terminal or from terminal to device pigtail lead.
 - 1. Circuit splices not permitted.
 - 2. Wiring joints, only when required at device pigtail leads shall utilize Scotchlok insulate conical spring connector.
- E. Color code all wiring by type of device.
 - 1. Coordinate colors with the Government.
- F. Installation of equipment and devices that pertain to other work in contract shall be closely coordinated with appropriate subcontractors.
- G. Cover all smoke detectors with plastic bags immediately after installation to maintain cleanliness.
- H. Device Mounting Schedule:
 - 1. Dimensions are to center of item unless otherwise indicated.
 - 2. Mounting heights as indicated below unless otherwise indicated on Drawings.
 - a. Manual pull stations: 48 IN.
 - b. Notification appliances: 80 IN.
 - c. Control panels 60" to top.

3.2 TESTING

- A. Obtain services of a factory trained representative of system manufacturer to supervise installation and its progress, supervise final connections to equipment and provide testing to assure that system is in proper operating condition, and is in compliance with all applicable regulations.
- B. Test system to satisfaction of Contracting Officer and state and local fire authorities in accordance with NFPA 72, state and local codes and manufacturer's requirements.

3.3 INSTRUCTION

- A. Manufacturer shall provide an authorized representative to instruct and train Fire Department personnel and the Government's personnel in operation of system.

3.4 SCHEDULES

END OF SECTION

SECTION 15010
GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 CONTRACTORS QUALIFICATIONS

- A. General: Wherever the word "sub-contractor" or "firm" is used in these sub-paragraphs, it shall mean the contractor/sub-contractor of record for the installations used for proficiency qualification.
- B. Plumbing Experience: The firm's proficiency in the installation and adjustment of plumbing systems shall have been demonstrated by the successful performance of work as specified herein on at least three commercial or institutional buildings, each containing a minimum of 20 plumbing fixtures. The firm shall have been in business performing services as specified herein, for at least 3 years.
- C. HVAC Experience: The firm's proficiency in the installation, start-up, adjustment, and maintenance of air conditioning systems shall have been demonstrated by the successful performance of work as specified herein on at least three systems each with ducted air distribution, and refrigerant piping of 40 tons capacity or greater. The firm shall have Certified Mechanical Contractor licensed personnel, instruments, tools, and equipment to perform the installation, balancing, and maintenance service specified. The firm shall have been in business performing services as specified herein, for at least 3 years.
- D. Test and Balance: The firm's proficiency in the test and balance of the air conditioning systems shall have been demonstrated by the successful performance of work as specified herein on at least three systems each with ducted air distribution, and refrigerant piping of 40 tons capacity or greater, incremental units excluded. The firm shall have trained personnel, instruments, tools, and equipment to perform the testing and balancing service specified. The firm shall have been in business performing services as specified herein, for at least 3 years and be independent of the mechanical contractor and shall be an active member of AABC or NEBB.

1.2 REQUIREMENTS

Requirements specified herein are minimum. All equipment, when installed, shall perform equal to or exceed specified requirements.

1.3 ARCHITECTURAL AND/OR STRUCTURAL REQUIREMENTS

Refer to the specifications and Architectural drawings for additional requirements pertaining to work under this discipline. Notify Contracting Officer if conflicts exist for clarification.

1.4 CLEARANCE ABOVE ELECTRICAL SWITCHGEAR AND ELECTRICAL PANELS

Clearance above electrical switchgear and electrical panels shall be maintained by mechanical system so that no mechanical ducts, pipes, vents or equipment is routed above or across the space directly above this equipment in conformance with N.E.C.

1.5 CODES AND ORDINANCES

- A. General: Where requirements of these specifications exceed specified codes and ordinances,

conform to these specifications. Materials and equipment included in Underwriters Label Service shall bear that label. Electrical equipment shall be U.L. approved as installed.

- B. Permits: Obtain all permits, paying all fees in connection therewith. At completion, have work inspected by proper authorities and furnish the Contracting Officer an inspection certificate showing approval of installation.
- C. Plumbing: Conform to the 2004 Florida Plumbing Code with 2005 and 2006 Amendments.
- D. Energy: Conform to the 2004 Florida State Energy Code for Buildings.
- E. Mechanical: Conform to the 2004 Florida Mechanical Code with 2005 and 2006 Amendments.
- F. NFPA: All applicable NFPA codes not to be limited to NFPA 101, NFPA 90A, NFPA 90B.

1.6 HOLLOW SPACES USED AS DUCTS OR PLENUMS

All materials of systems installation exposed in hollow spaces used as ducts or plenums shall have a flame spread rating of 25 or less and a smoke development rating of 50 or less.

1.7 SHOP DRAWINGS

- A. General: Contractor shall check data to ensure compliance with specifications prior to submitting. Submittal shall be assembled in complete sets in **hard back three-ring binders**, by trade, and bound with numbered index sheets and tabs. Submittal data shall be submitted at one time unless unavailable drawings would delay job progress. Data shall include capacities, complete installation instructions, dimensional data and electrical data, BHP, motor HP, operating weights and load distribution at mounting points.
- B. Identification: All submittal data shall be identified by a cover sheet showing project name, specification sections, drawing or detail number, room number, date, revision date, contractor and subcontractor's organization and project manager with phone number, the model, style and size of item being submitted with manufacturer's representative, salesman (or preparer who can answer questions), and phone number. Manufacturer's standard drawings shall be modified by deletions or additions to show only items applicable to this project.
 - 1. Review: The Contractor agrees that submittals of equipment and material and shop drawings of equipment and material layouts required under provisions of these specifications and processed by the Contracting Officer are not Change Orders. The purpose of submittals is to demonstrate that the Contractor understands the design concept of the project by indicating the equipment and materials he intends to furnish and install, and by detailing the installation he intends to achieve.

The Contractor shall conform to the requirements of the Contract Documents unless a change order is issued. The Contractor shall identify on each submittal and in letterform to the Contracting Officer any and all deviations from the contract documents.

Any submittal or shop drawings not conforming to the Contract Documents without this identification and notification shall be assumed to be marked "Revise and Resubmit" (Contractor acknowledges this by the submission), and the Contractor shall promptly re-submit said submittal so as to be in full compliance with the Contract Documents.

Failure of the Contractor to provide this information during the shop drawings phase shall make the Contractor responsible for all changes to achieve compliance with the Contract

Documents without additional compensation.

2. Items to be Submitted:

Tabulation of Power Wiring Requirements: Within 20 Days of Notice to Proceed, provide a Tabulation of Power Wiring Requirements of all proposed equipment, including H.P., amps, voltage, phase and KW, tabulated on a separate sheet. A copy of the tabulation shall be transmitted independently to the general contractor, Architect/Engineer, and to all affected trades. (Refer to Electrical Drawings for electrical provisions for equipment.)

Plumbing Fixtures.

Cleanouts.

Floor Drains.

Valves.

Thermometers & Gauges.

Vacuum Breakers.

Condensing Units:

- a. Capacity.
- b. Suction and condensing temperatures.

Split System Air Conditioning Units.

- a. Capacity, CFM, HP, KW, etc.
- b. Suction and condensing temperatures.
- c. Fin spacing, rows, entering and leaving conditions.
- d. Pressure drops.

Filters.

Grilles, Registers, Diffusers - current test factors.

- a. Performance data.
- b. NC ratings.

Ductwork and Accessories:

- a. Diffuser cuts.
- b. Diffuser pressure drop and noise data.
- c. Other items specified in Section, AIR DISTRIBUTION.

Fans:

- a. CFM, TSP, BHP, RPM and Motor HP.
- b. Accessories and dimensional data.

Piping Specialties.

Vibration Isolators.

Insulation.

Motors.

Identification Tags and Nameplates.

Refrigerant Piping Diagram approved by equipment manufacturer.

Controls and Control Diagrams. Interlock wiring with air conditioning and heating equipment approved by equipment manufacturers.

Operating Instructions.

Letter from Contractor. Stating that submittals have been checked for compliance with specifications.

Letter from Contractor. Stating that plans have been reviewed in accordance with Section 15010.

Other Items Specified Herein.

1.8 SUBSTITUTIONS

All costs incurred by acceptance of substitutions shall be borne by Contractor. Should any proposed substitute equipment require services in addition to or in excess of services provided in the Contract Documents, these services shall be provided at no extra cost to the Government.

Request for approval of a proposed product (substitution) shall be accompanied by a schedule setting forth in which respects the materials or equipment submitted for consideration differ from the materials or equipment designated in the Contract Documents and from the design intent, a minimum of 10 days prior to bid date. If there are no deviations or changes required to the design, the submittal shall be accompanied by the following statement: "The proposed material or equipment submitted for approval requires no changes to the Contract Documents to achieve the design intent." Lack of the schedule or statement will result in automatic disapproval of the request.

1.9 INSTRUCTIONS

- A. Instructions: Instruct operating personnel designated by Government in operation and maintenance of systems prior to the request for final observation. A manufacturer's service representative shall provide the instructions for each piece of equipment on system. A manufacturer's sales representative is not acceptable. (Instructor shall not be a sales person, but shall be one with service experience on a continuing basis, knowledgeable about the subject equipment.) The Contractor shall give notice to the Contracting Officer not less than 10 days of the anticipated date of instruction to allow planning by the Government. The Contractor shall request the instruction date not less than 5 days of the desired date for coordination with the Owner. Operating manual for the equipment/systems on which instructions are being given shall be in the possession of the operating personnel not less than 5 days prior to the date of instruction. The Contractor shall give an orientation session to operating personnel for achieving familiarity (not instructions) of the systems approximately 3 days prior to the instruction date. The Contractor's representative giving instruction shall be knowledgeable in the equipment/systems.

Provide signed statement from operating personnel certifying orientation and instructions have

been received. Provide typed sequence of operation to be inserted in the maintenance manuals.

1.10 WARRANTIES: Provide manufacturer's warranties prior to final observation.

1.11 NOISE AND VIBRATION: When in operation, the system shall be free from abnormal noise and vibration.

1.12 MANUFACTURER'S RECOMMENDATIONS

All equipment shall be installed in accordance with manufacturer's published installation instructions shipped with the equipment. In the event there is a discrepancy between these specifications or plans and the manufacturer's instructions, no work shall be performed until additional instructions are received.

1.13 SITE UTILITIES

- A. General: The information shown on the plans is based upon the best information available. Prior to performing any work on the site, the Contractor shall contact appropriate authorities and stake out all underground services in area of excavation. Notify Contracting Officer of any discrepancies.
- B. Recording: The Contractor shall record the exact location and depth of any existing underground utilities uncovered and all new underground utilities installed under this contract. Dimensions shall be from permanent structures and depth from a benchmark.
- C. Disposition: At the completion of the installation of the utilities, the set of record drawings shall be transmitted to the Contracting Officer for prompt review.

1.14 TEMPORARY EQUIPMENT OPERATION

Ducted air handling systems shall not be placed into operation for testing or for temporary operation until all walls in areas served by the system have been prepared for painting and the building is broom clean. Portable units may be used if required during construction at Contractor expense.

1.15 SPACE CONDITIONS

All apparatus shall fit into the available spaces in the building and must be introduced into the building so as not to cause damage to the structure. Equipment larger than access to equipment spaces shall be disassembled into sub-assemblies for installation. Where deviations from the plans are required in order to conform to the space limitations, such changes shall be made at no additional cost to the Government, and shall be subject to approval. All equipment requiring service shall be made accessible. Coordinate piping and ductwork installation to avoid conflict with other trades.

1.16 DRAWINGS

Plans are diagrammatic and show the location of the equipment, ducts, and pipes, and are not to be scaled. All dimensions shall be verified at the building site. Prefabrication and/or installation of work from drawings shall be at Contractor's risk. Refer to Architectural plans for building dimensions and details.

1.17 CUTTING AND PATCHING

Cut or core drill, where specified, openings in new work for the installation of the mechanical system. Patching shall be performed by the trade whose work is cut. Contractor shall lay out and install his work ahead of the work of other trades wherever possible.

1.18 PRESSURE TESTS

- A. General: Provide 48 hours notification in advance of any test. Test shall be maintained at conditions specified but, in no event, for less than 8 hours minimum duration, unless otherwise noted. Hydrostatic pressure test shall maintain pressure without change, except that due to temperature change. Complete test prior to insulating. Leaks shall be repaired, defective materials replaced, and system shall be retested. Strike all joints in copper and steel piping under pressure test. Conduct tests prior to connecting to equipment or isolate equipment from system. Submit affidavit of pressure tests compliance.
1. Domestic Water System: Hydrostatic test; 150 PSIG.
 2. Soil, Waste and Vent System: Static test; 10 feet minimum head. Test system in its entirety or in sections. Plug all openings except highest opening above roof. Water shall be kept in the system, or in the portion under test, for at least one (1) hour before inspection starts; the system shall be tight at all points.
 3. Refrigerant Piping:

Pressure test; 200 PSIG and 150 PSIG dry nitrogen on high and low sides respectively; 6 hours minimum duration.

Vacuum test; 500 microns; 15 minutes minimum duration.

Break vacuum with dry nitrogen and re-evacuate to 500 microns.

Break vacuum with dry nitrogen and re-evacuate to 500 microns.

Break vacuum with refrigerant charge.

1.19 COMPLETION OF WORK

- A. General: See General Conditions.
1. Incomplete Work: Prior to starting the observation process at "substantial" or other observations where work is observed, the Contractor shall give the Contracting Officer a list of work not completed, reason for incompleteness, and date when said work will be completed.
 2. Observation: At substantial, the entire system shall be demonstrated to be in specified working condition. The following shall be available during the observation:
 - a. Test and Balance Report.
 - b. Contractor Representative.
 - c. Mechanic with hand tools.
 - d. Specified test data.
 - e. Certificates.
 - f. Controls Manufacturer's Representative.
 - g. Complete Specifications and Drawings with all addenda and revisions.
 - h. Operating and Maintenance Manuals.
 - i. Substantial Observation: Punch list indicating disposition of all items with initials of person confirming completion.
- B. Uncovering of Concealed Work: Floor cleanouts shall be opened for inspection and then reclosed. Other concealed areas shall be opened upon request, where access is provided.

1.20 RECORD DRAWINGS

- A. Responsibility: The Contractor shall retain one set of clean drawings for recording all changes or modifications regarding relocation of pipe, valves, and equipment, and actual size of installed equipment, ductwork and piping in red ink. Underground utilities shall be dimensioned from permanent structures and depths recorded.
- B. Disposition: At the completion of the installation of the utilities, the set of record drawings and one set of reproducible of equipment room shop drawings shall be transmitted to the Architect/Engineer for prompt review.

1.21 OPERATING AND MAINTENANCE MANUALS

- A. Three (3) bound and indexed Operating and Maintenance Manuals shall be prepared by the Contractor for all equipment and be submitted for approval a minimum of one month prior to "substantial". Two (2) approved copies shall be delivered to the Contracting Officer at final observation.

Each Manual shall be compiled as follows: Data shall be bound in smooth surface hard back commercial quality **three-ring notebooks** with project identification shown on the front cover and binding back. Identification labels shall be typed and adhered.

Notebooks shall have 9 1/2-inch by 11 1/2-inch covers with back width to permit the covers to lie parallel or to converge, and have not less than 1 1/2-inch back width.

Index divider sheets of heavy Manila paper shall be inserted between each section of the Manual with a 2-inch x 1/3-inch ready-cut shield tab attached to each sheet for identification of sections. Data sheets and diagrams shall be 8 1/2-inch x 11-inch or be mounted on 8 1/2-inch x 11-inch sheets of 16-pound paper if smaller, with reinforced 11-inch mechanically perforated edge. Drawings and diagrams larger than 8 1/2-inch by 11-inch shall be folded up from the bottom to form a height of 11 inches and folded to the left to form a width of 8 1/2 inches.

- B. Index sheets shall be provided in the order listed with the following identifications typed in capital letters:

PLUMBING FIXTURES.
 CONDENSING UNITS.
 AIR DISTRIBUTION.
 AIR CONDITIONING UNITS (FAN COIL UNITS).
 COILS.
 FANS.
 FILTERS.
 WATER DISTRIBUTION.
 CONTROLS.
 TEST AND BALANCE REPORTS.
 CERTIFICATES.
 PIPING SPECIALTIES.
 INSTANTANEOUS WATER HEATERS.

- C. Each Manual shall contain the following information, data and drawings:
 1. List of contents. Insert under front cover.
 2. **Copy of reviewed submittals, equipment and materials.**
 3. Manufacturer's installation, operating and maintenance instructions for each item of

equipment with moving parts listed under SHOP DRAWINGS including recommended frequency of inspections and maintenance for one year's period of time.

4. Manufacturer's list of renewal parts for each item of equipment with recommended stock items and quantities indicated.
5. Control diagrams, electrical interlock diagrams, and control valve lists.
6. Copy of shop drawings showing layouts and construction details.
7. Copy of Test and Balance Reports including list of instruments and description of methods employed.

1.22 PROTECTION OF MATERIALS AND EQUIPMENT

- A. Delivery and Storage: Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Contracting Officer. Damaged or defective items shall be replaced. Equipment will not be delivered to the job site unless it can be stored inside the building or in an enclosed area such as a trailer or warehouse.
 1. Deliver, store, protect, and handle products to site according to manufacturer's recommendations.
 2. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
 3. Store insulation in original wrapping and protect from weather and construction traffic.
 4. Protect insulation against dirt, water, chemical, and mechanical damage.
- B. Maintenance of Filters: The contractor shall be responsible for maintaining all air filters until final acceptance of the building. If part of the building is occupied prior to final acceptance, the Contractor shall be responsible for maintaining any air filters in systems that do not serve occupied areas. No air system shall be operated at any time without air filters, and filters shall not be allowed to become overloaded with dust and dirt.
- C. Throwaway Filters: Install new set of filters prior to Test and Balance and Final Observation. Provide spare set of filters at final observation.
- D. During Construction: Pipe opening shall be closed with caps or plugs, floor drains excluded which shall be taped. All equipment shall be covered and protected against water, dirt and chemical or mechanical injury.
- E. Prior to Final Observation: All materials and equipment shall be cleaned. Chipped or scraped paint shall be retouched to match. All dents and sags in ductwork and equipment casings shall be straightened.
- F. Equipment Painting: Equipment which has been damaged beyond the point of retouching or has been retouched not to match shall be painted to match factory finish.
- G. Potable Water System:
 1. General: Flush all debris and pipe compound from domestic water system.
 2. Disinfection: Disinfection shall be in accordance with Environmental Protection Division, Florida Department of Environmental Protection, "Rules for Safe Drinking Water."
 3. Sterilization: Domestic water piping system shall be sterilized, complying with Federal Specifications BB-C-120. Work shall be performed by licensed operator.

- 4. Water Sample Certification: Water samples from the sterilized piping system shall be tested and approved by the local Health Department.

1.23 CERTIFICATES

For condensing units, air handling units, controls, start-up, testing, and placing into operation shall be performed by the field representatives of the manufacturers, and certificates of the manufacturers shall be provided on the letterheads of the manufacturers in which the manufacturer certifies that the equipment has been installed in strict compliance with the manufacturers recommendations and is operating properly. The manufacturers shall list in the certificate the item or items furnished to the job. The Contractor shall coordinate the performance of the aforesaid services and shall, in all cases where the equipment of two or more manufacturers tie in and function together, such as controls and air conditioning apparatus, require the field representative to perform simultaneously the initial start-up, the testing, and the placing of their equipment into operation. Start-up is defined as putting the equipment into action. Testing is defined as performing such testing as is stipulated in the Contract Documents to be performed. Placing into operation is defined as operating the equipment for a sufficient period of time for the determination to be made that it is performing properly. Notification shall be given 48 hours in advance of start-up. Upon completion of all mechanical work, the Contractor shall submit a certificate stating that all mechanical systems have been tested and that the installation and performance of all systems conform to the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MOTORS

- A. General: All motors shall have all copper windings and leads. (Aluminum is not allowed.) Motors for base mounted pumps and belt driven equipment shall have cast iron yoke and bearing housings. All motors shall have rated horsepower at least 10 percent above indicated brake horsepower of equipment including belt losses and inlet vane losses.
- B. Efficiency and Power Factor: The minimum efficiency and power factor for motors 1 HP and larger shall be:

Motor HP	Minimum Efficiency	Minimum Power Factor
1 to 3	82%	85%

- C. Protection: All single phase motors shall have integral overload protection in accordance with the National Electrical Code.
- D. Voltages: Refer to Electrical Drawings for voltage and phase.

2.2 STARTERS AND CONTACTORS

- A. General: Provide starters and contactors for all motors furnished hereunder unless otherwise noted.
- B. Enclosures: NEMA 1 indoors; NEMA 3R outdoors; unless otherwise noted.
- C. Accessories: See Control Section for sequence of operation.

2.3 VALVE LOCATION

All valves shall be accessible after completion of construction.

2.4 NAMEPLATES

- A. General: Provide for all equipment, motor starters, thermostats, interval timers, fans, panel mounted controls, manual damper operators, and all other equipment specified.
1. Designation: The name of each piece of equipment or usage shall be etched in 1/4-inch maximum, 1/8-inch minimum height letters and mounted on or adjacent to piece of equipment.
 2. Type: White core black phenolic secured with epoxy glue.

2.5 FERROUS FASTENERS

All ferrous fasteners not having a corrosion resistant plated finish shall be painted to prevent rust.

2.6 EQUIPMENT BELT AND COUPLING GUARDS

Provide guards shielding the perimeter and face of all new belt drives, shafts and couplings. Provide openings opposite drive and driven shafts to permit use of revolution counter. Guards for fans shall be supported from the fan and mounting base, independent of the floor or housekeeping pad.

PART 3 - EXECUTION**3.1 INSTALLATION OF EQUIPMENT**

Install and connect all appliances, equipment, and appurtenances as specified, indicated or required in accordance with the manufacturer's instructions and recommendations. Furnish and install complete auxiliary piping, water seals, valves, electric connections, and similar items, recommended by the manufacturer or as required for proper operation.

END OF SECTION

SECTION 15100
BASES, SUPPORTS & SLEEVES

PART 1 - GENERAL

1.1 SLEEVES IN SLABS, MASONRY WALLS, AND PARTITIONS

- A. General: Provide sleeves in all slabs, rated walls/partitions unless otherwise noted. Refer to Section 15300 for sleeves required for duct penetrations.
- B. Masonry: Twenty gauge galvanized steel. Sleeves shall be of size to include the insulation with minimum gap around insulation. Omit sleeves on cast iron pipe through slabs on grade. Omit sleeves in openings core drilled in walls and floors.

1.2 SEALING OF SLEEVES AND OPENINGS IN FLOORS AND WALLS

- A. Sleeves and openings in the following walls and floors shall be sealed watertight for smoke/fire protection as applicable:
 - 1. Exterior walls.
 - 2. Mechanical room walls.
 - 3. Fire rated partitions and smoke partitions.
 - 4. Floors above grade.
- B. Seal openings for fire protection and to make watertight with foam or putty type sealant, U.L. Classified, for penetration seal maintaining fire rating of barrier penetrated, having a flame spread rating of 20 in accordance with ASTM E-84-84, and capable of withstanding 450° F temperatures without softening, unless otherwise noted. Material shall comply with Federal Spec TTS-230-C Type II Class B for sealants. Dow Corning 2001 Fire Stop Foam and Dow Corning 2000 Caulk, Semco PR-855, 3M Products Fire Barrier Caulk CP 25 N/S (no sag) and Putty 303 (no filler sheets allowed), Metacaulk 835, Hilti CS 240 Caulk.

PART 2 - PRODUCTS

2.1 BOLTS AND INSERTS

- A. Provide inserts and bolts for supporting pipes and equipment.

2.2 PIPE SUPPORTS

- A. General: Hanger sizes shall conform to the size of the pipe where in contact with the pipe and shall conform to the O.D. of the insulation where installed outside insulation. Hangers and supports shall be hot-dipped galvanized or primed and painted.
- B. Insulated Pipes: Hangers for horizontal refrigerant, piping insulated with rigid insulation, condensate drain piping and trapeze supports shall be outside insulation, unless otherwise noted. Hangers for all other piping and riser clamps shall be inside insulation.
- C. Cast Iron, PVC Pipe: Clevis hanger, B-Line B-3100, Grinnell Fig. 260, Globe 404, Michigan

Hanger Fig. 400. Do not hang pipe in plumbing chases.

- D. Copper Tubing Unless Otherwise Noted: Copper clad adjustable swivel ring, B-Line B-3170CT, Grinnell Fig. CT-99C, Globe 301, Michigan Hanger Fig. 101; copper plated.
- E. Steel Pipe and Insulated Copper: Clevis hanger, B-Line B-3100, Grinnell Fig. 260, Globe 404, Michigan Hanger Fig. 400, unless otherwise noted.
- F. Buried Pipe: Rest body or barrel on solid earth. Provide bell holes for all hubs.
- G. Vertical Pipes:
 - 1. Up to 3" Hanger Size:
 - a. Copper Tubing Split Pipe Clamp: B-Line 3198HCT, Grinnell Fig. No. CT138R, Michigan Hanger Fig. 456.
 - b. Extension Split Pipe Clamp: B-Line B-3198R, Grinnell Fig. No. 138R, Michigan Hanger Fig. 455.
 - c. Multiple Tubing/Pipes: Green epoxy coated, cold formed, lipped steel channel horizontal member, 1 5/8" x 1 5/8" x 12 ga. base. Secure pipes to bases with pipe/tubing clamps and elastomer cushion. B-Line Vibracushion, Grinnell PS1400.
 - 2. Over 3": Shelf bracket formed of 2" x 2" x 1/4" angle and "U"-bolts. Riser clamps; see detail.
- H. Horizontal Steel Pipe from Steel Bents: B-Line B-3100, Grinnell Fig. 260-Michigan Hanger Fig. 400 or Globe 409 hangers with B-Line B-3036, Michigan Hanger Fig. 300 or Grinnell Fig. 88 clamps. Rods shall be 3/8-inch diameter.
- I. Horizontal & Vertical Pipes 1" and Smaller along Walls: Concealed screw hanger, galvanized finish. B-Line B-3100, Michigan 400 or Globe 400.
- J. Multiple Pipes (Trapeze) Support:
 - 1. Multiple Pipes Up to 3" Maximum Size: Green epoxy coated, cold formed, lipped steel channel horizontal member, not less than 1-1/2" x 1-1/2", No. 12 gage, designed to accept spring held, hardened steel nuts.
- K. Horizontal and Vertical Pipes at Walls 1 1/4-inch and Larger: Offset strap constructed of 1 1/4-inch x 1/4-inch flat steel and "U" bolts.
- L. Hanger Spacing Schedule:
 - 1. General: Spacing indicated is maximum distance based on pipe material and size. Closer spacing shall be provided to conform to structural spacing and load capacity of structural support points.
 - 2. Cast Iron Pipe:
 - a. 5 ft. lengths - maximum 5 ft. on centers.
 - b. 10 ft. lengths - maximum 8 ft. on centers.
 - 3. PVC Pipe: Maximum 5 ft. on centers. Support at base of each stack. Conform to manufacturer's recommendations where more stringent.

4. Copper Pipe:
 - a. Up to 1 1/4-inch - maximum 5 ft. on centers.
 - b. 1 1/2-inch to 4 inch - maximum 8 ft. on centers.
 5. Vertical Pipe: Same as horizontal spacing. Use riser clamps at upper floor slabs to support vertical weight of pipe; a minimum of every floor for cast iron pipe. Space as noted for other piping. Support for chilled water pipe shall be inside pipe insulation. Insulate chilled water support with foamed spray insulation.
 6. Changes in Direction: Provide support within 2 feet of any change in direction or unconnected end. Exception: Piping 1-inch and smaller shall be supported within 6 inches of connected end.
- M. Hanger Supports: Round rod to:
1. Precast Masonry: Phillips "Red Head" or Hilti Kwik-Bolt concrete anchors. Anchors must center on 'tees'.
 2. Precast Concrete Hollow Core Slabs: Support pipe by trapeze with threaded rod up through joint in slabs to steel washer plate and nut. Do not drill slab for pipe support attachment.
 3. Steel Bar Joists: B-Line B3033, Michigan Fig. 310, Grinnell Fig.61 or Globe 110.
 4. Hollow Masonry Units: Toggle bolts.
 5. Wood Beams: B-Line B3213, B3227; Michigan 41, 44. (Individual hangers only).

2.3 EQUIPMENT BASES

- A. General: Provide housekeeping bases as shown or listed below. Rough up slab under bases before pouring concrete.
- B. Materials: Omit test cylinders for concrete poured under this section.
- C. Size: Bases shall be rectangular, unless otherwise indicated, with vertical sides 4 inches from centerline of anchor bolts or 2 inches from edge of equipment supports, whichever provides the larger dimension, side of equipment/base edge unless otherwise noted.
- D. Height:
 1. Air Handling Units (Indoor Unit): 4 inches.
 2. Condensing Unit/Heat Pump: See detail.
 3. Housekeeping Pads and Pads for Other Equipment: 4 inches or as shown on plans.
- E. Chamfer: 3/4-inch on edges and corners.
- F. Reinforcing: 6" x 6", 10/10 WWF at mid-depth of slab.

2.4 VIBRATION ISOLATORS

- A. General: Provide vibration isolators for all equipment with motors. All isolation devices shall be

selected for uniform static deflections according to distribution of weight and for the lowest disturbing frequency of the unit.

1. Rubber-in-Shear Isolators: Isolators shall have housings for bolting to equipment with molded mound shaped element. Single and double rubber-in-shear isolators shall be designed for 1/4-inch and 1/2-inch deflection, respectively, under the imposed load.

B. Minimum Requirements:

1. Minimum Equipment Isolation: Vibration isolators for equipment on grade or equipment up to 1 HP on floors other than grade shall be selected for following minimum isolation efficiencies, unless otherwise noted.
 - a. Below 450 rpm 80% efficiency.
 - b. 451 to 900 rpm 85% efficiency.
 - c. 901 to 1700 rpm 90% efficiency.
 - d. Above 1700 rpm 90% efficiency.

C. Equipment:

1. Air Handling Units: Rubber-in-shear isolators.

D. Suspended Fans:

1. Direct Drive: Rubber-in-shear.

E. Condensing Unit: Rubber-in-shear. See detail.

F. Manufacturers: Amber/Booth, Consolidated Kinetic, Korfund, Mason, Peabody Noise Control, Vibration Eliminator Co. or Vibration Mounting & Control, Inc.

END OF SECTION

SECTION 15200
HVAC CONTROLS

PART 1 - GENERAL

1.1 HVAC CONTROLS

- A. General: Provide commercial thermostats, interval timers, time clock, sensors and interconnecting wiring as specified herein.
- B. Submittals: Include the following:
1. Complete shop drawings of entire control system.
 2. Composite wiring diagrams indicating equipment interlocks, including exhaust fans.
 3. Written sequence of operation.
 4. Equipment data sheets for all major components, including but not limited to:
 - a. Time Clock
 - b. Thermidistats (Combination Thermostat/Humidistat)
 - c. Interval Timers
- C. Warranty: At completion of final test of installation and acceptance. Warrant equipment for one year for defects in workmanship and material under normal use and service. Replace or repair free of charge equipment proven to be defective in workmanship or material.
- D. Products:
1. Acceptable Manufacturers: The following manufacturers shall be acceptable for the controls system installation: RobertShaw, Johnson Controls, Honeywell, Barber Colman or equivalent.
 2. Programmable Commercial Thermostat/Humidistat
 - a. Contractor shall provide a commercial thermidistat or a thermostat and a humidistat for each system.
 - b. Units shall provide the following features as minimum requirements:
 1. Individual temperature and humidity set points for both occupied heat, and cool and unoccupied heat (low limit), and cool (high limit).
 2. Automatic heat/cool change over.
 3. Switching subbase for manual selection of system and fan operation and emergency heat switch.
- E. Components

1. Automatic Control Damper: Aluminum parallel blade dampers by Arrow Louver and Damper Corporation, Johnson D-1300, or approved equal by Ruskin.
2. Electric Damper Motors: Damper motors shall be capable of providing smooth, two position control under design temperature and pressure conditions.
3. Programmable Time Clock: Provide Programmable Controller for time clock functions with minimum of two circuits, battery backup, relays for start and stop of fans and outside air dampers.

F. Installation

1. Prepare coordinated composite wiring diagram showing all interlock wiring associated with starters, control panel, DX refrigeration compressors and other equipment as applicable.
2. Provide sequence of operation and as-built drawings framed under plexiglas and placed in mechanical closet. All prints to be of "non-fading" print process.
 - a. Electrical:
 1. Furnish electrical control components under this Division.
 2. Furnish and install all control wiring under this Division in accordance with NEC and local codes.
 3. Line voltage devices, such as electric thermostats, shall be installed under Division 16.
 4. Route wiring from the sequencers, and actuators, in a separate conduit from line voltage wiring or other conductors that supply highly inductive loads, the use of shielded cable is required. Use Belden No. 22 gauge Beldfoil 8761 or equivalent for runs up to 250 feet.
 5. Furnish and install all sensor and actuator wiring under this Division.

G. Quality Control

1. Demonstrate the entire sequence of operation for all systems to the Contracting Officer and the Government.
2. Provide a minimum of four hours of instruction to operating personnel in the operation and maintenance of the control system.

END OF SECTION

SECTION 15300
AIR DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 GENERAL

- A. Requirements: Include supply, return, exhaust, outside air ductwork; acoustical liner, and accessories as shown, to make a complete air distribution system. References are to SMACNA HVAC Duct Construction Standards, First Edition, 1985, unless otherwise noted. Duct shall be galvanized steel construction. All duct dimensions are net metal unless otherwise noted.

1.2 LOW PRESSURE DUCTWORK

All ductwork shall be low pressure construction unless otherwise noted.

1.3 MOISTURE INTEGRITY

- A. Roof: All outside air intakes, and roof penetrations shall be watertight.
- B. Walls: All louvers, and wall penetrations shall be watertight.

1.4 OFFSETS AND CHANGES IN DIRECTION

- A. All changes in direction in exhaust, return and supply duct shall be made with 90° elbows with turning vanes or 1.5 radius elbows without vanes, unless otherwise noted. Mitered elbows and mitered offsets are not allowed.

PART 2 - PRODUCTS

2.1 DUCT FITTINGS AND ACCESSORIES

- A. Duct Hangers: Figure Nos. 4-1 through 4-9 and Tables 4-1 through 4-3. Ducts shall not be supported from metal roof deck unless otherwise noted, 16" x 16" and smaller excluded.
- B. Flexible Connections: Install in duct connections to equipment, where shown and at all equipment with motors unless otherwise noted, of fireproof material composed of watertight, impregnated 30 ounce glass fabric. Figure 2-19. Do not install on curb mounted fans.
- C. Branch Connections and Runouts:
1. General: Refer to drawings for type required. Flexible duct shall be used only where shown on drawings. Refer to detail for appurtenances.
 2. Rectangular and Rectangular to Round Runouts: Galvanized sheet metal fitting for runout take-off from low pressure rectangular trunk ducts - SMACNA Fig. 2-8, 45° entry. Use where rectangular branch and runout ducts connect to rectangular trunk ducts and where the dimension of round branch fittings exceeds height of trunk duct so as to prohibit their use for round branch ducts. Factory fabricated fitting with adhesive gasket are acceptable: Flexmaster "STO". Refer to Detail.
 3. Runouts to Sidewall Grille: Figure 2-8; 45° entry tap, unless otherwise noted. See detail.

- D. Angle Frames: 24 gauge galvanized with mitered corners. Provide where exposed ducts penetrate walls and floors except where fire dampers or sidewall grilles or registers are installed. Secure to ducts and caulk between frame and wall.
- E. Access Panels & Doors: Hinged, insulated access doors with lock; Figure 2-12, insulated where duct is insulated or lined, with only metal exposed to the air stream. Door lock shall be handle or cam lock (screws are not acceptable). Inside dimensions shall be sized to provide access to indicated damper, 12" minimum except one dimension shall be 2" smaller than duct for ducts under 14". Provide at all concealed dampers, smoke dampers, duct mounted coils, and where shown. Seal door duct joints airtight for indicated duct pressure in accordance with manufacturer's recommendations shipped with door. Maximum leakage per door at 6" of water pressure shall not exceed 2 CFM. Factory fabricated doors are acceptable; Ventlok, Airstream, D.A.D., Prefco HAD, Cesco CAD-10, National Controlled Air ADR, Nailor Hart 0800, Flexmaster "Inspector" Series.
- F. Turning Vanes: Figure Nos. 2-3 and 2-4; double vane, double thickness. Provide at all square elbows in rectangular supply, return and exhaust duct, unless otherwise noted by a specific written note. Install long turning vanes where shown. Factory fabricated vanes similar to above are acceptable.
- G. Trapeze Multiple Duct Support: Figure No. 4-4 and Table 4-3.
- H. Duct Joint Sealant: Seal transverse joints in all low pressure metal supply, exhaust and return ducts with waterproof mastic joint sealant; Marahon 460 high-velocity duct sealer; Kingco 11-376; Tuff Bond #29; 3M-800.
- I. Easements: Figure 2-10.
- J. Manual Volume Dampers: Figure Nos. 2-14 and 2-15. Dampers shall be opposed blade when larger than one blade. 2" x 1/2" x 1/8" steel channel frame with blade stops top and bottom; 16 gauge steel blades with formed edge groove to have 3/8" interlock between adjacent blades, 7" maximum blade width; self-lubricating oilite bronze or nylon bearings with 1/2" diameter cadmium plated shaft extended 6" beyond frame; blade linkage; locking quadrant and rust inhibitor coating.
- K. Test Openings: Provide plugged brass 3/8" openings in ducts and apparatus casings adjacent to all thermometer elements, and temperature pressure transmitters.
- L. Transformations: Changes in duct sizes shall be made via transformations. Transformations shall be provided between equipment and duct where sizes are not the same. Where duct transformations occur, unless otherwise noted, the slope shall not be greater than 1" in 4", with slope of 1" in 7" space permitting.
- M. Duct Openings:
1. Openings at Non-rated Walls and Partitions: Ducts shall have openings 1/2" larger, maximum, than the overall duct dimensions framed in place when walls are constructed, except for sidewall grilles. Note different requirements for sound isolation treatment and special appurtenance. Space between duct and structure shall be filled with fiberglass duct insulation.
- N. Traverse Taps: Galvanized construction for permanent attachment to duct with positive locking type cap to prevent air leakage when not in use. Locate in accordance with AABC or NEBB recommendations.

2.2 LOW PRESSURE METAL DUCT CONSTRUCTION

All low pressure duct shall be 2-inch static pressure rating, Class "B" seal, in accordance with SMACNA Standards of best bloom galvanized steel of gauges and construction, unless otherwise noted. Metal stamp shall be visible after installation showing metal gauge. No gauge lighter than 24 shall be used.

- A. Longitudinal Joints and Seams: Pittsburgh lock (19-inch and over) for corner seams or button punch snap lock (up to and including 18-inch only) sealed airtight with high pressure duct sealant before assembly; grooved seam for all other seams.

Gauge and reinforcing is determined by dimension of longest side of duct.

Reinforcing at joints is same size as reinforcing between joints.

- B. Fasteners: For angle reinforcing and bar slips on short sides shall be 6" O.C. maximum at girth joints.
- C. Fasten Round Ducts: 6" O.C. maximum at girth joints.
- D. Drive Slips: Shall be used on short sides 18" or less and reinforcing drive slip shall be used on short sides 19 to 30", except when pocket lock is called for on long sides, use on all four sides.
- E. Joints: On longer sides shall be not less than 1/4" shorter than duct dimension.

All dimensions and sizes are inside metal measurements in inches, unless otherwise shown.

2.3 FLEXIBLE DUCT

- A. Core: Metal Helix mechanically bonded to an acoustically transparent flexible fabric with rip stop reinforcement; U.L. listed Class 1 air duct connector; compliance with NFPA 90A and 90B; pressure rated to 10" W.G. and 200° F. Helix not constructed of corrosion resistant metal shall be coated to prevent corrosion. Unreinforced polyester material is not acceptable for core.
- B. Insulation: All flexible duct shall be insulated unless otherwise noted. Insulation shall be 1" minimum thick, 3/4 lb. minimum density fiberglass with vapor barrier jacket. Aluminum foil jackets shall be reinforced.
- C. Installation: SMACNA HVAC Duct Construction Standards, First Edition, 1985. Flexible duct shall be installed in a fully extended condition free of sags and kinks, in maximum lengths of 5 feet (in minimum lengths to make smooth connection). Flexible duct shall NOT be utilized to correct for misalignment or round to oval transitions. All flexible duct connections shall be made by coating the interior of the duct to a depth of 3" with an approved high pressure duct sealer, and secured in place over sheet metal collar with 1/2" wide positive locking steel straps. Vertically suspended ducts shall be additionally secured with a minimum of three sheet metal screws on no greater than 8" centers. Horizontal support shall be provided at maximum intervals of 3 feet with 3" wide flat banded material or as recommended by manufacturer. Wire hangers shall not be used under duct. Flexible duct shall be utilized only where shown or specifically called for in specifications.
- D. Manufacturers: Flexmaster Type 6M acoustically insulated or approved equivalent by prior approval.

2.4 DUCTWORK ACOUSTICAL LINER

- A. Figure Nos. 2-22 thru 2-25: Glass fiber duct liner, 3 pound density, with mat faced, coated finish. Liner shall be glued to inside of ductwork during fabrication with fire retardant adhesive, 95% maximum adhesive coverage, and further anchored with liner fasteners, type 3 or 4, located in accordance with SMACNA Figure 2-22. Adhesive shall be Benjamin Foster 81-60, Insul-Coustic #225 supply, return, and exhaust ducts where noted and all outside air ducts. Duct sizes shown include allowance for liner thickness, unless otherwise noted. Longitudinal and traverse joints on supply ducts shall be coated with adhesive and shall be under compression when installed to prevent air leaks and duct condensation. Liner shall be 1" thick, unless otherwise noted. Line all R.A. ducts/plenums.
- B. Fasteners: Shall start within 3" of the upstream transverse edges of the liner and 3" from the longitudinal joints and shall be spaced as shown in Figure 2-22.

2.5 GRILLES, REGISTERS & DIFFUSERS

- A. Provide Supply, Return, Relief and exhaust air grilles and registers and ceiling diffusers as shown. Model numbers shown are Titus. Grilles by Anemostat, E.H. Price Co., Krueger, Tuttle & Bailey, or Metalaire are acceptable. Refer to Schedule. Where grilles having removable cores are specified and a manufacturer is listed which does not make removable cores, auxiliary frames shall be provided. Coordinate locations of ceiling diffusers and grilles with lights and ceiling grid. Lattice core grilles for installation in Tee-bar ceiling systems are nominal size. Size to fit applicable ceiling system.
- B. Basis of Design: Grille sizes shown are based upon Titus net areas and performance. Grilles of other listed manufacturers must be adjusted in size to provide equal or greater net area and performance. Performance is based on maximum static loss of 0.06" W.G. and NC = 27 or less (with damper wide open), unless otherwise noted.

2.6 LOUVERS

Provided under Architectural.

2.7 FABRIC RELIEF DAMPER

60% minimum free area, neoprene coated fabric, 16 gauge minimum galvanized or aluminum frame, expanded metal rear grille, with rust inhibitor coating. American Warming and Ventilating Series BD-15; Cesco Model 'H'; Dowco Model SHF; Vent Products 3600; Louvers & Dampers, Inc. PRD-220; Metal Form MFD-34; Ruskin Type NMS2; Industrial Louvers BDD-900; Shipman BD-15 relief damper with fabric blades.

END OF SECTION

SECTION 15400**EQUIPMENT****PART 1 - GENERAL****1.1 GENERAL**

- A. Requirements specified herein are minimum. All equipment, when installed, shall perform equal to or exceed specific requirements. If Test and Balance Report indicates any equipment is performing at less than specified capacity, the manufacturer shall provide field testing to correct or demonstrate performance as specified to the Contracting Officer.
- B. Installations: All equipment shall be installed in accordance with manufacturer's published installation instructions shipped with the equipment. In the event there is a discrepancy between these specifications or plans and the manufacturer's instructions, no work shall be done until additional instructions are received. After final balancing, equipment with belt drive shall have their belts operating in the mid-80% position of the adjustable sheave.

PART 2 - PRODUCTS**2.1 SPLIT SYSTEM AIR CONDITIONING UNITS**

- A. Outdoor Unit.
 - 1. General: Unit shall be cataloged for continuous operation at 115° ambient maximum; consisting of condensing coil, vertical air discharge fan, compressor(s), hot gas muffler, liquid receiver, moisture indicating sight glass, refrigerant valves, interconnecting refrigerant piping, charging valves, starters, contactors, controls and internal wiring factory assembled on one common base in a heavy gauge weatherproof casing designed for outdoor application. Casing or protective guard shall protect condenser coil return bends and fins from damage. The entire refrigerant circuit shall be pressure tested, dehydrated, and shipped with refrigerant holding charge.
 - 2. Compressors: Compressors shall be hermetic, designed for refrigerant scheduled air cooled operation; unloaded start, and hermetic motor with protective thermostat located in the stator windings. Compressor shall be mounted on vibration isolators and enclosed in a sound attenuating compartment. Compressor shall have non-prorated 5-year warranty.
 - 3. Condenser Fans: Fans shall have ball bearings; weatherproof ball bearing, heavy duty motor; and built-in thermal overload protection.
 - 4. Condenser Coils: Copper tubes with aluminum fins.
 - 5. Controls: Controls shall be factory mounted and wired in unit, including terminal strip, compressor and condenser fan contactors; compressor overload protection on all phases; high pressure cutout; separate low pressure cutout; oil pressure switch; non-recycling interlock; lockout relay for remote reset of safety controls; contactors phase failure relay; built-in stop to restart timer. Unit shall have one power source terminal block connection, with all power wiring, fusing and controls factory installed beyond connection point.
 - 6. Acceptable Head Pressure Control Methods: Dampers operated from head pressure; flooded coil operated from head pressure; condenser fans controlled from head pressure with "last" fan motor variable speed.

B. Indoor Unit:

1. General: Packaged draw-thru (horizontal or vertical as shown) type unit complete with all appurtenances. Casing shall be painted cold rolled steel, braced with the unit structural frame and additional structural members. All components except the drain pan shall be internally insulated with **aluminum foil faced** 1-inch thick, fiberglass insulation, adhered with waterproof adhesive, 100% coverage. Unit arrangement shall be as shown.
2. Fan Section: Fan shall operate at stable point on curve. Fan section shall have DWDI centrifugal type fans, forward curved. Fans shall be low pressure, statically and dynamically tested and balanced at rated speed after installation in the factory assembled unit. Fan motor shall be quiet operating. Fan drive shall be multi-speed direct drive with PSC motor.
3. Drain Pan: Condensate drain pans shall be watertight plenum rated plastic, pitched for flow to drain connection. Pan shall be insulated with 1/2-inch thick minimum closed cell rigid foamed insulation secured with waterproof adhesive, foamed in place or 1-inch rigid board with two coats of Spray-Cor.
4. Direct Expansion Coils: Seamless copper tubes and aluminum fins. Coil shall be furnished with distributor(s).
5. Filter: Horizontal airflow filter box with 1-inch thick fiberglass media contained in rigid frame with supporting maze across entering and leaving faces of media.
6. Electric Heater: Heating coil shall have a separate chassis and shall contain an open coil resistance type heating element with automatic high temperature cutout. Electric heat shall be located downstream of the evaporator coil.
7. Capacities: Capacities shall not be less than scheduled when matched together; 45°F minimum SST, 95°F ODT.

2.2 FANS

- A. Performance Ratings: Based upon tests conducted in accordance with AMCA Standard.
- B. Motors and Drives: Fans shall be belt drive with belt guard, unless otherwise noted, with drives selected at 1.5 x motor HP and with standard open motors mounted on sliding rails for ease of belt adjustment. Provide second adjustable motor sheave during balancing to place belt in mid-position at scheduled operating CFM. Single phase motors shall be capacitor start with resilient base. After balancing, sheaves shall be in mid-80% of adjustment.
- C. Unit Disconnects: Provide a unit mounted, U.L. disconnect switch for all fans unless noted otherwise.
- D. Tests: Wheels shall be statically balanced before assembly and the assembled fans shall be dynamically balanced at the speeds at which they are scheduled to operate.
- E. Finish: All non-corrosion resistant ferrous metal fan parts shall be cleaned and painted with a heavy coat of primer finish.
- F. Cabinet and Ceiling Fans (CAB):

General: Direct drive centrifugal type with internal acoustical insulation in formed metal cabinet, gravity backdraft discharge shutter and disconnect. Ceiling mounted fans shall have intake grille.

Duct mounted fans shall have inlet and outlet duct connections and removable panel for service. Provide multi-speed control and time delay switch where shown.

Manufacturers: Acme 'V', Carnes 'VCDB', Cook 'Gemini', Greenheck 'SP', Pace 'DD', Penn 'Z', Jenn 'J', Breidert 'BF'.

END OF SECTION

SECTION 15500
PLUMBING FIXTURES & EQUIPMENT

PART 1 – NOT APPLICABLE

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

- A. General: All fixtures shall be Grade A. The name or trademark of the manufacturer shall be printed or pressed on all water closets, electric water cooler, sinks, urinals and lavatories. A label which cannot be removed without destroying the fixture, containing the manufacturer's name or trademark and the quality or class of the fixtures, shall be affixed to all fixtures. All enamel shall be acid resistant.

- B. Installation:

Grout: Space between wall or floor and back of all wall hung lavatories, electric water cooler, urinals, water closets and floor mounted mop receptor shall be grouted with white silicone latex tile grout. Joints shall be finished smooth and flush.

Fasteners: Wall hung lavatories, urinals and electric water cooler equipped with bolting lugs shall be secured to walls with toggle bolts through these lugs in addition to other supporting means.

On all disabled lavatories and sinks, faucet for fixture shall be actuated by rotating Hot and Cold water handles toward user.

- C. Insulation - Fixture for Disabled:

General: All exposed piping under lavatories or sinks for disabled persons shall be insulated. Where multiple lavatories are mounted in a counter, all exposed piping under all lavatories using hot water shall be insulated.

Material: Fully molded, flexible vinyl insulation, nominal wall thickness 3/16" thick, light gray color which can be painted with automotive trim paint, self-extinguishing meeting ASTM D635 and have a K-value of 1.17. Fasteners shall be nylon type.

Manufacturer: Truebro Model 102, Trap Wrap 500R or approved equivalent.

- 2.2 FIXTURE SCHEDULE:** Refer to schedule.

2.3 FIXTURE SUPPLIES

- A. General: All lavatories, sinks, electric water coolers, and other fixtures requiring 1/2" or 3/8" supply stops shall have stops with metal-to-metal seats and loose key handles.

2.4 FIXTURE TRAPS

- A. General: All sinks, and electric water coolers: Traps shall be chrome plated, 17 gauge, adjustable, semi-cast brass with brass nuts, cast set-screw escutcheons, and integral cleanout.

2.5 CLEANOUTS

A. General: Provide cleanouts where shown on plans as follows:

Location	Finish	J. R. Smith	Jones	Josam	Wade	Zurn
Floor Slab (6) (7)	NB	4025	61010	56000	W-6010	ZN-1400-IC
Walls (8)	SS	4472	63000	58890	W-847OR-75	Z-1470-1 w/Z-1469
Outside	C.I.	4280	60000	58190	W-8530-G	ZN-1402-NH

Legend: NB - Nickel Bronze
SS - Stainless Steel
CI - Cast Iron

Notes:

- (1) Provide wrench for each type cleanout.
- (2) After installation of cleanouts, remove plug, grease threads and replace.
- (3) Cleanouts in exterior piping shall be brought up to grade as detailed and have recessed cleanout plug.
- (4) All cleanouts shall be accessible.
- (5) See Plans for sizes.
- (6) Standard cleanout denoted as 3" or 4" C.O.
- (7) All floor type cleanouts, unless otherwise noted, shall be flush with finished floor.
- (8) Cleanout shall be installed in sanitary T-branch, tapped.

2.6 DRAINS

A. General:

Cast iron bodies and flashing collar.

Provide flashing clamp on drains installed in floors with waterproof membrane.

Refer to fixture schedule.

Provide with floor drain trap primer connection where shown.

2.7 TRAP PRIMERS

Single Primer: Pressure type, cast brass unit with satin finish chrome plated and built-in air gap/backflow preventer, 1/2" inlet and 1/2" outlets. Provide exposed in cold supply line under lavatory.

2.8 EQUIPMENT

Electric Instantaneous Water Heater:

Instantaneous water heater shall have ABS U.L. 94 rated cover. Heater body and element shall be glass reinforced Noryl. Element shall be replaceable cartridge insert. Unit shall have a replaceable filter in the

inlet connector and a constant flow regulator in the outlet connector. Element shall be iron free, nickel-chrome material. Heater shall be fitted with 3/8" compression nuts and sleeves to eliminate need for soldering. Heater shall be installed upright with water connections on top. Maximum operating pressure of 150 psig.

2.9 SHOCK ABSORBERS

Pre-pressurized tank with two chambers separated by a permanent flexible barrier. The upper chamber shall contain air or inert gas of a pre-determined charge to prevent water hammer according to a sizing table. The lower chamber surfaces shall be of a non-corrosive material. Absorber must be A.S.S.E. Standard 1010 approved, ANSI A112.26.1M approved and PDI Standard WH-201 approved and certified.

Manufactures: American Tube Diatrol, Josam Absorbotron, Wade Shokstop, Sioux-Chief Hydra-Rester, or Watts Series 15.

2.10 TESTS, FLUSHING AND STERILIZATION

- A. Defective Work: If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests shall be repeated. Repairs to piping shall be made with new materials. No caulking of screwed joints or holes will be acceptable.
- B. System Flushing: After tests are completed, potable water piping shall be flushed. In general, sufficient water shall be used to produce a minimum water velocity of 2.5 feet per second through piping being flushed. Flushing shall be continued until discharge water shows no discoloration. System shall be drained at low points. Strainer screens shall be removed, cleaned, and replaced in line. After flushing and cleaning, systems shall be prepared for service by immediately filling water piping with clean, fresh potable water. Any stoppage, discoloration, or other damage to the finish, furnishings, or parts of the building, due to the Contractor's failure to properly clean the piping system, shall be repaired by the Contractor. When the work is complete, the hot-water system shall be adjusted for uniform circulation. Flush valves and automatic control devices shall be adjusted for proper operation.
- C. Operational Test: Upon completion of and prior to acceptance of the installation, the Contractor shall subject the plumbing system to operating tests to demonstrate satisfactory functional and operational efficiency. Such operating tests shall cover a period of not less than 2 hours for each system and shall include the following information in a report with conclusion as to the adequacy of the system:

Time, date, and duration of test.

Water pressures at the most remote and the highest fixtures.

Operation of each fixture and fixture trim.

Operation of each valve, and faucet.

Temperature of domestic hot-water supply.

Operation of each floor drain by flooding with water.

Operation of each vacuum breaker and backflow preventer.

Each indicating instrument shall be read at 1/2-hour intervals. The report of the test shall be submitted in quadruplicate.

- D. Sterilization

After pressure tests have been made, the entire domestic hot- and cold-water distribution system shall be sterilized. System shall be thoroughly flushed with water of sufficient velocity until all entrained dirt and other foreign material have been removed, before introducing chlorinating material. The chlorinating material shall be hypochlorite or liquid chlorine. Water chlorination procedure shall be in accordance with AWWA M20. The chlorinating material shall be fed into the water piping system at a constant rate at a concentration of at least 50 parts per million (ppm). A properly adjusted hypochlorite solution injected into the main with a hypochlorinator, or liquid chlorine injected into the main through a solution-feed chlorinator and booster pump, shall be used. The chlorine residual shall be checked at intervals to ensure that the proper level is maintained. Chlorine application shall continue until the entire main is filled. The water shall remain in the system for a minimum of 24 hours. Each valve in the system being sterilized shall be opened and closed several times during the contact period to ensure its proper disinfection. Following the 24-hour period, no less than 25 ppm chlorine residual shall remain in the system. During the flushing period each valve and faucet shall be opened and closed several times.

2.11 VACUUM BREAKERS FOR HOSE END CONNECTIONS

Chrome plated for plated devices, rough brass elsewhere. Watts 8A, Nidel 34-H, T & S B-972, Wilkins BFB-8, Conbraco 38-304-CS.

END OF SECTION

SECTION 15600
PIPING SYSTEM AND PIPING SPECIALITIES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Identification: ASTM No. and Schedule shall be stamped on each length of pipe. Bundles shall have metal tag attached showing ASTM No. and Schedule.
- B. Steel Pipe Nipples: All thread nipples are prohibited. Nipples 1 1/2-inch and smaller in diameter and attached to larger pipes shall be schedule 80 and shall be attached with the use of threadlets or weldlets.
- C. Weld Elbows in Steel Piping: Long radius, unless otherwise noted.
- D. Mitered Fittings and Tapped Pipes: Mitered fittings and tapped pipes are not allowed.
- E. Weldlets and Threadlets in Steel Piping: Weldlets and threadlets may be used for side outlet reducing tees if more than two pipe sizes smaller than main. Bonney Forge or Allied type 1 branchlet.
- F. Unions: Provide in piping to all equipment and specialties to permit removal for service. Union shall be metal seat type.
- G. Reducers: Reducers in steel piping shall be eccentric type where grading is specified. Reducers shall be used to change pipe sizes.
- H. Dissimilar Metals: Dissimilar metals, copper and steel, shall not be installed to allow direct contact between the metals. Provide dielectric nipples as specified herein.

PART 2 - PRODUCTS

2.1 PIPE & FITTINGS

- A. Exceptions: Pipe, fittings and grades shall be as listed below unless otherwise noted.
- B. Soil, Waste and Vent:
 - 1. Pipe: Schedule 40, Poly-vinyl Chloride (PVC), ASTM D 1785-76, with solvent weld joints.
 - 2. Fittings: Same material as piping.
 - 3. Grades: Horizontal drainage piping of 3-inch diameter and less shall be installed with fall of not less than 1/4-inch per foot. Drainage piping larger than 3-inch diameter shall be installed with fall of not less than 1/8-inch per foot, unless otherwise noted.
 - 4. Protection: Before, during, and after installation, pipe and fittings shall be protected from exposure to sunlight and damage or deterioration to the material. Solvents, solvent compounds, lubricants, elastomeric gaskets, and materials used to install the pipe shall be stored in accordance with the manufacturer's printed recommendation and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use will

be discarded when the recommended pot life is exceeded.

C. Domestic Hot and Cold Water.

1. Pipe:

Above Ground: CPVC Schedule 40 solvent weld: in non-return air plenum to include all areas below ceiling and comfort station. Hard drawn type "L" copper tubing: in return air plenum areas to include spaces above ceiling in visitor's center and auditorium.

Below Concrete Slab: Soft temper type "K" copper tubing with no joints or fittings below the floor slab.

2. Fittings:

Copper Tubing: Sweat type wrought copper. Reducers shall be used to reduce pipe size. CPVC Piping: Same as piping material.

D. Refrigerant Piping:

1. General: Refrigerant pipe sizes are for estimating purposes only. Size and install as per manufacturer's recommendations.

2. Pipe: Hard drawn ACR copper tubing.

3. Fittings: Brazed type, wrought copper. Elbows shall be long radius.

4. Provide clearances for double suction riser traps.

5. Grade: Horizontal pipes in direction of flow with traps as shown and at condensing unit.

E. Condensate Drain:

1. Pipe and Fittings: Type I, Schedule 40 Polyvinyl Chloride with PVC solvent weld type fittings.

2. Grade: Horizontal pipe 1/8-inch per foot minimum down in direction of flow.

3. Location: Provide full size drain with 2-inch minimum water seal trap from all condensate drain pans to nearest floor drain, unless otherwise shown.

F. Pipes Under Slab and Underground: Where noted, pipes under slab and underground shall be installed in Type 'A' light wall PVC conduit and fittings.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION

A. General: Remove burrs and all loose material from interior and exterior of all piping prior to assembly.

B. Refrigerant Pipe Installation: Pipe shall be cleaned, after removing burrs. Dry nitrogen shall be continuously bled through system during brazing to prevent oxidation.

C. Piping in Exterior Walls: Pipe routed in exterior walls shall be installed on building side of wall insulation. Where interior construction is block, cut outside face of block and route pipe in depth

of cavity and outside block wall thickness. Do not interrupt board type cavity wall insulation or vapor barrier.

- D. Valves: Unless otherwise noted or prohibited by space limitations, mount all valves in piping 8-inches or more above floor with spindles horizontal and in a direction to minimize obstruction of service aisles.
- E. Coring: Core drill all openings in slabs and masonry walls where sleeves are not installed as wall is constructed, and in all exposed masonry walls except where exposure is on mechanical room side only.
- F. Pipe Routing: Pipes shall be run level, plumb, and parallel with building structure, unless otherwise noted.
- G. Pipe Spacing: Maintain 4-inch minimum clearance between pipe and fittings after insulating, space permitting, unless otherwise noted.

3.2 PIPE JOINTS

- A. General: Joints shall be as determined by the equipment, valve or fitting specified.
- B. Threaded: All threads shall be American Standard pipe thread. Ream cut ends and remove all burrs. Apply teflon thread sealing compound to male threads only on all piping.
- C. Solvent Welds: Conform to piping manufacturers solvent weld instructions. Clean pipe and fitting before applying solvent. Materials must be maintained between 50° and 90° F during assembly.
- D. Welded: Welding procedures and welders qualifications shall be in accordance with ASA B31.1 Code for Pressure Piping, dated 1983. Provide copy of certificate of qualification for all welders to be used prior to performing any welding.
 - 1 1/2-inch and Smaller: Gas weld with oxygen and acetylene.
 - 2-inch and Larger: Metallic arc weld.
- E. Soldered:
 - 1. Type K, L & M, Unless Otherwise Noted:

Solder shall meet all Federal requirements for lead-free solders as mandated by the Federal Safe Drinking Act Amendments of 1986 (Public Law 99-339); and shall be listed and/or evaluated for potable water systems by NSF.

Manufacturers: J. W. Harris (Stay-Safe Bridgit); Willard Industries, Inc. (Plum Safe) or Taracorp Industries (Taramet Sterling).
 - 2. Type "L" ACR Refrigerant and Buried Type "L" Copper Piping: Brazed (silver solder). Joints shall be with silver-bearing alloy brazing rod having a melting point in excess of 1000°F. Utilize 95/5 solder within fan coil and cabinet heater enclosures.

3.3 VALVES

- A. General:

Valves shall be installed in supplies to all equipment. Provide balance valves in returns from all heat transfer equipment, unless otherwise indicated.

Gauge cocks (Type 'K' valve) shall be installed at all connections to piping for instruments and controls such as pressure gauges and pressure controls. Brass valve shall serve as dielectric between steel pipe and copper tubing.

All domestic water valves with hose end connections shall be provided with non-removable vacuum breaker.

B. Types:

1. Type D - Ball Valves:

2 1/2-inch and Smaller: Bronze body, bronze ball, teflon seats and seals, full port opening, 150 SWP, 400 WOG, solder ends. Consolidated 82-200, Crane 9303, Grinnell 3810SJ, Milwaukee BA-301, Nibco S595, Watts B-6801.

2. Type O - 3/4" Interior Hose Bibbs: Brass body, polished chrome exterior finish, wall flange, lockshield; loose key and vacuum breaker. Install 18 inches above floor unless otherwise noted. Manufacturers: Woodford model 24P; Nibco 763VB-LS or Arrowhead Brass Co.

C. Use: (Valve types shall be as shown on drawings)

Domestic Water, Unless Otherwise Noted: Type D, O.

Balance Valves: Domestic Water-Type D.

3.4 PIPING SPECIALTIES

A. Flashings:

1. Plastic Pipe Vents Thru Roof: Neoprene flashing collar.
2. Workmanship: Flashing materials shall be free of holes and splits, and all joints and seams shall be sealed watertight with solder.

B. Floor and Ceiling Plates:

1. Chromium plated with concealed hinge and catch. Provide where insulated and un-insulated pipes exposed to view pass through floors, walls, ceilings and cabinets in finished areas. Plates shall be heavy pattern with tension spring. Sizes: 3/8"-8" for iron pipe sizes; 3/8"-4" for copper tube sizes.

C. Dielectric Nipple:

Use where ferrous and non-ferrous pipes join. Dielectric shall be comprised of a steel nipple with a 2-inch long thermoplastic liner for dielectric separation rated for 300 psig at 225 ° F as manufactured by Flow Design in Model DN or approved equivalent.

3.5 BACK FLOW PREVENTER

- A. General: A backflow preventer shall be provided in the potable water supply to the building in accordance with codes and utility regulations.

- B. Reduced pressure type with bronze strainer, air gap and isolation ball valves for pipe sizes 3/4" - 2". Watts series No. 009, Febco series No. 825Y, Hersey series No. FRP-II, Wilkins series 575AS, Conbraco series 40-200.
- C. Reduced pressure type with isolation ball valves with resilient seat isolation for piping sizes 2-1/2" - 10". Watts No. 909; Beeco No. 6CM, Hersey No. 825, Wilkins 575A 2 1/2-6 inch, 575AM 6-10 inch.
- D. Drain: Vent/relief shall be discharged via fixed air gap or funnel. Pipe discharge to floor drain.

END OF SECTION

SECTION 15700 INSULATION

PART 1 - GENERAL

1.1 REQUIREMENTS

Insulation thickness specified are minimum. Exterior of visible duct and pipe insulation shall be uniform in appearance. All insulation, adhesives, materials, jackets, and sealers shall have a flame spread of 25 or less and smoke development of 50 or less (exception allowed for canvas jacket and PVC fitting covers except in return air plenums) as tested by ASTM E-84-80. All insulation, mastics, coatings, sealants, and adhesives shall be certified by the manufacturer to be asbestos-free. Unless otherwise noted, insulation shall be continuous thru sleeves.

1.2 CODES

Duct insulation materials and adhesives shall conform to NFPA 90A.

Refer to Section 15010 Codes and Ordinances.

PART 2 - PRODUCTS

2.1 DUCT INSULATION

- A. Materials:
- B. Blanket Type: Glass fiber duct insulation, 3/4-pound density with FSK facing. Install mechanical fasteners not more than 18-inches on centers on bottom of ducts over 24-inches wide, seal punctures with FSK tape. Lap transverse joints 2 inches minimum and secure with staples 18" on centers. Seal all joint and vapor barrier penetrations with FSK tape. Wrap insulation with 18-gauge stainless steel wire 18-inches maximum on centers. Do not pull insulation tight around ducts when wrapping. Use 24-inch minimum length 6# density board type insulation on bottom of ducts at trapeze hangers.
- C. Board Type: Glass fiber rigid duct insulation board, 6-pound density with FSK facing. Cut to fit between standing seams and stiffeners to provide 1/2-inch minimum cover, and secure to ducts with 100% coverage of duct insulation adhesive and mechanical fasteners on 12-inch centers. Butt joints. Tape all joints and pin penetrations with 4-inch wide FSK tape after pointing up clip penetrations with insulating cement.
- D. Foamed Plastic: Flexible foamed plastic sheet insulation, 6-pound density, having a thermal conductivity of not more than 0.28 at 75° F. Apply insulation with smooth side out of coating both surfaces to be joined completely with a thin coat of waterproof instant bonding adhesive. Adjacent sheets shall fit under compression. Finish insulation with two coats white vinyl insulation paint after adhesive has dried 12 hours. Allow 2 hours between coats. Insulation shall have flame spread rating of 25 or less when tested in accordance with ASTM E84-80.
- E. Finish for Insulation Exposed Indoors: Secure metal corner beads to all exterior edges and cover insulation and beads with glass cloth adhered with fire-resistant adhesive and finished with a white breather coating. Taper insulation to test openings and leave brass plugs exposed.
- F. Location and Thickness:

Supply Ducts: Blanket; 2-inch thick.

Ceiling Supply Diffusers: Insulate tops and sides of all ceiling supply diffusers. Thickness same as supply duct.

Return Ducts Above Ceiling: Do not insulate if internally lined, otherwise insulate with 1-inch blanket.

Outside Air Ducts: Blanket 2-inch thick.

Exhaust Ducts: Do not insulate.

Insulation At Rated Partitions: Refer to duct openings in AIR DISTRIBUTION section. Seal joint between sealant and duct insulation using FSK tape, leaving 3/8-inch of sealant exposed for observation of sealant.

2.2 PIPE INSULATION

A. General:

U.L. Rating: Glass fiber pipe and fitting insulation materials adhesive, jackets and accessories shall be Underwriters Laboratories rated to provide a U.L. rated, non-combustible pipe insulation system.

Fixture Supply Piping Exposed and In Cabinets: Do not insulate. Insulate exposed drain and hot water supply for all handicapped accessible lavatories.

Domestic Hot & Cold Water, and Condensate Drain Piping: Insulate all fittings including valve bonnets. Leave only valve stems, open ends of wells, and gauge cocks exposed.

All Other Piping: Omit insulation on unions and valves. Taper insulation ends and cover with jacket material.

Domestic Cold Water Piping In Plumbing Chases and Concealed In Non-exterior Walls: Do not insulate.

Insulation At Hangers: Hangers for horizontal, refrigerant suction, supports shall be outside insulation with saddles as specified herein.

Insulation thru Rated Partitions: Install U.L. classified sealant as specified in section, BASES, SUPPORTS and SLEEVES, within sleeve as required by sealant manufacturer to maintain wall rating. Allow sealant to protrude 3/8-inch from sleeve for observation of sealant.

B. Materials:

1. Glass Fiber: Molded, sectional 4-pound minimum density glass fiber pipe insulation with ASJ self-sealing lap jacketing. Run pipe covering over fittings in concealed areas. Insulate fittings in exposed areas with pipe insulation mitered to fit and finished smooth to thickness of adjacent insulation with insulating cement. Molded fittings shall be furnished in exposed areas.
2. Flexible Foamed Plastic: Closed cell 5-pound minimum density foamed plastic flexible insulation having a thermal conductivity of not more than 0.26 at 75° F. Seal joints with insulation adhesive. Install insulation under compression during pipe fabrication without

splitting. **Do not split insulation longitudinally** except at tees and expansion bulbs. Insulation shall have flame spread rating of 25 or less and smoke developed rating of 50 or less when tested in accordance with ASTM E84-80.

3. Finish:
 - a. Concealed: Factory applied white kraft and foil laminate, reinforced, fire retardant jacket (ASJ) with self-sealing lap and butt strips. Seal longitudinal lap and transverse joints with vapor barrier adhesive and apply 3-inch wide joint sealer strips in adhesive at traverse joints. Fittings shall be covered with PVC fitting covers and vapor sealed on cold pipes. Staple laps with outward clinching staples 18-inches on centers and at each fittings, outlet or end. Seal punctures with vapor barrier.
 - b. Exposed Indoors: Factory applied white kraft and foil laminate, reinforced, fire retardant jacket (ASJ) with self-sealing lap and butt strips. Seal longitudinal lap and transverse joints with vapor barrier adhesive and apply 3-inch wide joint sealer strips in adhesive at transverse joints. Staple laps with outward clinching staples 18-inches on centers and at each fitting, outlet or end. Seal punctures with vapor barrier adhesive.
 - c. Jacket shall be outside of jacket for "concealed" insulation. Finish with gray breather mastic and glass cloth on fittings.
 - d. Foamed Plastic Indoors or Outdoors: No jacket. Paint exposed insulation with two coats white vinyl insulation paint after adhesive has dried 12 hours. Allow two hours between coats.

C. Type and Thickness:

Domestic Water: Flexible foamed plastic.

Hot Water: ¾" thick.

Cold Water: 1/2-inch thick. Do not insulate buried piping.

D. Refrigerant Suction: ¾-inch flexible foamed plastic.

E. Domestic Hot and Cold Water Piping and Waste Piping Under Lavatories or Sinks for the Disabled: Refer to Section 15500, PLUMBING FIXTURES & EQUIPMENT.

F. Condensate Drain Piping: Flexible foamed plastic; 1/2-inch thick.

G. Insulation at Saddles and Supports: Rigid insulation of length to extend 1-inch minimum beyond each end of support or saddle. Use foamed glass or urethane insulation on chilled water refrigerant suction and condensate drains and silicate on all other, of thickness to match adjacent insulation. Composite insulation-shield units manufactured by Pipe Shields, Inc. are acceptable as equal to insulation and saddles specified herein.

2.3 SADDLES

- A. Provide galvanized steel saddles at each point where pipe insulation passes through a hanger or rests on a support. Saddles shall be 180° arc for horizontal piping, 360° arch for vertical piping. Length and gauge of saddle shall be as follows:

Length of Saddle Insulation Thickness of:

Pipe Size	Saddle Gauge	1/2"	1"	1 1/2"
1" & Smaller	18	6"	6"	--
1 1/4" – 2"	18	8"	6"	6"
3"	18	12"	10"	8"
4"	16	16"	12"	12"

PART 3 - INSTALLATION

3.1 INSTALLATION

General: All insulation shall be installed in accordance with the insulation manufacturer's instructions unless prohibited herein.

3.2 COATINGS AND ADHESIVE MANUFACTURERS

Insul-Coustic; Lion Oil; Foster; Armstrong; Childer.

3.3 STAPLES, BANDS, WIRES, WIRE NETTING, CORNER BEADS, AND CORNER ANGLES

Staples shall be outward clinching type of type 304 or 316 stainless steel, or monel.

Bands shall be aluminum, brass, or nickel copper alloy, of 3/4-inch nominal width. The band thickness exclusive of coating shall be not less than 0.005-inch for steel and nickel copper alloy, 0.007-inch for aluminum, and 0.01-inch for brass.

Wire shall be 18-gauge stainless steel.

Wire netting provided for exposed surfaces of insulation to be cement finished, shall be 22-gauge, 1-inch galvanized mesh, with continuous 26-gauge galvanized steel corner beads having 2 1/2-inch wings.

Corner angles on insulation of ducts and equipment exposed in finished spaces shall be formed of 28-gauge, 1-inch by 1-inch aluminum adhered to 2-inch by 2-inch heavy kraft paper to protect external corners under field applied jackets or facings.

3.4 ADHESIVES, COATINGS, SEALING COMPOUNDS AND PROTECTIVE FINISHES

Lagging Adhesive and Coating for Glass Cloth Jackets and Other Facings - MIL-A-3316 B, Class 1.

Lap Adhesive for Vapor Barrier Jacket - MIL-A-3316 B, Class 2.

Bonding Adhesives - For securing insulation to metal surfaces - MIL-A-3316 B, Class 2 for temperatures up to 200° F.

Contact Type Adhesive - For installing flexible unicellular insulation - MIL-A-24179A, Type II, Class 1.

Bedding Compound and Joint Sealers - MIL-B-19564A.

Coating Compound - Vapor Barrier Treatment - MIL-C-19565B, Type I or II.

Protective Finish Outside of Buildings - Coating Compound MIL-C-19565 B, Type I.

3.5 INSULATION MANUFACTURERS

Armstrong; BFG; Certainteed; Johns Manville, Owens Corning; Pittsburg Corning; Rubatex; Knauf.

END OF SECTION

SECTION 15800
BALANCING & OPERATIONAL TESTS

PART 1 – GENERAL

1.1 REVIEW

The sub-contractor performing the services under this Section shall review the Contract Documents for appurtenances and arrangement for specified balancing prior to the installation of any equipment and material. The Contractor shall notify the Contracting Officer of any omissions noted within 30 days of the Contractor's notice to proceed. The sub-contractor performing the services under this section shall be a separate independent firm with no relationship with the mechanical sub-contractor or the controls sub-contractor.

1.2 INSTRUMENTS

Instruments for which calibration is periodically required and which will be utilized for balancing air and water systems must have been calibrated within a period of six months prior to balancing. Types and dates of calibration of all instruments shall be listed in the final air and water balance reports.

1.3 ADJUSTING OUTSIDE AIR QUANTITIES

Outside air quantities shall be established, as a percentage of total supply air, from measurements of return, outside and mixed air, using a 12-inch long glass thermometer with 1/2° F divisions. Outside quantity shall be made after complete adjustment of supply air quantity and with a 15° F minimum temperature differential between outside and return air temperatures.

The following formula shall be utilized for calculating percentage outside air:

$$\text{OSA equals } \frac{T_m - T_r}{T_o - T_r}$$

T_m = Mixed air temperature.

T_r = Return air temperature.

T_o = Outside air temperature.

1.4 CONNECTING EQUIPMENT

Where two elements of a system, e.g., condensing unit and coil, are connected, the testing of equipment shall be simultaneous.

1.5 BALANCING

System shall be initially balanced for air and water quantities shown. Final balancing shall be under seasonal operating conditions by adjusting for equal temperature in all spaces. This shall be done at outside temperatures above 85° F and below 50° F for cooling and heating, respectively.

1.6 AIR BALANCE PERFORMANCE REQUIREMENTS

- A. Measurements: Air quantity measurements in main and branch ducts shall be made by pitot tube traverse of the entire cross sectional area of the duct. Ducts having velocities of 1000 or more feet

per minute shall be measured with inclined manometers, draft gage, or magnehelic gages; ducts having velocities of less than 1000 feet per minute shall be measured with micromanometers, hook gages, or Alnor velometers.

- B. Duct Openings: Openings in ducts for pitot tube and thermometer insertion shall be sealed with snap-in plugs after air balance is complete.
- C. Outlet and Inlet Air Quantities: Determine by direct reading velocity meters in accordance with outlet and inlet manufacturer's recommendation.
- D. Adjustments: Total air quantities shall be obtained by adjustment of fan speeds. Branch duct air quantities shall be adjusted by volume dampers. Dampers shall be permanently marked after air balance is complete so that they can be restored to their correct position if disturbed at any time. Final air quantities shall be within plus or minus 5% of those called for on the drawings.

7. CERTIFIED BALANCE REPORTS

- A. Three copies of the initial balance report shall be submitted prior to contractor's request for substantial completion inspection. Report shall be entitled initial "Balance Report". This report shall include the data listed below for each system, required and actual. Where data cannot be furnished during initial balance due to season, temperature, or other conditions, complete data for that system shall be provided under seasonal balance.
- B. Air Balance Data - Air Handling Equipment:
 - 1. Air Handling Units, Fans:
 - Unit designation.
 - Size and manufacturer.
 - Motor H.P., volts, phase, cycles, full load amps.
 - 2. Test Results: Record readings with fan adjusted for design CFM.
 - Total C.F.M.
 - Static pressure, total, inlet, outlet and components, i.e., coil, filter.
 - Motors, amps and voltage. (All legs.)
 - Outside Air, CFM.
 - Fan RPM.
 - Fan B.H.P.
 - Coil air inlet and outlet dry and wet bulb temperatures.
 - Return and outside air dry and wet bulb temperatures.
- C. Air Distribution System:
 - 1. Individual Outlets and Inlets:
 - Outlet and inlet identification, location and room designation.
 - Design and resultant test quantities in C.F.M.
- D. Air Cooled Condensing Unit:
 - 1. Installed Unit Data:
 - Unit designation.

Size and manufacturer.
 Motor horsepower, volts, phase, cycles, and full load amps.

2. Test Results:

Suction and discharge pressures.
 Motor amps and voltage. (All legs)
 Ambient temperature.

E. Element Tests, All Heat Transfer Equipment:

1. Tests Results: These readings shall be taken during initial and seasonal balance.

Unit designation.
 Entering and leaving air temperatures (DB & WB on cooling coils).
 Pressure drop.
 Amperage and voltage. (All legs)

F. Filters:

Description of condition.
 Pressure drop.

G. Smoke Detectors: Verify operation and confirm test.

H. All Safety Controls: Verify operation, tabulate list of controls with settings and confirm test.

I. All Motors:

Nameplate data.
 Operating amps and voltage. (All legs.)
 Heater elements rating.

J. Controllers: Tabulate settings of all controllers, individually, by location, equipment, or space.

K. Sensors: Record temperature at all sensors; equipment, space, duct, and pipe; and settings of controllers.

L. Installed Data: Where installed data is specified, complete specified data on piece of equipment shall be included in report.

M. Space Temperatures: Temperature of each conditioned space and dry bulb setting of controlling thermostat.

N. Deficiencies: List all deficiencies noted.

8. BALANCE UNDER SEASONAL OPERATING CONDITIONS

A. Test: After the initial balance has been completed, reviewed and accepted, the Contractor shall adjust the system under seasonal operating conditions by performing operational tests (over a minimum period of eight hours under both cooling and heating conditions. These tests shall be performed only after each piece of equipment has been individually tested, and is verified to be in correct operating condition, and shall be made at times when outdoor dry bulb temperatures are above 85° F for cooling, or below 50° F for heating. When test is run during the cooling cycle, the

building must be occupied, all lights shall be turned on for a minimum of six (6) hours. Doors to all spaces shall be closed and all space thermostats set at 74° F.

- B. Purpose: Prove correctness of installation; prove functioning of capacity and safety controls; prove calibration of operating controls; and prove stability of operation under actual loading conditions.
- C. Certified Reports: Three copies of the following balance data shall be submitted within five (5) days of the job visit. Report shall be entitled "Seasonal Operating Conditions Cooling" or "Heating". The following information shall be included in each report:

Temperature of each conditioned space and dry bulb setting of controlling thermostat.

Settings of all controllers, individually, by location, equipment, or space.

Temperature at sensors in equipment, space, duct, and pipe; and settings of controllers.

Complete data on equipment/systems not submitted with initial balance reports.

Date and outdoor DB and WB range at the time indoor temperatures were recorded.

Adjustments performed and corrective action taken.

List of deficiencies noted.

Certification that the purpose of the visit has been complete.

END OF SECTION

SECTION 15900
FIRE PROTECTION SYSTEMS

PART 1 - GENERAL**1.1 GENERAL**

- A. Refer to all sections of Division 15 for applicable requirements.

1.2 BASIS OF DESIGN

- A. Provide a complete wet type sprinkler system affording 100% protection for all zones as specified.
- B. System is light hazard as shown on schedule. Pipe sizes shall be hydraulically calculated based upon flow data shown on the drawing; 20 FPS max. velocity in any pipe at municipal water tap.

1.3 CONTRACTOR'S QUALIFICATIONS

- A. Fire Protection Experience: The firm's proficiency in the design, layout, and installation of fire protection systems shall have been demonstrated by the successful performance of work as specified herein on at least 10 installations in commercial or institutional buildings, each with a minimum of 10,000 square feet of sprinklered area. The firm shall have trained personnel, instruments, tools, and equipment to perform the work specified. The firm shall have been in business performing services as specified herein, for at least 3 years.

1.4 REQUIREMENTS

- A. It is not the intent of these contract documents to provide a complete detailed description of the apparatus, materials, and equipment making a complete installation of the fire protection system. Include all material and equipment and perform all work to install the fire protection system in accordance with specified codes and governing bodies with additional requirements as shown or specified herein.

1.5 CODES AND PERMITS

- A. General: Where requirements of these specifications exceed specified codes and ordinances, conform to these specifications.
- B. Permits: Obtain all city, county, and state permits required for installation of system, paying all fees in connection therewith.
- C. NFPA Codes: Materials, equipment, installation, and testing shall conform to the requirements of NFPA Code.
1. NFPA No. 13: Standard for the Installation of Sprinkler Systems.
 2. NFPA No. 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 3. NFPA No. 72: National fire alarm code.
 4. NFPA No. 101: Code for Safety to Life from Fire in Buildings and Structures.

- D. Local Codes and Ordinances: Conform to local codes and ordinances. NFPA Code, where more stringent, shall take precedence.

1.6 SHOP DRAWINGS

- A. Plans are diagrammatic showing the partial pipe routing and type of system to be used. Submit detailed shop drawings for the complete system with arrangement as shown showing the location of heads, piping, pipe sizes, hangers, elevations, and installation details. Shop drawings conforming to applicable Codes and review agencies shall indicate piping offsets and routing coordinated with building structure; mechanical duct and piping and appurtenances; and electrical conduit and appurtenances. Submit these drawings, submittal data, and hydraulic calculations for review prior to the fabrication or installation of any piping.
- B. Provide hydraulic calculations, including flow diagram with shop drawings. For gridded and tree systems, pressures at hydraulic junction points shall balance within 0.5 PSI. The highest pressure at the junction point shall be carried into the calculations.

1.7 AUTHORITIES INSPECTIONS AND TESTS

- A. Furnish all labor and equipment and conduct all specified tests in the presence of the designated representative.

1.8 CERTIFICATE OF APPROVAL

- A. On completion of installation, obtain and deliver certificates of final observation and approval by local authority having jurisdiction. Test certificates shall be signed by a Certificate of Competency holder.

PART 2 - PRODUCTS

2.1 FIRE ALARM SYSTEM

- A. Provide relay and flow switches for and electrically interconnect with the fire alarm system in conformance with NFPA Code. See Fire Alarm. panel location on electrical plans. Provide tamper switch on main sprinkler valve and each isolation valve for electrical supervision under Division 16, Electrical.

2.3 PIPING SYSTEM

- A. Identification: ASTM, ANSI, or AWWA No. shall be stamped on each length of pipe. Bundles of steel pipe shall have metal tag attached showing ASTM No. and schedule.
- B. Pipe:
1. Above Ground: Black carbon steel pipe.
ASTM A-135, Grade A, schedule 40.
 2. Below Ground: Ductile iron pipe, ANSI-21.51, 250-PSI minimum working pressure with slip-on joints, ANSI-A21.11 and thrust blocks.
 3. Fittings:
 - a. Above Ground:
 1. 2-inch and Smaller Steel Pipe: 125 lb. black threaded cast iron fittings, ASTM

A-126-73 class A, with wrought steel couplings. Bushings are not allowed.

2. 2-1/2-inch and Larger Steel Pipe: Malleable iron grooved pipe fittings. Reducing couplings are not allowed.
 3. Weld Fittings: Buttweld carbon steel, ASTM-A234-79. Wall thickness shall be same as piping.
 4. Reducing Tees: Coupolet-300 by Bonney Forge Division of Energy Products Group, Sprink-Line by Sunbelt Marketing, "TEE-LET" 300 by Merit Manufacturing Corp., NAP300 by North Alabama Pipe Corp., F400 by Grinnell Corp. may be used for side outlet reducing tees more than two pipe sizes smaller than main.
4. Below Ground: Fittings shall be cast iron, ANSI-21.10.

C. Installation:

1. Above and Below Ground: Refer to NFPA Code.
2. Below Ground: Dedicated fire protection piping shall be installed by a Certificate of Competency holder.
 - a. Anchors: Concrete thrust blocks shall be provided at all offsets and tees for water main. At end of lines plugged, tie rods and collars shall be provided.
 - b. Cover: 3 feet minimum.
 - c. Supports: All pipes shall have uniform bearing on trench bottom.
 - d. Dedicated Underground Piping: All dedicated underground fire protection piping or other piping used to feed the fire protection system shall be installed by a Certificate of Competency holder. Piping shall be flushed and tested in accordance with NFPA 13 and NFPA 24. All tests shall be certified and signed by a Certificate of Competency holder. Provide three (3) copies of certificate(s) to Architect.

D. Joints:

1. Threaded: All male threads shall be American Standard pipe thread.
2. Welded: Welding procedures and welders qualifications shall be in accordance with ANSI B31.1 Code for Pressure Piping, dated 1977.
 - a. 1 1/2-inch and Smaller: Gas weld with oxygen and acetylene.
 - b. 2-inch and Larger: Metallic arc weld.
3. Slip-on Joints: Joints in ductile iron water main shall be slip on type with Bell Tite rubber gasket, except that joints at valves and fire hydrants shall be mechanical joint with rubber gasket.
4. Grooved Pipe Couplings: ASTM A-47-77 malleable iron/ASTM A-536-77 ductile iron housings; ASTM D-2000-80 chlorinated butyl grade 'H' gasket for water services to 200° F; ASTM A183-68 heat treated carbon steel bolts and nuts. Install with uniform coat of lubricant on pipe and in housing. Victaulic Style; Gustin-Bacon; Ward; Grinnell "Gruvlok".

E. Excavation & Backfill: Refer to SECTION 15600.

- F. Hangers & Supports: Refer to NFPA 13 for hanger type. Contractor to utilize U.L. listed or FM approved hangers and supports which attach directly to structure and piping.
- G. Hanger Spacing Schedule:
 1. Horizontal Run: Paragraph 4-5.2 NFPA 13.
 2. Provide support within 2'-0" of any change in horizontal direction.
 3. Provide support for any vertical pipe 36" in length or greater.

2.4 SPRINKLER SYSTEM ACCESSORIES, VALVES AND HYDRANTS

- A. General:
 1. Devices, hangers, valves, and accessories shall be listed in an Underwriters' Standard as approved material and be in accordance with NFPA Codes.
 2. All threaded connections for Fire Department use shall have threads compatible with local Fire Department equipment.
 3. All underground valves shall have extension to grade and 2-inch square operating nut.
 4. Provide floor and ceiling plates as specified.
 5. Valves and Fittings shall be provided with threaded, flanged, or grooved joint connection as required by piping they connect to.
- B. Gate Valves:
 1. 2" and Smaller: Bronze body, U.L. listed – F.M. approved, OS&Y, solid wedge, 175 pound W.L.G., threaded ends. Nibco Scott T-104-0, Crane 459, Jenkins 275U, Hammond 1B681, Stockham B-133.
 2. 2-1/2" and Larger: Iron body, bronze trim, U.L. listed – F.M. approved, OS&Y, solid wedge, 175 pound W.L.G., flanged ends. Nibco Scott F-607-0, Crane 467, Jenkins 825-A, Hammond 1R1154, Stockham G-634.
- C. Butterfly Valves 2-1/2" and Larger: Gear operated, cast iron body, wafer design type body, U.L. Listed - F.M. approved, with resilient seat, self-sealing between companion flanges, 175 pound W.O.G. Grinnell Series 8000FP, Nibco WD3510 Series, Mueller B-3250-00.
- D. Globe Valves: 2" and Smaller. Bronze body, rubber disc, union bonnet, 175 pound W.W.P., threaded ends. Nibco-Scott KT-65, Kennedy 97SD, United 125S, Fairbanks 4591-3.
- E. Angle Valves: 2" and Smaller. Bronze body, rubber seat disc, 175 pound non-shock cold water. Nibco-Scott T-301-W, Kennedy 985D, United 126S, Fairbanks 4691-3.
- F. Check Valve: Iron body, U.L. listed – F.M. approved, swing type, bronze trimmed, bronze seat and disc, Jenkins 629, Crane 375, Stockham G-940, Mueller A2120-6, Kennedy #126.
- G. Water Flow Alarm-Riser: U.L. listed and F.M. approved. Install 110 volt, 8" round electric bell for outside wall mount in conjunction with water flow alarm device.

- H. Tamper Switch: Switch designed for installation on indicator valves with cased aluminum housing with red finish; U.L. Listed - F.M. approved. Notifier, Simplex, Potter, Grinnell.
- I. Flow Switches: Paddle type with retard, N.O. contact, for connection to fire alarm panel. Provide at main system risers and floor control stations. Notifier, Simplex, Potter, Grinnell.
- J. Siamese Connection: Two 2 ½" brass, flush wall type with double clappers, caps and chains and wall flange, lettered "Automatic Sprinkler". Before purchasing, verify thread count and type with Fire Department hose connections. Siamese connection shall be compatible. Mount Siamese connection 3 feet above grade unless otherwise noted. A single outlet fire department connection is acceptable where it connects to a 3 inch or smaller riser. Elkhart, Croker Standard, Potter Roemer.
- K. Sprinkler Service Gauges: U.L. listed – FM approved. For use in wet type sprinkler systems. Corrosion-resistant brass case and ring, 3 1/2" dial size, 1/4" NPT size, 0-300 PSIG range. Ashcroft 1000A.
- L. Sprinkler Heads: All heads shall be U.L. listed – F.M. approved, with glass temperature actuated link; fused in accordance with NFPA 13; 1/2" orifice, 1/2" N.P.T. connection. Heads shall center in ceiling tiles on exposed grid ceiling systems. Viking, Automatic Sprinkler, Gem.
 - 1. Recessed Type: Recessed escutcheon housing quick response pendant type head with 1-1/8" maximum projection below ceiling; polished chrome.
 - 2. Upright Type: Standard upright type, pipe mounted, rough brass finish.
 - 3. Sidewall: Horizontal mounted; polished chrome finish.
 - 4. Locations:
 - a. Below Ceilings: Chrome plated recessed or extended coverage sidewall type.
 - b. Mechanical Rooms and Unfinished Spaces without Ceilings: Upright rough brass, as shown.

2.5 SPRINKLER SYSTEM SIGNS

- A. Signs shall be installed in accordance with NFPA Code. Where valves are concealed above removable lay-in ceiling panels, provide a visible descriptive sign at ceiling elevation nearest to panel providing access.

2.6 STOCK OF SPARE SPRINKLERS

- A. The contractor shall provide spare sprinkler heads of each type and special sprinkler wrench in a wall mounted cabinet as required by NFPA 13, paragraph 2-2.7.

2.7 MAINTENANCE INFORMATION/AS-BUILT DRAWINGS

- A. The contractor shall provide maintenance information in accordance with NFPA 13.
- B. As built sprinkler drawings representing system as installed and Operation and Maintenance manuals shall be assembled and be in accordance with specification requirements.
- C. Refer to Section 15010, General Mechanical Requirements for specific format to be submitted.

END OF SECTION

SECTION 16010
ELECTRICAL: BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic requirements for electrical systems.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 16120 - Wire and Cable - 600 Volt and Below.
 - 2. Section 16130 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA).
 - 2. American Iron and Steel Institute (AISI).
 - 3. ASTM International (ASTM):
 - a. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. ETL Testing Laboratories (ETL).
 - 5. Institute of Electrical and Electronics Engineers/American National Standards Institute (IEEE/ANSI):
 - a. C2, National Electrical Safety Code (NESC).
 - 6. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 7. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 8. Underwriters Laboratories, Inc. (UL).
- B. Where Underwriters Laboratories, Inc. (UL) test procedures have been established for the product type, use UL or ETL Testing Laboratories (ETL) approved electrical equipment and provide with the UL or ETL label.

1.3 DEFINITIONS

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
 - 1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
 - 2. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
 - 3. Non-architecturally finished interior area: Mechanical, electrical rooms and other similar rooms.
 - 4. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

1.4 SUBMITTALS

- A. Shop Drawings:

1. General requirements:
 - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
 - b. Include data sheets that include manufacturer's name and product model number.
 - 1) Clearly identify all optional accessories.
 - c. Acknowledgement that products are UL or ETL listed or are constructed utilizing UL or ETL recognized components.
 - d. Manufacturer's delivery, storage, handling and installation instructions.
 - e. Product installation details.
 - f. See individual specification sections for any additional requirements.
- B. Operation and Maintenance Manuals:
 1. See Section 10785.
- C. When a Specification section includes products specified in other specification sections, each section shall have the required Shop Drawing transmittal form per FP – 03, Subsection 104.03, Sections shall be submitted simultaneously.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See FP – 03, Subsection 104.03.

1.6 AREA DESIGNATIONS

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
 1. Outdoor areas:
 - a. Wet.
 - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
 2. Indoor areas:
 - a. Dry.
 - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 MATERIAL REQUIREMENTS

- A. Modular strut:
 1. Galvanized steel: ASTM A123 or ASTM A153.
 2. Stainless steel: AISI Type 316.
 3. PVC coated galvanized steel: ASTM A123 or ASTM A153 and 20 mil PVC coating.
- B. Mounting hardware:
 1. Galvanized steel.
 2. Stainless steel.
- C. Field touch-up of galvanized surfaces.
 1. Zinc-rich primer.
 - a. One (1) coat, 3.0 mils.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specifications and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
 - 1. NFPA 70 (NEC).
 - 2. IEEE/ANSI C2.
 - 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
 - 1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
 - 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
 - 1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
 - 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
 - 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
 - 4. See Section 16120 for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70 (NEC).
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.
- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operating and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
 - 1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
 - a. Light switch (to center): 48 IN.
 - b. Receptacle in architecturally finished areas (to center): 18 IN.
 - c. Receptacle on exterior wall of building (to center): 18 IN.
 - d. Receptacle in non-architecturally finished areas (to center): 48 IN.
 - e. Telephone outlet in architecturally finished areas (to center): 18 IN.
 - f. Safety switch (to center of operating handle): 54 IN.
 - g. Panelboard (to top): 72 IN.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
 - 1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 IN in equipment location with the Engineer's approval.
- K. Provide electrical equipment support system per the following area designations:
 - 1. Dry areas:

- a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
- b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- 2. Wet areas:
 - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
 - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
 - 1. Do not cut, or weld to, building structural members.
 - 2. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.

3.2 FIELD QUALITY CONTROL

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. The protective coating integrity of support structures and equipment enclosures shall be maintained.
 - 1. Repair galvanized components utilizing a zinc rich paint.
 - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
 - 4. Repair surfaces which will be inaccessible after installation prior to installation.
 - 5. See Section 16130 for requirements for conduits and associated accessories.
- D. Replace nameplates damaged during installation.

END OF SECTION

SECTION 16060 GROUNDING

PART 1 - GENERAL

SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for grounding system(s).
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 16010-Electrical Basic Requirements
 - 2. Section 16080 - Acceptance Testing.
 - 3. Section 16120 - Wire and Cable - 600 Volt and Below.
 - 4. Section 16130 - Raceways and Boxes.

QUALITY ASSURANCE

- C. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. Standard Specification for Highway Bridges.
 - 2. ASTM International (ASTM):
 - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - 3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. 837, Qualifying Permanent Connections Used in Substation Grounding.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 5. Underwriters Laboratories, Inc. (UL):
 - a. 467, Standard for Safety Electrical Grounding and Bonding Equipment.
- D. Assure ground continuity is continuous throughout the entire Project.

SUBMITTALS

- E. Shop Drawings:
 - 1. Product technical data.
 - a. Provide submittal data for all products specified in PART 2 of this Specification except:
 - 1) Grounding clamps, terminals and connectors.
 - 2) Exothermic welding system.
 - b. See Section 16010 for additional requirements.

PART 2 - PRODUCTS

ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the contract documents, the following manufacturers are acceptable:
 - 1. Ground Rods and bars and grounding clamps, connectors and terminals;
 - a. Burndy
 - b. Harger Lightning Protection
 - c. Heary Brothers

- d. Joslyn
- e. Robbins Lightning Protection
- f. Thomas & Betts (Blackburn)
- g. Thompson
 - 2. Exothermic weld connections
 - a. Erico Products Inc., Cadweld
 - b. Harger Lightning Protection
 - c. Thermoweld
 - 3. Prefabricated composite test stations
 - a. Quazite Composolite
 - b. Armorcast Products Company

2.2 COMPONENTS

- A. Wire and Cable:
 - 1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
 - 2. Insulated conductors: Color coded green, per Section 16120.
- B. Conduit: As specified in Section 16130.
- C. Ground Bars:
 - 1. Solid copper:
 - a. 1/4 IN thick.
 - b. 2 or 4 IN wide.
 - c. 24 IN long minimum in main service entrance electrical rooms, 12 IN long elsewhere.
 - 2. Predrilled grounding lug mounting holes.
 - 3. Stainless steel or galvanized steel mounting brackets.
 - 4. Insulated standoffs.
- D. Ground Rods:
 - 1. 3/4 IN x 10 FT, or as indicated on the Drawings.
 - 2. Copperclad:
 - a. Heavy uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
 - b. Corrosion resistant bond between the copper and steel.
 - c. Hard drawn for a scar-resistant surface.
- E. Grounding Clamps, Connectors and Terminals:
 - 1. Mechanical type:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - 2. Compression type for interior locations:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - c. Non-reversible.
 - d. Terminals for connection to bus bars shall have two bolt holes.
 - 3. Compression type suitable for direct burial in earth or concrete:
 - a. Standards: UL 467, IEEE 837.
 - b. High copper alloy content.
 - c. Non-reversible.
- F. Exothermic Weld Connections:
 - 1. Copper oxide reduction by aluminum process.
 - 2. Molds properly sized for each application.
- G. Prefabricated Composite Material Test Stations:
 - 1. Fiberglass reinforced polymer concrete.

2. Body and cover shall sustain a minimum vertical load test of 22,000 LBS over a 10 IN square or be H-20 rated per AASHTO.
3. Size: 12 IN round or 12 IN square.
4. Open bottom.
5. Stackable design as required for specified depth.
6. Engrave cover with the word "GROUND".

PART 3 - EXECUTION

INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.
2. Size grounding conductors and bonding jumpers in accordance with NFPA 70 Article 250, except where larger sizes are indicated on the Drawings.
3. Remove paint, rust, or other nonconducting material from contact surfaces before making ground connections.
4. Where ground conductors pass through floor slabs or building walls provide non-metallic sleeves.
5. Do not splice grounding conductors except at ground rods.
6. Install ground rods and grounding conductors in undisturbed, firm soil.
 - a. Provide excavation required for installation of ground rods and ground conductors.
 - b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
 - c. Unless otherwise specified, connect conductors to ground rods with compressor type connectors or exothermic weld.
 - d. Provide sufficient slack in grounding conductor to prevent conductor breakage during backfill or due to ground movement.
 - e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
 7. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.

B. Grounding Electrode System:

1. Provide a grounding electrode system in accordance with NFPA 70 Article 250 and as indicated on the Drawings.
2. Grounding conductor terminations:
 - a. Ground bars mounted on wall, use compression type terminal and bolt it to the ground bar with two bolts.
 - b. Ground bars in electrical equipment, use compression type terminal and bolt it to the ground bar.
 - c. Piping systems, use mechanical type connections.
 - d. Building steel, below grade and encased in concrete, use compression type connector or exothermic weld.
 - e. At all above grade terminations, the conductors shall be labeled per Section 10400.

C. Supplemental Grounding Electrode:

1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
2. Metal light poles:
 - a. Connect metal pole to a ground rod.
 - b. Grounding conductor: Bare #6 AWG minimum.

D. Raceway Bonding/Grounding:

1. All metallic conduit shall be installed so that it is electrically continuous.
2. All conduits to contain a grounding conductor with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
3. NFPA 70 required grounding bushings shall be of the insulating type.
4. Provide double locknuts at all panels.
5. Bond all conduit, at entrance and exit of equipment, to the equipment ground bus or lug.
6. Provide bonding jumpers if conduits are installed in concentric knockouts.
7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

E. Equipment Grounding:

1. All utilization equipment shall be grounded with an equipment ground conductor.

FIELD QUALITY CONTROL

F. Leave grounding system uncovered until observed by Owner.

G. Acceptance testing:

1. See Section 16080.

END OF SECTION

SECTION 16080
ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic requirements for acceptance testing.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 16010 - Electrical: Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 400-3, Guide for Partial Discharge Testing of Power Cable Systems in a Field Environment.
 - 2. International Electrical Testing Association (NETA):
 - a. ATS, Acceptance Testing Specifications for Electric Power Distribution Equipment and Systems.
 - 3. National Institute for Certification in Engineering Technologies (NICET).
 - 4. National Institute of Standards and Technology (NIST).
 - 5. Nationally Recognized Testing Laboratory (NRTL).

1.3 SYSTEM DESCRIPTION

- A. The purpose of field acceptance testing is to verify equipment and system integrity and operation after manufacture, shipping and installation.
 - 1. All equipment included in Division 16 shall receive all routine factory tests required by the applicable industry standards or Nationally Recognized Testing Laboratory (NRTL) and certification of these tests shall be submitted concurrent with shipment to the job site.
 - 2. However, factory testing will not be accepted in lieu of the field acceptance testing requirements specified in this Section.
- B. Test the following:
 - 1. Test all electrical equipment on the project.
 - 2. The following identifies the specific equipment to be tested:
 - a. Low voltage cable:
 - 1) All feeders.
 - b. Low voltage circuit breakers 225 A and larger.
 - c. Grounding.
- C. Tests and inspections not specifically listed, but required to insure that the equipment is safe to energize and ready for commercial operation, shall be performed.

1.4 SUBMITTALS

- A. See FP – 03, Subsection 104.03.
- B. Submit a minimum of four (4) weeks before scheduling acceptance testing:
 - 1. Sample test report forms for each type of equipment to be tested.
- C. Submit prior to energizing equipment:
 - 1. Photocopies of field test reports for all applicable pre-energization tests including over-potential, insulation resistance, protective device and continuity tests.
- D. Submit within two (2) weeks of the completion of acceptance testing:

1. Final test report signed by the contractor including the following information:
 - a. Summary of Project.
 - b. Description of equipment/components tested.
 - c. Date and time of each test.
 - d. Ambient conditions including temperature, humidity, precipitation.
 - e. Visual inspection report.
 - f. Description of tests.
 - g. Test results recorded legibly or typewritten on appropriate test forms.
 - 1) Include acceptance criteria, acceptable range of values or other basis for pass/fail decision.
 - 2) Include “as found” and “as left” results and identify all adjustments or corrections made during testing.
 - h. Conclusions and recommendations.
 - i. Identification of test equipment used:
 - 1) Manufacturer.
 - 2) Model number.
 - 3) Ranges.
 - 4) Serial number.
 - 5) Inventory number.
 - 6) Calibration number and date.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SECTION)

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Scope:
 1. Complete visual inspection, mechanical and electrical operational tests and electrical acceptance tests shall be performed in accordance with NETA ATS.
 2. The following paragraphs identify the scope of testing for each item to be tested.
 - a. All required tests per NETA shall be performed.
 - b. Tests identified by NETA ATS as optional shall be performed when listed below.
 - c. Additional tests not required by NETA ATS are also listed when required.
 3. Perform and report all tests recommended or required by the equipment manufacturer’s installation, operation and maintenance instructions, even if not included in NETA ATS or listed below.
 4. Repairs shall be made when test values do not meet known acceptable values.
 - a. Test report shall clearly indicate “as found” and “as left” values, the cause of the unacceptable values, and the details of the corrective action taken to obtain acceptable results.
- B. Sequencing and Scheduling:
 1. Testing shall be performed only after completion of installation of systems and equipment unless the nature of the test requires an exception.
 - a. Do not test partial systems unless specified.
 2. Schedule all tests intended to determine fitness for energizing to occur immediately prior to first energizing of equipment.
 3. Equipment and systems shall not be energized or placed into service until testing is complete and all unacceptable results have been resolved.
 - a. Except tests that, by their nature, require the equipment in an energized or operational state, such as synchronism-check.
- C. Testing personnel shall have the following system and equipment reference data on site during all testing:

1. Approved Shop Drawings for the Project to include at a minimum:
 - a. Single line diagrams.
 - b. Equipment schedules.
 - c. Cable schedules.
2. Manufacturers approved Shop Drawings for power equipment.
3. Manufacturer's instruction manuals for all equipment.
4. A copy of this Specification Section.
5. Manufacturer's instruction manuals for all test instruments.
6. NETA ATS.

3.2 ACCEPTANCE TESTING

- A. Panelboards:
 1. Perform inspections and tests per NETA.
 2. Components: Test all components per applicable paragraphs of this Specification and NETA.
- B. Cable - Low Voltage:
 1. Perform inspections and tests per NETA.
- C. Low Voltage Molded Case Circuit Breakers:
 1. Perform inspections and tests per NETA.
 2. Components:
 - a. Test all components per applicable paragraphs of this Specification and NETA.
 - b. Thermal magnetic breakers: Visual and mechanical inspection per NETA only.
 3. Record as-left settings.
- D. Grounding:
 1. Perform inspections and tests per NETA.
 2. Components: Test all components per applicable paragraphs of this Specification and NETA.

END OF SECTION

SECTION 16120**WIRE AND CABLE: 600 VOLT AND BELOW****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
1. Material and installation requirements for:
 - a. Building wire.
 - b. Power cable.
 - c. Control cable.
 - d. Instrumentation cable.
 - e. Wire connectors.
 - f. Insulating tape.
 - g. Pulling lubricant.
- B. Related Sections include but are not necessarily limited to:
1. Section 16010 - Electrical: Basic Requirements.
 2. Section 16080 - Acceptance Testing.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. National Electrical Manufacturers Association (NEMA):
 - a. ICS 4, Industrial Control and Systems: Terminal Blocks.
 2. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
 - a. WC 57/S-73-532, Standard for Control Cables.
 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 4. Underwriters Laboratories, Inc. (UL):
 - a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
 - b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - c. 467, Standard for Safety Grounding and Bonding Equipment.
 - d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
 - e. 486C, Standard for Safety Splicing Wire Connections.
 - f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
 - g. 910, Test for Cable Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air.
 - h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
 - i. 2250, Standard for Safety Instrumentation Tray Cable.

1.3 DEFINITIONS

- A. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
- Product technical data:
2. Provide submittal data for all products specified in Part 2 of this specification except:
 - a. Wire connectors.

- b. Insulating tape.
- c. Cable lubricant.
3. See Section 16010 for additional requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 16010.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Building Wire:
 1. Conductor shall be copper with 600 V rated insulation.
 2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
 3. Surface mark with manufacturers name or trademark, conductor size, insulation type and UL label.
 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN and THHN/THWN-2 insulation.
 5. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.
- B. Wire Connectors:
 1. Twist/screw on type:
 - a. Insulated pressure or spring type solderless connector.
 - b. 600 V rated.
 - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
 - d. Phase and neutral conductors: Conform to UL 486C.
 2. Compression and mechanical screw type:
 - a. 600 V rated.
 - b. Ground conductors: Conform to UL 467.
 - c. Phase and neutral conductors: Conform to UL 486A.
 3. Terminal block type:
 - a. High density, screw-post barrier-type with white center marker strip.
 - b. 600 V and ampere rating as required, for power circuits.
 - c. 600 V, 20 ampere rated for control circuits.
 - d. 300 V, 15 ampere rated for instrumentation circuits.
 - e. Conform to NEMA ICS 4 and UL 486A.
- C. Insulating and Color Coding Tape:
 1. Pressure sensitive vinyl.
 2. Premium grade.
 3. Heat, cold, moisture, and sunlight resistant.
 4. Thickness, depending on use conditions: 7, 8.5, or 10 mil.
 5. For cold weather or outdoor location, tape must also be all-weather.
 6. Color:
 - a. Insulating tape: Black.
 - b. Color coding tape: Fade-resistant color as specified herein.
 7. Comply with UL 510.
- D. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Permitted Usage of Insulation Types:
 - 1. Type XHHW-2:
 - a. Building wire and power and control cable in architectural and non-architectural finished areas.
 - b. Building wire and power and control cable in conduit below grade.
 - 2. Type THHN/THWN and THHN/THWN-2:
 - a. Building wire and power and control cable No. 8 AWG and smaller in architectural and non-architectural finished areas.
- B. Conductor Size Limitations:
 - 1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
 - 1. Building wire:

240/120 V	
Phase 1	Black
Phase 2	Red
Neutral	White
Ground	Green

- a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
 - b. Conductors larger than No. 6 AWG:
 - 1) Insulated phase and neutral conductors shall be identified by one (1) of the following methods:
 - a) Continuous colored outer finish along its entire length.
 - b) 3 IN of colored tape applied at the termination.
 - 2) Insulated grounding conductor shall be identified by one (1) of the following methods:
 - a) Continuous green outer finish along its entire length.
 - b) Stripping the insulation from the entire exposed length.
 - c) Using green tape to cover the entire exposed length.
 - 3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes, wireways, manholes and handholes.
 - 2. Power cables ICEA Method 4 with:
 - a. Phase and neutral conductors identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
 - b. Ground conductor: Bare.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch, control or alarm circuits shall not be combined in a raceway, junction or pull box.
 - 1. Multiple branch circuits for lighting, receptacle and other 120 Vac circuits are allowed to be combined into a common raceway.
 - a. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NEC, including but not limited to:

- 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
 - 2) The neutral conductor may be shared on sequential circuits (e.g., circuit numbers 1,3,5). Where indicated.
 - 3) Up sizing raceway size for the size and quantity of conductors.
- F. Ground the drain wire of shielded instrumentation cables at one (1) end only.
1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).
- G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
1. Feeder and branch power circuits:
 - a. Device outlet boxes:
 - 1) Twist/screw on type connectors.
 - b. Junction and pull boxes and wireways:
 - 1) Twist/screw on type connectors for use on No. 8 and smaller wire.
 - 2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
 - c. Motor terminal boxes:
 - 1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.
 - 2) Mechanical screw type connectors for use on No. 8 AWG and larger wire.
 2. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.
- H. Insulating Tape Usage:
1. For insulating connections of No. 8 AWG wire and smaller: 7 mil vinyl tape.
 2. For insulating splices and taps of No. 6 AWG wire or larger: 10 mil vinyl tape.
 3. For insulating connections made in cold weather or in outdoor locations: 8.5 mil, all weather vinyl tape.
- I. Color Coding Tape Usage: For color coding of conductors.

3.2 FIELD QUALITY CONTROL

- A. Acceptance Testing:
1. See Section 16080.

END OF SECTION

SECTION 16130
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Material and installation requirements for:
 - a. Conduits.
 - b. Conduit fittings.
 - c. Conduit supports.
 - d. Wireways.
 - e. Outlet boxes.
 - f. Pull and junction boxes.
 - B. Related Sections include but are not necessarily limited to:
 1. Section 16010 - Electrical: Basic Requirements.
 2. Section 16135 - Electrical: Exterior Underground.
 3. Section 16140 - Wiring Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Iron and Steel Institute (AISI).
 2. ASTM International (ASTM):
 - a. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - c. D2564, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 3. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - c. RN 1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - d. TC 2, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
 - e. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.
 4. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. C80.1, Rigid Steel Conduit - Zinc-Coated.
 - b. C80.3, Electrical Metallic Tubing - Zinc-Coated.
 5. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 6. Underwriters Laboratories, Inc. (UL):
 - a. 1, Standard for Safety Flexible Metal Conduit.
 - b. 6, Standard for Safety Rigid Metal Conduit.
 - c. 50, Standard for Safety Enclosures for Electrical Equipment.
 - d. 360, Standard for Safety Liquid-Tight Flexible Steel Conduit.
 - e. 467, Standard for Safety Grounding and Bonding Equipment.
 - f. 514A, Standard for Safety Metallic Outlet Boxes.
 - g. 514B, Standard for Safety Fittings for Cable and Conduit.
 - h. 651, Standard for Safety Schedule 40 and 80 Rigid PVC Conduit.
 - i. 797, Standard for Safety Electrical Metallic Tubing.

- j. 870, Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.
- k. 886, Standard for Safety Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Section FP – 03, Subsection 104.03.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification except:
 - 1) Conduit fittings.
 - 2) Support systems.
 - b. See Section 16010 for additional requirements.
 - 3. Fabrication and/or layout drawings:
 - a. Identify dimensional size of pull and junction boxes to be used.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. See Section 16010.

PART 2 - PRODUCTS

2.1 RIGID METALLIC CONDUITS

- A. Rigid Galvanized Steel Conduit (RGS):
 - 1. Mild steel with continuous welded seam.
 - 2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
 - 3. Threads galvanized after cutting.
 - 4. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
 - 5. Standards: NEMA/ANSI C80.1, UL 6.
- B. PVC-Coated Rigid Steel Conduit (PVC-RGS):
 - 1. Nominal 40 mil Polyvinyl Chloride Exterior Coating:
 - a. Coating: Bonded to hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1.
 - b. The bond between the PVC coating and the conduit surface: Greater than the tensile strength of the coating.
 - 2. Nominal 2 mil, minimum, urethane interior coating.
 - 3. Urethane coating on threads.
 - 4. Conduit: Epoxy prime coated prior to application of PVC and urethane coatings.
 - 5. Female Ends:
 - a. Have a plastic sleeve extending a minimum of 1 pipe diameter or 2 IN, whichever is less beyond the opening.
 - b. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used with it.
 - 6. Standards: NEMA/ANSI C80.1, UL 6, NEMA RN 1.
- C. Electrical Metallic Tubing (EMT):
 - 1. Mild steel with continuous welded seam.
 - 2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
 - 3. Internal coating: Baked lacquer, varnish, or enamel for a smooth surface.
 - 4. Standards: NEMA/ANSI C80.3, UL 797.

2.2 RIGID NON-METALLIC CONDUIT

- A. Schedules 40 (PVC-40) and 80 (PVC-80):
 - 1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.

2. Rated for direct sunlight exposure.
3. Fire retardant and low smoke emission.
4. Shall be suitable for use with 90 DegC wire and shall be marked "maximum 90 DegC".
5. Standards: NEMA TC 2, UL 651.

2.3 FLEXIBLE CONDUIT

- A. Flexible Galvanized Steel Conduit (FLEX):
 1. Formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
 2. Standard: UL 1.
- B. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):
 1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
 2. Extruded PVC outer jacket positively locked to the steel core.
 3. Liquid and vaportight.
 4. Standard: UL 360.

2.4 CONDUIT FITTINGS AND ACCESSORIES

- A. Fittings for Use with RGS:
 1. Locknuts:
 - a. Threaded steel or malleable iron.
 - b. Gasketed or non-gasketed.
 - c. Grounding or non-grounding type.
 2. Bushings:
 - a. Threaded, insulated metallic.
 - b. Grounding or non-grounding type.
 3. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
 4. Couplings:
 - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
 - b. Threadless type: Gland compression or self-threading type, concrete tight.
 5. Unions: Threaded galvanized steel or zinc plated malleable iron.
 6. Conduit bodies (ells and tees):
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. Cover:
 - 1) Clip-on type with stainless steel screws.
 - 2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
 7. Conduit bodies (round):
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.
 8. Expansion couplings:
 - a. 2 IN nominal straight-line conduit movement in either direction.
 - b. Galvanized steel with insulated bushing.
 - c. Gasketed for wet locations.
 - d. Internally or externally grounded.
 9. Expansion/deflection couplings:
 - a. 3/4 IN nominal straight-line conduit movement in either direction.
 - b. 30-degree nominal deflection from the normal in all directions.
 - c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.
 - d. Internally or externally grounded.
 - e. Watertight, raintight and concrete tight.

10. Standards: UL 467, UL 514B, UL 886.
- B. Fittings for Use with PVC-RGS:
1. The same material and construction as those fittings listed under paragraph "Fittings for Use with RGS " and coated as defined under paragraph "PVC Coated Rigid Steel Conduit (PVC-RGS)."
- C. Fittings for Use with EMT:
1. Connectors:
 - a. Straight, angle and offset types furnished with locknuts.
 - b. Zinc plated steel.
 - c. Insulated gland compression type.
 - d. Concrete and raintight.
 2. Couplings:
 - a. Zinc plated steel.
 - b. Gland compression type.
 - c. Concrete and raintight.
 3. Conduit bodies (ells and tees):
 - a. Body: Copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. Cover:
 - 1) Screw down type with steel screws.
 - 2) Gasketed or non-gasketed galvanized steel or copper free aluminum.
 4. Standard: UL 514B.
- D. Fittings for Use with FLEX:
1. Connector:
 - a. Zinc plated malleable iron.
 - b. Squeeze or clamp-type.
 2. Standard: UL 514B.
- E. Fittings for Use with FLEX-LT and FLEX-NM:
1. Connector:
 - a. Straight or angle type.
 - b. Metal construction, insulated and gasketed.
 - c. Composed of locknut, grounding ferrule and gland compression nut.
 - d. Liquid tight.
 2. Standards: UL 467, UL 514B.
- F. Fittings for Use with Rigid Non-Metallic PVC Conduit:
1. Coupling, adapters and conduit bodies:
 - a. Same material, thickness, and construction as the conduits with which they are used.
 - b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
 - c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
 2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
 3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.
- G. Weather and Corrosion Protection Tape:
1. PVC based tape, 10 mils thick.
 2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
 3. Used with appropriate pipe primer.

2.5 ALL RACEWAY AND FITTINGS

- A. Mark Products:
1. Identify the nominal trade size on the product.
 2. Stamp with the name or trademark of the manufacturer.

2.6 OUTLET BOXES

- A. Metallic Outlet Boxes:
 - 1. Hot-dip galvanized steel.
 - 2. Conduit knockouts and grounding pigtail.
 - 3. Styles:
 - a. 2 IN x 3 IN rectangle.
 - b. 4 IN square.
 - c. 4 IN octagon.
 - d. Masonry/tile.
 - 4. Accessories:
 - a. Flat blank cover plates.
 - b. Barriers.
 - c. Extension, plaster or tile rings.
 - d. Box supporting brackets in stud walls.
 - e. Adjustable bar hangers.
 - 5. Standards: NEMA OS 1, UL 514A.
- B. Cast Outlet Boxes:
 - 1. Zinc plated cast iron or die-cast copper free aluminum with manufacturers standard finish.
 - 2. Threaded hubs and grounding screw.
 - 3. Styles:
 - a. "FS" or "FD".
 - b. "Bell".
 - c. Single or multiple gang and tandem.
 - d. "EDS" or "EFS" for hazardous locations.
 - 4. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.
 - 5. Standards: UL 514A, UL 886.
- C. See Section 16140 for wiring devices, wallplates and coverplates.

2.7 PULL AND JUNCTION BOXES

- A. NEMA 1 Rated:
 - 1. Body and cover: 14 GA minimum, galvanized steel or 14 GA minimum, steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - 2. With or without concentric knockouts on four (4) sides.
 - 3. Flat cover fastened with screws.
- B. NEMA 4 Rated:
 - 1. Body and cover: 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - 2. Seams continuously welded and ground smooth.
 - 3. No knockouts.
 - 4. External mounting flanges.
 - 5. Hinged or non-hinged cover held closed with stainless steel screws and clamps.
 - 6. Cover with oil resistant gasket.

2.8 SUPPORT SYSTEMS

- A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:
 - 1. Material requirements:
 - a. Galvanized steel: ASTM A123 or ASTM A153.
 - b. Stainless steel: AISI Type 316.
 - c. PVC coat galvanized steel: ASTM A123 or ASTM A153 and 20 mil PVC coating.
- B. Single Conduit and Outlet Box Support Fasteners:
 - 1. Material requirements:
 - a. Zinc plated steel.

- b. Stainless steel.
- c. Malleable iron.
- d. PVC coat malleable iron or steel: 20 mil PVC coating.
- e. Steel protected with zinc phosphate and oil finish.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL

- A. Shall be in accordance with the requirements of:
 - 1. NFPA 70.
 - 2. Manufacturer instructions.
- B. Size of Raceways:
 - 1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
 - 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
 - a. Conduit: 3/4 IN.
- C. Field Bending and Cutting of Conduits:
 - 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
 - 2. Do not reduce the internal diameter of the conduit when making conduit bends.
 - 3. Prepare tools and equipment to prevent damage to the PVC coating.
 - 4. Degrease threads after threading and apply a zinc rich paint.
 - 5. Debur interior and exterior after cutting.
- D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.
- E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
 - 1. Repair galvanized components utilizing a zinc rich paint.
 - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.
 - a. Total nominal thickness: 40 mil.
 - 4. Repair surfaces which will be inaccessible after installation prior to installation.
- F. Remove moisture and debris from conduit before wire is pulled into place.
 - 1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.
 - 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
 - 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.
- H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.
- I. Fill openings in walls, floors, and ceilings and finish flush with surface.

3.2 RACEWAY ROUTING

- A. Raceways shall be routed in the field unless otherwise indicated.
 - 1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
 - 2. Run in straight lines parallel to or at right angles to building lines.
 - 3. Do not route conduits:
 - a. Through areas of high ambient temperature or radiant heat.
 - b. In suspended concrete slabs.
 - 4. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
 - 5. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 degrees of bends in the conduit run or in long straight runs to limit pulling tensions.
- B. All rigid conduits within a structure shall be installed exposed except as follows:
 - 1. As indicated on the Drawings.
 - 2. Concealed above gypsum wall board or acoustical tile suspended ceilings.
 - 3. Concealed within stud frame, poured concrete, concrete block and brick walls of an architecturally finished area.
 - 4. Embedded in floor slabs or buried under floor slabs where shown on the Contract Drawings.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 FT:
 - 1. Between instrumentation and telecommunication: 1 IN.
 - 2. Between instrumentation and 125 V, 48 V and 24 Vdc, 2 IN.
 - 3. Between telecommunication and 125 V, 48 V and 24 Vdc, 2 IN.
 - 4. Between 125 V, 48 V and 24 Vdc and 600 V and less AC power or control: 2 IN.
 - 5. Between 125 V, 48 V and 24 Vdc and greater than 600 Vac power: 2 IN.
 - 6. Between 600 V and less AC and greater than 600 Vac: 2 IN.
 - 7. Between process, gas, air and water pipes: 6 IN.
- D. Conduits shall be installed to eliminate moisture pockets.
 - 1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.
- G. Provide all required openings in walls, floors, and ceilings for conduit penetration.

3.3 RACEWAY APPLICATIONS

- A. Permitted Raceway Types Per Wire or Cable Types:
 - 1. Power wire or cables: All raceway types.
 - 2. Control wire or cables: All raceway types.
 - 3. Instrumentation cables: Metallic raceway except non-metallic may be used underground.
 - 4. Telecommunication cables: All raceway types.
- B. Permitted Raceway Types Per Area Designations:
 - 1. Dry areas:
 - a. RGS.
 - 2. Wet areas:
 - a. RGS.
- C. Permitted Raceway Types Per Routing Locations:
 - 1. In stud framed walls:
 - a. EMT.
 - 2. In concrete block or brick walls:
 - a. PVC-40.

3. Above acoustical tile ceilings:
 - a. EMT.
 4. Embedded in poured concrete walls and floors:
 - a. PVC-40.
 - b. RGS wrapped with factory applied weather and corrosion protection tape when emerging from concrete into areas designated as dry or wet.
 - c. PVC-RGS when emerging from concrete into areas designated as wet.
 5. Beneath floor slab-on-grade:
 - a. PVC-40.
 6. Through floor penetrations:
 - a. RGS wrapped with factory applied weather and corrosion protection tape when emerging from concrete into areas designated as dry, wet, corrosive or highly corrosive.
 - b. PVC-RGS in areas designated as wet, corrosive or highly corrosive.
 7. Direct buried conduits:
 - a. PVC-80.
 - b. 90 degree elbows for transitions to above grade:
 - 1) RGS wrapped with factory applied weather and corrosion protection tape.
 - 2) PVC-RGS.
 - c. Long sweeping bends greater than 15 degrees:
 - 1) RGS wrapped with factory applied weather and corrosion protection tape.
 - 2) PVC-RGS.
- D. FLEX conduits shall be installed for connections to light fixtures, HVAC equipment and other similar devices above the ceilings.
1. The maximum length shall not exceed:
 - a. 6 FT to light fixtures.
 - b. 3 FT to all other equipment.
- E. FLEX-LT and FLEX-NM conduits shall be install as the final conduit connection to light fixtures, motors, and other electrical equipment that is liable to vibrate.
1. The maximum length shall not exceed:
 - a. 6 FT to light fixtures.
 - b. 3 FT to motors.
 - c. 2 FT to all other equipment.

3.4 CONDUIT FITTINGS AND ACCESSORIES

- A. Conduit Seals:
1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.
- B. Rigid non-metallic conduit and fittings shall be joined utilizing solvent cement.
1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- C. Install Expansion Fittings:
1. Where conduits are exposed to the sun and conduit run is greater than 200 FT.
 2. Elsewhere as identified on the Drawings.
- D. Install Expansion/Deflection Fittings:
1. Where conduits enter a structure.
 - a. Except electrical manholes and handholes.
 - b. Except where the ductbank is tied to the structure with rebar.
 2. Where conduits span structural expansions joints.
 3. Elsewhere as identified on the Drawings.
- E. Threaded connections shall be made wrench-tight.
- F. Conduit joints shall be watertight:
1. Where subjected to possible submersion.

2. In areas classified as wet.
 3. Underground.
- G. Terminate Conduits:
1. In metallic outlet boxes:
 - a. RGS:
 - 1) Conduit hub and locknut.
 - 2) Insulated bushing and two (2) locknuts.
 - 3) Use grounding type locknut or bushing when required by NFPA 70.
 - b. EMT: Compression type connector and locknut.
 2. In NEMA 1 rated enclosures:
 - a. RGS:
 - 1) Conduit hub and locknut.
 - 2) Insulated bushing and two (2) locknuts.
 - 3) Use grounding type locknut or bushing when required by NFPA 70.
 - b. EMT: Compression type connector and locknut.
 3. When stubbed up through the floor into floor mount equipment:
 - a. With an insulated grounding bushing on metallic conduits.
 - b. With end bells on non-metallic conduits.
- H. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

3.5 CONDUIT SUPPORT

- A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
1. Dry or wet and/or hazardous areas:
 - a. Galvanized system consisting of: Galvanized steel channels and fittings, nuts and hardware and conduit clamps.
- B. Permitted single conduit support fasteners per area designations and conduit types:
1. Architecturally finished areas:
 - a. Material: Zinc plated steel, or steel protected with zinc phosphate and oil finish.
 - b. Types of fasteners: Spring type hangers and clips, straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - c. Provide anti-rattle conduit supports when conduits are routed through metal studs.
 2. Dry or wet:
 - a. Material: Zinc plated steel, stainless steel and malleable iron.
 - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
- C. Conduit Support General Requirements:
1. Maximum spacing between conduit supports per NFPA 70.
 2. Support conduit from the building structure.
 3. Do not support conduit from process, gas, air or water piping; or from other conduits.
 4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 LBS.
 - a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
 - b. Conduit hangers: Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
 - c. Do not use suspended ceiling support systems to support raceways.
 - d. Hangers in metal roof decks:
 - 1) Utilize fender washers.
 - 2) Not extend above top of ribs.

- 3) Not interfere with vapor barrier, insulation, or roofing.
5. Conduit support system fasteners:
 - a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
 - b. Do not use concrete nails and powder-driven fasteners.

3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.
2. See Section 16010 and the Drawings for area classifications.
3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.

B. Outlet Boxes:

1. Permitted uses of metallic outlet boxes:
 - a. Housing of wiring devices:
 - 1) Recessed in all stud framed walls and ceilings.
 - 2) Recessed in poured concrete, concrete block and brick walls of architecturally finished areas and exterior building walls.
 - b. Pull or junction box:
 - 1) Above gypsum wall board or acoustical tile ceilings.
 - 2) Above 10 FT in an architecturally finished area where there is no ceiling.
2. Permitted uses of cast outlet boxes:
 - a. Housing of wiring devices surface mounted in non-architecturally finished dry or wet areas.
 - b. Pull and junction box surface mounted in non-architecturally finished dry or wet areas.
3. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Section 16010.
4. Set device outlet boxes plumb and vertical to the floor.
5. Outlet boxes recessed in walls:
 - a. Install with appropriate stud wall support brackets or adjustable bar hangers so that they are flush with the face of the wall.
 - b. Locate in ungrouted cell of concrete block with bottom edge of box flush with bottom edge of block and flush with the face of the block.
6. Back-to-back are not permitted.
7. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.

C. Pull and Junction Boxes:

1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
 - a. Make covers of boxes accessible.
2. Permitted uses of NEMA 1 enclosure:
 - a. Pull or junction box surface mounted above removable ceiling tiles of an architecturally finished area.
3. Permitted uses of NEMA 3R or 4 enclosure:
 - a. Pull or junction box surface mounted in areas designated as wet.

END OF SECTION

SECTION 16135
ELECTRICAL: EXTERIOR UNDERGROUND

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Handhole.
 - b. Underground conduits and ductbanks.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 02221 – Trenching, Backfilling, and Compacting for Utilities.
 - 2. Section 16060 - Grounding.
 - 3. Section 16130 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. Standard Specifications for Highway Bridges.
 - 2. ASTM International (ASTM):
 - a. A536, Standard Specification for Ductile Iron Castings.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 5. Society of Cable Telecommunications Engineers (SCTE):
 - a. 77, Specification for Underground Enclosure Integrity.
 - 6. ASTM D 1557:
 - a. (2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu. m.))

1.3 DEFINITIONS

- A. Direct-buried conduit(s):
 - 1. Individual (single) underground conduit.
 - 2. Multiple underground conduits, arranged in one or more planes, in a common trench.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification.
 - 3. Fabrication and/or layout drawings:
 - a. Provide dimensional drawings of each manhole indicating all specified accessories and conduit entry locations.

PART 2 - PRODUCTS

2.1 HANDHOLES

- A. Prefabricated Composite Material Handholes:

1. Handhole body and cover: Fiberglass reinforced polymer concrete conforming to all test provisions of SCTE 77.
2. Minimum load ratings: SCTE 77 Tier 8.
3. Open bottom.
4. Stackable design as required for specified depth.
5. Cover:
 - a. Engraved legend of "COMMUNICATIONS".
 - b. Non-gasketed bolt down with stainless steel penta head bolts.
 - c. Lay-in non-bolt down, when cover is over 100 LBS.
 - d. One or multiple sections so the maximum weight of a section is 125 LBS.
6. Cover lifting hook: 24 IN minimum in length.

PART 3 - EXECUTION

3.1 GENERAL

- A. Drawings indicate the intended location of handholes and routing of direct buried conduit.
 1. Field conditions may affect actual routing.
- B. Handhole Locations:
 1. Approximately where shown on the Drawings.
 2. As required for pulling distances.
 3. As required to keep pulling tensions under allowable cable tensions.
 4. As required for number of bends in ductbank routing.
 5. Shall not be installed in a swale or ditch.
 6. Determine the exact locations after careful consideration has been given to the location of other utilities, grading, and paving.
 7. Locations are to be approved by the Engineer prior to excavation and placement or construction of manholes and handholes.
- C. Install products in accordance with manufacturer's instructions.
- D. Install handholes in conduit runs where indicated or as required to facilitate pulling of wires or making connections.

3.2 HANDHOLES

- A. Prefabricated Composite Material Handholes:
 1. For use in areas subjected to occasional non-deliberate vehicular traffic.
 2. Place handhole on a foundation of compacted 1/4 to 1/2 IN crushed rock or gravel a minimum of 8 IN thick and 6 IN larger than handholes footprint on all sides.
 3. Provide concrete encasement ring around handhole per manufacturers installation instructions (minimum of 10 IN wide x 12 IN deep).
 4. Install so that the surrounding grade is 1 IN lower than the top of the handhole.
 5. Size: As indicated on the Drawings or as required for the number and size of conduits.
 6. Provide cable rails and pulling eyes as needed.

3.3 UNDERGROUND CONDUITS

- A. General Installation Requirements:
 1. Do not place soil until conduits have been observed by the Engineer.
 2. During construction and after conduit installation is complete, plug the ends of all conduits.
 3. Provide conduit supports and spacers.
 - a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 IN and less: 3 FT.
 - 2) 1-1/4 to 3 IN: 5 FT.
 - 3) 3-1/2 to 6 IN: 7 FT.

- b. Securely anchor conduits to supports and spacers to prevent movement during placement of soil.
 4. Make conduit joints watertight and in accordance with manufacturer's recommendations.
 5. Accomplish changes in direction of runs exceeding a total of 15 degrees by long sweep bends having a minimum radius of 25 FT.
 - a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
 6. Furnish manufactured bends at end of runs.
 - a. Minimum radius of 18 IN for conduits less than 3 IN trade size and 36 IN for conduits 3 IN trade size and larger.
 7. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
 8. After the conduit run has been completed, pull a standard flexible mandrel having a length of not less than 12 IN and a diameter approximately 1/4 IN less than the inside diameter of the conduit through each conduit.
 - a. Then pull a brush with stiff bristles through each conduit to remove any foreign material left in conduit.
 9. Pneumatic rodding may be used to draw in lead wire.
 - a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
 - b. Extend cord 3 FT beyond ends of conduit.
 10. Place warning tape in trench directly over direct-buried conduit in accordance with the Drawings. Place tape 6" above conduit.
 11. Placement of conduits stubbing into handholes and manholes shall be located to allow for proper bending radiuses of the cables.
- B. Direct-Buried Conduit(s):
1. Install so that the top of the uppermost conduit, at any point:
 - a. Is not less than 30 IN below grade.
 - b. Is below pavement sub-grading.
 2. Provide a uniform minimum clearance of 2 IN between conduits or as required in Section 16130 for different cabling types.
 - a. Maintain the separation of multiple planes of conduits by one of the following methods:
 - 1) Install multilevel conduits with the use of conduit supports and separators to maintain the required separations, and backfill with flowable fill (100 PSI).
 - 2) Install the multilevel conduits one level at a time.
 - a) Each level is backfilled with the appropriate amount of soil and compaction. Compaction shall be to 90 percent of ASTM D1557.

END OF SECTION

SECTION 16140

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Light switches.
 - b. Receptacles.
 - c. Device wallplates and coverplates.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 16010 - Electrical: Basic Requirements.
 - 2. Section 16130 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. WD 1, General Color Requirements for Wiring Devices.
 - c. WD 6, Wiring Devices - Dimensional Requirements.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 20, Standard for Safety General Use Snap Switches.
 - b. 498, Standard for Safety Attachment Plugs and Receptacles.
 - c. 514A, Standard for Safety Metallic Outlet Boxes.
 - d. 894, Standard for Safety Switches for Use in Hazardous (Classified) Locations.
 - e. 943, Standard for Safety Ground-Fault Circuit-Interrupters.
 - f. 1010, Standard for Safety Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification.
 - b. See Section 16010 for additional requirements.

PART 2 - PRODUCTS

2.1 LIGHT SWITCHES

- A. General requirements unless modified in specific requirements paragraph of switches per designated areas or types:
 - 1. Toggle type, quiet action, Industrial Specification Grade.
 - 2. Self grounding with grounding terminal.
 - 3. Back and side wired.
 - 4. Solid silver cadmium oxide contacts.
 - 5. Rugged urea housing and one-piece switch arm.
 - 6. Rated 20 A, 120/277 Vac.
 - 7. Switch handle color: White.
 - 8. Types as indicated on the Drawings:
 - a. Single pole.

- b. Double pole.
 - c. 3-way.
- 9. Standards: UL 20, UL 514A, NEMA WD 6.
- B. Architecturally Finished Areas:
 - 1. Wallplate:
 - a. White colored high impact thermoplastic or nylon.
 - b. Single or multiple gang as required.
- C. Dry Non-architecturally Finished Areas:
 - 1. Coverplate:
 - a. Zinc plated malleable iron or galvanized steel.
 - b. Single or multiple gang as required.
- D. Wet Non-architecturally Finished Areas:
 - 1. Coverplate:
 - a. Gasketed zinc plated malleable iron or aluminum with stainless steel screws utilizing rocker, front mounted toggle or pull type switch.
 - b. Single or multiple gang as required.

2.2 RECEPTACLES

- A. General requirements unless modified in specific requirements paragraph of receptacles per designated areas:
 - 1. Straight blade, Industrial Specification Grade.
 - 2. Brass triple wipe line contacts.
 - 3. One-piece grounding system with double wipe brass grounding contacts and self grounding strap.
 - 4. Back and side wired.
 - 5. Rated 20 A, 125 Vac.
 - 6. High impact nylon body.
 - 7. Receptacle body color:
 - a. Normal power: White.
 - 8. Types as indicated on the Drawings:
 - a. Normal: Self grounding with grounding terminal.
 - b. Ground fault circuit interrupter: Feed-through type with test and reset buttons.
 - 9. Duplex or simplex as indicated on the Drawings.
 - 10. Configuration: NEMA 5-20R.
 - 11. Standards: UL 498, UL 514A, UL 943, NEMA WD 1, NEMA WD 6.
- B. Architecturally Finished Areas:
 - 1. Wallplate: White colored high impact thermoplastic or nylon.
- C. Dry Non-architecturally Finished Areas:
 - 1. Coverplate:
 - a. Zinc plated malleable iron or galvanized steel.
 - b. Single or multiple gang as required.
- D. Wet Non-architecturally Finished Areas:
 - 1. Coverplate: Weatherproof (NEMA 3R) while in use, gasketed, copper-free aluminum, 2.5 IN minimum cover depth.
- E. Exterior Locations:
 - 1. Coverplate: Weatherproof (NEMA 3R) while in use, gasketed, copper-free aluminum, 2.5 IN minimum cover depth.

2.4 DIMMER SWITCHES

- A. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. Provide positive off switch.
- B. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 10 percent of full brightness. Provide positive off switch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Mount devices where indicated on the Drawings and as scheduled in Section 16010.
- C. See Section 16130 for device outlet box requirements.
- D. Where more than one (1) receptacle is installed in a room, they shall be symmetrically arranged.
- E. Provide blank plates for empty outlets.

END OF SECTION

SECTION 16410
SAFETY SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Safety switches.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 1 - General Requirements.
 - 2. Section 16010 - Electrical: Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 98, Standard for Safety Enclosed and Dead-Front Switches.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification.
 - b. Provide a table that associates safety switch model number with connected equipment tag number.
 - c. See Section 16010 for additional requirements.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785.

PART 2 - PRODUCTS

2.1 SAFETY SWITCHES

- A. General:
 - 1. Non-fusible or fusible as indicated on the Drawings.
 - 2. Suitable for service entrance when required.
 - 3. NEMA Type HD heavy-duty construction.
 - 4. Switch blades will be fully visible in the OFF position with the enclosure door open.
 - 5. Quick-make/quick-break operating mechanism.
 - 6. Deionizing arc chutes.
 - 7. Double-break rotary action shaft and switchblade shall be manufactured as one (1) common component.
 - 8. Clear line shields to prevent accidental contact with line terminals.
 - 9. Operating handle:
 - a. Red and easily recognizable.
 - b. Padlockable in the OFF position
 - c. Interlocked to prevent door from opening when the switch is in the ON position with a defeater mechanism.

- B. Ratings:
 - 1. Horsepower rated of connected motor.
 - 2. Voltage and amperage: As indicated on Drawings.
 - 3. Short circuit withstand:
 - a. Non-fused: 10,000A.
- C. Accessories, when indicated in PART 3 or on the Drawings:
 - 1. Neutral kits.
 - 2. Ground lug kits.
 - 3. Auxiliary contact kits with 1 N.O. and 1 N.C. contact.
- D. Enclosures:
 - 1. NEMA 1 rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. With or without knockouts, hinged and lockable door.
 - 2. NEMA 3R rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. With or without knockouts, hinged and lockable door.
- E. Standards: NEMA KS 1, UL 98.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's instructions and recommendations.
- B. Switches shall be installed adjacent to the equipment they are intended to serve unless otherwise indicated on the Drawings.
- C. Permitted uses of NEMA 1 enclosure:
 - 1. Surface or flush mounted in areas designated dry in architecturally finished areas.
- D. Permitted uses of NEMA 3R enclosure:
 - 1. Surface mounted in exterior location.

END OF SECTION

SECTION 16411

TRANSFER SWITCHES

PART 1 - GENERAL

1.1 GENERAL

- A. Section Includes:
 - 1. Manual transfer switches.
- B. Related Sections include but are not necessarily limited to:
 - 1. Division 1 - General Requirements.
 - 2. Section 16010 - Electrical: Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 98, Standard for Safety Enclosed and Dead-Front Switches.
 - b. 1008, Standard for Safety Switch Equipment.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification:
 - b. See Section 16010 for additional requirements.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. See Section 16010.

PART 2 - PRODUCTS

2.1 MANUAL TRANSFER SWITCH

- A. Double throw load break rated with:
 - 1. Quick-make/quick-break operating mechanism.
 - 2. Deionizing arc chutes.
 - 3. Double-break rotary action shaft and switchblade shall be manufactured as one (1) common component.
 - 4. Clear line shields to prevent accidental contact with line terminals.
- B. Operating handle: Easily recognizable and padlockable in both positions.
- C. Wiring configuration to allow single load to be supplied by a normal or alternate source.
- D. Ratings:

1. Voltage and amperage: As indicated on Drawings.
 2. Short circuit withstand: Equal to or greater than the upstream equipment (22,000 amps symmetrical).
- E. Enclosure:
1. NEMA 3R rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. With or without knockouts, hinged and lockable door.
- F. Standards: NEMA KS 1, UL 98.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's recommendations and instructions.
- B. Connect as indicated in one-line diagram.
- C. Mounting of manual transfer switches: Wall-mounted.

END OF SECTION

SECTION 16412
SEPARATELY MOUNTED CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Separately mounted circuit breakers.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 16010 - Electrical: Basic Requirements.
 - 2. Section 16490 - Overcurrent and Short Circuit Protective Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 489, Standard for Safety Molded Case Circuit Breakers, Molded Case Switches, and Circuit Breaker Enclosures.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification:
 - b. Provide a table that associates equipment model number with equipment tag number.
 - c. See Section 16010 for additional requirements.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. NEMA 3R rated:
 - 1. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - 2. With or without knockouts, hinged or unhinged cover.
 - 3. Breaker is front operable and padlockable in the OFF position.
 - 4. Suitable for service entrance.
- B. Standards: UL 489.
- C. Overcurrent and short circuit protective devices:
 - 1. Molded case circuit breaker.
 - 2. See Section 16490 for overcurrent and short circuit protective device requirements.
 - 3. Factory installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's recommendations and instructions.
- B. Permitted uses of NEMA 3R enclosure:
 - 1. Surface mounted in areas designated as wet.

END OF SECTION

SECTION 16441 PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Lighting and appliance panelboards.
 - 2. Power distribution panelboards.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 16010 - Electrical: Basic Requirements.
 - 2. Section 16490 - Overcurrent and Short Circuit Protective Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. PB 1, Panelboards.
 - 2. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 3. Underwriters Laboratories, Inc. (UL):
 - a. 50, Standard for Safety Cabinets and Boxes.
 - b. 67, Standard for Safety Panelboards.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data.
 - a. Provide submittal data for all products specified in PART 2 of this Specification:
 - b. See Section 16010 for additional requirements.
 - 3. Fabrication and/or layout drawings:
 - a. Panelboard layout with alphanumeric designation, branch circuit breakers size and type, as indicated in the panelboard schedules.
- B. Operation and Maintenance Manuals:
 - 1. See Section 01785.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Standards: NEMA PB 1, NFPA 70, UL 50, UL 67.
- B. Ratings:
 - 1. Current, voltage, number of phases, number of wires as indicated on the Drawings.
 - 2. Panelboards rated 240 Vac or less: 10,000 amp minimum short circuit rating or as indicated in the schedule.
 - 3. Service Entrance Equipment rated when indicated on the Drawings.
- C. Construction:
 - 1. Interiors factory assembled and designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.

2. Multi-section panelboards: Feed-through or sub-feed lugs.
 3. Main lugs: Solderless type approved for copper and aluminum wire.
- D. Bus Bars:
1. Main bus bars:
 - a. Plated copper sized to limit temperature rise to a maximum of 65 DegC above an ambient of 40 DegC.
 - b. Drilled and tapped and arranged for sequence phasing of the branch circuit devices.
 2. Ground bus and isolated ground bus, when indicated on Drawings: Solderless mechanical type connectors.
 3. Neutral bus bars: Insulated 100 percent rated or 200 percent rated, when indicated on the Drawings and with solderless mechanical type connectors.
- E. Enclosure:
1. Boxes: Code gage galvanized steel, furnish without knockouts.
 2. Trim assembly: Code gage steel finished with rust inhibited primer and manufacturers standard paint inside and out.
 3. Lighting and appliance panelboard:
 - a. Trims supplied with hinged door over all circuit breaker handles.
 - b. Trims for surface mounted panelboards, same size as box.
 - c. Trims for flush mounted panelboards, overlap the box by 3/4 IN on all sides.
 - d. Doors lockable with corrosion resistant chrome-plated combination lock and catch, all locks keyed alike.
 - e. Nominal 20 IN wide and 5-3/4 IN deep with gutter space in accordance with NEC.
 - f. Clear plastic cover for directory card mounted on the inside of each door.
- F. Overcurrent and Short Circuit Protective Devices:
1. Main overcurrent protective device:
 - a. Molded case circuit breaker.
 2. Branch overcurrent protective devices:
 - a. Mounted molded case circuit breaker.
 3. See Section 16490 for overcurrent and short circuit protective device requirements.
 4. Factory installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated on Drawings, in accordance with the NEC, and in accordance with manufacturer's instructions.
- B. Support panelboard enclosures from wall studs or modular channels support structure, per Section 16010.
- C. Provide NEMA 1 rated enclosure as indicated on the Drawings.
- D. Provide each panelboard with a typed directory:
 1. Identify all circuit locations in each panelboard with the load type and location served.
 2. Mechanical equipment shall be identified by Owner-furnished designation if different than designation indicated on Drawings.
 3. Room names and numbers shall be final building room names and numbers as identified by the Owner if different than designation indicated on Drawings.

END OF SECTION

SECTION 16490
OVERCURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Low voltage circuit breakers.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 16010 - Electrical: Basic Requirements.
 - 2. Section 16080 - Acceptance Testing.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).
 - b. 399, Recommended Practice for Industrial and Commercial Power Systems Analysis (Brown Book).
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. AB 1, Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures.
 - 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 489, Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
 - b. 943, Standard for Safety for Ground-Fault Circuit-Interrupters.
 - c. 1066, Standard for Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See FP – 03, Subsection 104.03.
 - 2. Product technical data including:
 - a. Provide submittal data for all products specified in PART 2 of this Specification:
 - b. See Section 16010 for additional requirements.
- B. Operation and Maintenance Manual:
 - 1. See Section 01785.
 - a. The mechanics and administration of the submittal process.

PART 2 - PRODUCTS

2.1 CIRCUIT BREAKERS

- A. Molded Case Type:
 - 1. General:
 - a. Standards: NEMA AB 1, UL 489.
 - b. Over-center, toggle handle operated.

- c. Quick-make, quick-break, independent of toggle handle operation.
 - d. Manual and automatic operation.
 - e. All poles open and close simultaneously.
 - f. Three (3) position handle: On, off and tripped.
 - g. Molded-in ON and OFF markings on breaker cover.
 - h. One-, two- or three-pole as indicated on the Drawings.
 - i. Current and interrupting ratings as indicated on the Drawings.
 - j. Bolt on type.
2. Thermal magnetic type:
- a. Inverse time overload and instantaneous short circuit protection by means of a thermal magnetic element.
 - b. Frame size 150 amp and below:
 - 1) Non-interchangeable, non-adjustable thermal magnetic trip units.
 - c. Frame sizes 225 to 250 amp:
 - 1) Interchangeable and adjustable instantaneous thermal magnetic trip units.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Current and interrupting ratings as indicated on the Drawings.
- B. Series rated systems not acceptable.
- C. Devices shall be ambient temperature compensated.
- D. Circuit Breakers:
 - 1. Molded case circuit breakers shall incorporate the following, unless indicated otherwise on the Drawings:
 - a. Frame sizes 400 amp and less shall be thermal magnetic type.
- E. Testing:
 - 1. Acceptance testing: See Section 16080.

END OF SECTION

SECTION 16491
LOW VOLTAGE SURGE PROTECTION DEVICES (SPD)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Type 4 SPD - Medium exposure location (panelboard), externally mounted.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Institute of Electrical and Electronics Engineers (IEEE):
 - a. C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
 2. Institute of Electrical and Electronics Engineers/American National Standards Institute (IEEE/ANSI):
 - a. C62.41.1, Guide on the Surge Environment in Low-Voltage (1000V and Less) AC Power Circuits.
 - b. C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
 - c. C62.45, Recommended Practice on Surge Testing For Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits.
 3. Military Standard:
 - a. MIL-STD-220B, Method of Insertion-Loss Measurement.
 4. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. LS 1, Low Voltage Surge Protective Devices.
 5. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 6. Underwriters Laboratories, Inc. (UL):
 - a. 1283, Standard for Electromagnetic Interference Filters.
 - b. 1449, Standard for Safety Transient Voltage Surge Suppressors.
- B. Qualifications:
1. Provide devices from a manufacturer who has been regularly engaged in the development, design, testing, listing and manufacturing of SPDs of the types and ratings required for a period of ten years or more and whose products have been in satisfactory use in similar service.
 - a. Upon request, suppliers or manufacturers shall provide a list of not less than three (3) customer references showing satisfactory operation.

1.3 DEFINITIONS

- A. Clamping Voltage:
1. The applied surge shall be induced at the 90 degree phase angle of the applied system frequency voltage.
 2. The voltage measured at the end of the 6 IN output leads of the SPD and from the zero voltage reference to the peak of the surge.
- B. Let-Through Voltage:
1. The applied surge shall be induced at the 90 degree phase angle of the applied system frequency voltage.
 2. The voltage measured at the end of the 6 IN output leads of the SPD and from the system peak voltage to the peak of the surge.

- C. Maximum Continuous Operating Voltage (MCOV): The maximum steady state voltage at which the SPD device can operate and meet its specification within its rated temperature.
- D. Maximum Surge Current:
 1. The maximum 8 x 20 microsecond surge current pulse the SPD device is capable of surviving on a single-impulse basis without suffering either performance degradation or more than 10 percent deviation of clamping voltage at a specified surge current.
 2. Listed by mode, since number and type of components in any SPD may vary by mode.
- E. MCC: Motor Control Center.
- F. Protection Modes: This parameter identifies the modes for which the SPD has directly connected protection elements, i.e., line-to-neutral (L-N), line-to-line (L-L), line-to-ground (L-G), neutral-to-ground (N-G).
- G. Surge Current per Phase:
 1. The per phase rating is the total surge current capacity connected to a given phase conductor.
 - a. For example, a wye system surge current per phase would equal L-N plus L-G; a delta system surge current per phase would equal L-L plus L-G.
 - b. The N-G mode is not included in the per phase calculation.
- H. System Peak Voltage: The electrical equipment supply voltage sine wave peak (i.e., for a 480/277 V system the L-L peak voltage is 679V and the L-N peak voltage is 392 V).

1.4 SUBMITTALS

- A. Shop Drawings:
 1. See FP – 03, Subsection 104.03.
 2. Product technical data including:
 - a. Manufacturer's qualifications.
 - b. Standard catalog cut sheet.
 - c. Electrical and mechanical drawing showing unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit.
 - d. Testing procedures and testing equipment data.
 - e. Create a Product Data Sheet for each different model number of SPD provided (i.e., Model XYZ with disconnect and Model XYZ without disconnect, each require a Product Data Sheet).
 - 1) Data in the Product Data Sheet heading:
 - a) SPD Type Number per PART 2 of the Specification.
 - b) Manufacturer's Name.
 - c) Product model number.
 - 2) Data in the Product Data Sheet body:
 - a) Column one: Specified value/feature of every paragraph of PART 2 of the Specification.
 - b) Column two: Manufacturer's certified value confirming the product meets the specified value/feature.
 - c) Name of the nationally recognized testing laboratory that performed the tests.
 - d) Warranty information.
 - 3) Data in the Product Data Sheet closing:
 - a) Signature of the manufacturer's official (printed and signed).
 - b) Title of the official.
 - 4) Date of signature.
- B. Operation and Maintenance Manual:
 1. See Section 10785.
 2. Warranty.

1.5 WARRANTY

- A. Minimum of a five (5) year Warranty from date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer's installation, operation and maintenance instructions.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Standards: IEEE/ANSI C62.41.1, IEEE/ANSI C62.41.2, IEEE/ANSI C62.45, NEMA LS 1, MIL-STD 220B, UL 1283, UL 1449.

2.2 TYPE 4 SPD

- A. Product:
 - 1. Externally mounted next to Panelboard.
 - 2. Hybrid solid state high performance suppression system.
 - a. Do not use gas tubes, spark gaps or other suppression system components which might short or crowbar the line resulting in interruption of normal power flow to connected loads.
 - 3. Do not connect multiple SPD modules in series to achieve the specified performance.
 - 4. Designed for parallel connection.
 - 5. Enclosure:
 - a. Metallic NEMA 4 or 12 for interior locations.
 - 6. Field connection:
 - a. Mechanical or compression lugs for each phase, neutral and ground that will accept #10 through #1/0 conductors. OR
 - b. Preinstalled lead conductors: Size per manufacturer, length as required with a maximum of 5 FT.
 - 7. Device monitor:
 - a. Long-life, solid state, externally visible indicators and Form C dry contact(s) that monitor the on-line status of each mode of the units suppression filter system or power loss in any of the phase.
 - b. A fuse status only monitor system is not acceptable.
 - 8. Accessories (when specifically specified): Unit mounted disconnect switch.
- B. Operating Voltage: Nominal unit operating voltage and configuration as indicated on the Drawings.
- C. Modes of Protection: All modes.
 - 1. Single phase (2 pole): L-L, L-N, L-G and N-G.
- D. Maximum Continuous Operating Voltage: Less than 130 percent of system peak voltage.
- E. Operating Frequency: 45 to 65 Hz.
- F. Maximum Surge Current: 160,000 A per phase, 80,000 A per mode minimum.
- G. Minimum Repetitive Surge Current Capacity: 4000 IEEE C High or B combination waveform impulses with no degradation of more than 10 percent deviation of the clamping voltage.
- H. SPD Protection:
 - 1. Integral unit level and/or component level overcurrent fuses and sustained overvoltage thermal cutout device.
 - 2. An IEEE B combination wave shall not cause the fuse to open and render the SPD inoperable.
- I. Maximum Clamping Voltages: Dynamic test at the 90 degree phase angle including 6 IN lead length and measured from the zero voltage reference:

System Voltage	Test	IEEE C62.41	UL 1449
BICY 61948 / 110159			16491 - 3 LOW VOLTAGE SURGE PROTECTION DEVICES (SPD)

	Mode	B Comb. Wave	B Ring Wave	
L-L < 250 V	L-L	1000 V	700 V	800 V
L-N < 150 V	L-N	600 V	400 V	500 V
	L-G	800 V	550 V	600 V
	N-G	800 V	550 V	600 V

- J. EMI-RFI Noise Rejection: Attenuation greater than 30 dB for frequencies between 100 kHz and 100 MHz.

2.3 SOURCE QUALITY CONTROL

- A. SPD approvals and ratings shall be obtained by manufacturers from nationally recognized testing laboratories.
- B. The SPD are to be tested as a complete SPD system including:
 - 1. Integral unit level and/or component level fusing.
 - 2. Neutral and ground shall not be bonded during testing.
 - 3. 6 IN lead lengths.
 - 4. Integral disconnect switch when provided.
- C. The “as installed” SPD system including the manufacturers recommended circuit breaker, the SPD is connected to, will not open when tested with a IEEE C3 combination waveform.
- D. Tests to be performed in accordance with IEEE/ANSI C62.45:
 - 1. Clamping voltage performance testing using IEEE C62.41 Category waveforms.
 - 2. Single pulse surge current capacity test.
 - 3. Repetitive surge current capacity testing.
 - 4. Spectrum analysis for EMI-RFI noise rejection.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Type 4 SPD:
 - 1. Mounting options:
 - a. On wall or support structure adjacent to the equipment to be protected with leads routed through conduit.
 - 2. Install leads as short and straight as possible.
 - 3. Maximum lead length: 5 FT.
 - 4. Minimum lead size:
 - a. Type 4 SPD: #2 stranded AWG.
 - 5. When conduit connection is used, provide a minimum of four (4) twists per foot in the lead conductors and install in NEC sized conduit.
 - 6. Connect leads to the equipment to be protected by the following means:
 - a. Through a circuit breaker or molded case switch mounted in the equipment.
 - 1) Use manufacturer recommended circuit breaker size.

END OF SECTION

SECTION 16500
INTERIOR AND EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Material and installation requirements for:
 - a. Interior building lighting fixtures.
 - b. Exterior building and site lighting fixtures.
 - c. Lamps.
 - d. Ballasts.
 - e. Lighting bollards
 - f. Lighting control.
- B. Related Sections include but are not necessarily limited to:
1. Section 16010 - Electrical: Basic Requirements.
 2. Section 16120 - Wire and Cable - 600 Volt and Below.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Certified Ballast Manufacturers (CBM).
 2. Federal Communications Commission (FCC):
 - a. Rules and Regulations, Part 18:
 - 1) Code of Federal Regulations (CFR), 47 CFR 18, Industrial, Scientific and Medical Equipment.
 3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
 4. National Electric Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000Volts Maximum).
 - b. C82.1, For Lamp Ballast - Line Frequency Fluorescent Lamp Ballast.
 - c. C82.4, Ballasts for High-Intensity Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).
 - d. C82.11, High Frequency Fluorescent Lamp Ballast - Supplements.
 - e. LE 4, Recessed Luminaires, Ceiling Compatibility.
 5. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 101, Life Safety Code.
 6. Underwriters Laboratories, Inc. (UL):
 - a. 248-4, Low-Voltage Fuses - Part 4: Class CC Fuses.
 - b. 924, Standard for Safety Emergency Lighting and Power Equipment.
 - c. 935, Standard for Safety Fluorescent Lamp Ballasts.
 - d. 1029, Standard for Safety High-Intensity-Discharge Lamp Ballasts.
 - e. 1598, Standard for Safety for Luminaires.
 7. United States Department of Energy (USDOE):
 - a. EPAct, the National Energy Policy Act.

1.3 SUBMITTALS

- A. Shop Drawings:
1. See FP – 03, Subsection 104.03.
 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification:

- b. Identify fixtures by Fixture Schedule number.
- c. Fixture data sheet including:
 - 1) Photometric performance data including candlepower distribution and coefficient of utilization (CU) table.
 - 2) Fixture EPA's for pole mounted fixtures.
- d. Bollard data shall include:
 - 1) Anchor bolt template.
- e. See Section 16010 for additional requirements.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. All lighting fixtures and electrical components:
 - 1. UL labeled.
 - 2. Fixtures complete with lamps and ballasts.
- B. Provide standard plaster frame for all recessed lighting fixtures installed in plaster walls or ceilings.
 - 1. Design, finish and fabricate material to preclude possibility of rust stain in plaster.
- C. No live parts normally exposed to contact.
- D. When intended for use in wet areas: Mark fixtures "Suitable for wet locations."
- E. When intended for use in damp areas: Mark fixtures "Suitable for damp locations" or "Suitable for wet locations."

2.2 LIGHT FIXTURES

- A. Fluorescent:
 - 1. UL 1598.
 - 2. NEMA LE 4 for recessed locations.
 - 3. Lenses: As indicated in Fixture Schedule, with the following minimums:
 - a. Troffer: 100 percent virgin acrylic, conical shaped, female 0.1875 IN, square based prisms, aligned 45 degrees to the length and width, 0.125 IN nominal thickness.
 - 4. Finish:
 - a. Manufacturer's standard polyester, acrylic enamel or epoxy powder coating applied after fabrication.
 - b. Manufacturer's standard color or special color specified in Fixture Schedule.
 - 5. Prewired and provided with lamps that are properly mated to the ballast operating characteristics.
- B. High Intensity Discharge:
 - 1. UL 1598.
 - 2. Finish:
 - a. Manufacturer's standard polyester, acrylic enamel or epoxy powder coating applied after fabrication.
 - b. Manufacturer's standard color or special color specified in Fixture Schedule.
 - 3. Prewired and provided with lamps that are properly mated to the ballast operating characteristics.
 - 4. Provided with safety chain.
- C. Exit Signs and Emergency Lighting Units:
 - 1. UL 924.
 - 2. NFPA 101.

2.3 LAMPS

- A. Incandescent:
 - 1. Type as indicated in fixture schedule.
 - 2. Meet the current Federal Energy Standards (EPA 1992).
- B. Fluorescent:
 - 1. T8 (265 mA) instant or rapid-start medium bipin lamps.
 - a. Correlated color temperature of 3500 degrees Kelvin.
 - b. Minimum color rendering index (CRI) of 70.
 - c. Minimum initial lumen ratings for each lamp type shall be:
 - 1) 2800 lumens for 48 IN, 32 watt F32T8 lamp.
 - 2. T4 twin-tube, quad-tube, and/or triple twin-tube compact fluorescent lamps.
 - a. Correlated color temperature of 3500 degrees Kelvin.
 - b. Minimum color rendering index (CRI) of 80.
 - c. Minimum initial lumen ratings for preheat 2-pin twin-tube lamps with a G23 or GX23 base shall be:
 - 1) 800 lumens for 7.1 IN, 13 watt CF13TT lamp.
 - d. Minimum initial lumen ratings for rapid-start 4-pin quad-tube lamps with a G24q-1, G24q-2 or G24q-3 base shall be:
 - 1) 1700 lumens for 6.5 IN, 26 watt CF26QT lamp.
 - e. Minimum initial lumen ratings for rapid-start 4-pin triple twin-tube lamps with a GX24q-2 or GX24q-3 base shall be:
 - 1) 2200 lumens for 5.8 IN, 32 watt CF32TTT lamp.
- C. High Intensity Discharge (HID) Lamps:
 - 1. Metal halide lamps:
 - a. Metal halide lamps shall be pulse-start type.
 - 1) If used in an open luminaire, the lamp shall be rated for use in an open fixture and incorporate a protective arc tube shroud design.
 - b. Clear lamps:
 - 1) Correlated color temperature of 4000 degrees Kelvin.
 - 2) Minimum color rendering index (CRI) of 65.
 - c. Minimum initial lumen ratings for metal halide lamps with a medium base in a vertical position shall be:
 - 1) 5600 lumens for 70 watt, ED-17 (ANSI M98) clear lamp.
 - 2. Uncoated (clear) unless identified as coated in the fixture schedule.
 - 3. The specified fixture in the fixture schedule shall dictate the required lamp operating position and base type.
 - 4. Provide lamps that have the correct bulb shape for the fixture specified.

2.4 BALLASTS

- A. Fluorescent High Frequency Electronic Ballasts:
 - 1. UL 935.
 - 2. "High Frequency" electronic operating lamps at a frequency of 20 KHz or higher without visible flicker.
 - 3. Power factor: Greater than 90 percent.
 - 4. Input current total harmonic distortion (THD) of less than 20 percent.
 - 5. Lamp current crest factor: Less than 1.7, in accordance with lamp manufacturer's recommendations and ANSI C82.11.
 - 6. Instant start with lamps wired in parallel.
 - 7. Support a sustained short to ground or open circuit of any output leads without damage to the ballast.
 - 8. Ballast Factor: Greater than 0.85 per ANSI C82.11.
 - 9. Audible noise rating: Class A or better.
 - 10. Operation in ambient temperatures up to 40 DegC (105 DegF) without damage.
 - 11. Light output to remain constant for a line voltage fluctuation of +5 percent.

12. Meet the requirements of the FCC Rules and Regulations, Part 18 (47 CFR 18), for non-consumer equipment for EMI and RFI.
 13. Meet ANSI C82.11 standards regarding harmonic distortion.
 14. Meet IEEE C62.41 Cat. A for transient protection.
 15. Comply with all applicable state and federal efficiency standards.
 16. UL listed, Class P.
 17. Contain no Polychlorinated Biphenyls (PCB's).
- B. Fluorescent Emergency Ballasts:
1. UL 924, NFPA 101.
 2. High temperature, 24 Watt-hour, maintenance-free nickel cadmium battery with charger.
 3. Charging indicator light (LED) to monitor the charger and battery.
 4. Double-pole test switch.
 5. Light one (1) lamp for 90 minutes.
 6. Dual input voltage (120/277V), 4 Watts input.
 7. Compatible with the install lamp type.
 8. Initial lumen output: 1400.
 9. Contain no Polychlorinated Biphenyls (PCB's).
- C. High Intensity Discharge Ballasts:
1. ANSI C82.4, UL 1029.
 2. Metal halide:
 - a. Input voltage variation: +10 percent.
 - b. Maximum lamp regulation spread: 20 percent.
 - c. Minimum power factor: 90 percent.
 - d. Starting current: Not greater than operating current.
 - e. Maximum input voltage dip: 40 percent.
 - f. Crest factor: 1.5 to 1.8.
 - g. Types:
 - 1) Lead-type regulators: Constant wattage autotransformer (CWA) and pulse start.
 - 2) Lag-type regulators: Magnetic regulator and pulse start.
 - h. Contain no Polychlorinated Biphenyls (PCB's).
 3. Ballasts for interior use:
 - a. Encased and potted type.
 - b. Audible noise rating of B or better.
 - c. Built-in automatic resetting thermal protection switch.
 4. Ballasts for exterior use:
 - a. Starting temperature: 0 DegF.

2.5 MAINTENANCE MATERIALS

- A. Furnish a minimum of 2 or 10 percent of total of each type and wattage of lamps, whichever is greater.
- B. Spare parts are to be stored in a box clearly labeled as to its contents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate fixture types with ceiling construction.
 1. Provide mounting hardware for the ceiling system in which the fixture is to be installed.
- B. Fasten lighting fixtures supported by suspended ceiling systems to ceiling framing system with hold down clips.
- C. Provide mounting brackets and/or structural mounting support for wall-mounted fixtures.
 1. Do not support fixture from conduit system.

2. When fixtures are supported from outlet boxes, install per NFPA 70.
 3. Supports for fixtures mounted on exterior walls shall not be attached to exterior face of the wall.
- D. Locate fixtures in accordance with reflected ceiling plans.
- E. Locate in exact center of tile when indicated.
1. Relocate misplaced fixtures and replace damaged ceiling materials.
- F. Mount lighting fixtures at heights indicated in Section 16010 or per fixture schedule or as indicated on Drawings.
- G. Install exterior fixtures so that water can not enter or accumulate in the wiring compartment.
- H. Ground fixtures and ballasts.

3.2 ADJUST AND CLEAN

- A. Replace all inoperable lamps with new lamps prior to final acceptance.
- B. Aim all emergency lighting units, so that, the path of egress is illuminated.

END OF SECTION

Florida Department of
Environmental Protection**Memorandum**

TO: Florida State Clearinghouse

FROM: Robert W. Hall, Environmental Specialist
Office of Intergovernmental Programs

DATE: January 31, 2003

PROJECT: U.S. Department of the Interior, National Park Service, Notice of Preparation of Environmental Assessment (EA) for Construction of a Multi-Agency Welcome Facility on U.S. Route 41, Big Cypress National Preserve, Collier County

SAI: FL200212053131

The Department has reviewed the above-referenced project and offers the following comments.

The project will require an Environmental Resource Permit (ERP) from the South Florida Water Management District (SFWMD).

A wastewater collection system permit will be required from the Department of Environmental Protection (DEP) if the building connects to the existing wastewater treatment plant. The wastewater permit will be processed by the DEP office in Ft. Myers. A potable water distribution system permit may also be required, depending on the exact method of connection. The applicant should check with the DEP office in Ft. Myers on required permits when detailed plans have been finalized.



Department of Environmental Protection

Jeb Bush
Governor

South District
P.O. Box 2549
Fort Myers, Florida 33902-2549

Colleen M. Castille
Secretary

VIA ELECTRONIC MAIL

In the Matter of an
Application for Permit by:

Permittee:

National Park Service, Big Cypress National Preserve
Pedro Ramos
HCR 61 Box 110
Ochopee, Florida 34141
Pedro_ramos@nps.gov

Permit Number: 54796-002-DWC

Issued: October 17, 2005

Expires: October 16, 2010

Project: Big Cypress Visitor Center

Connected to: Big Cypress National Preserve WWTP

County: Collier

NOTICE OF PERMIT ISSUANCE

Enclosed is Permit Number 54796-002-DWC to construct a sewage collection/transmission system pursuant to Chapter 403, Florida Statutes (FS) and Florida Administrative Code (F.A.C.) Rules 62-4 and 62-604.

The Department's proposed agency action shall become final unless a timely petition for an administrative hearing is filed under Sections 120.569 and 120.57, Florida Statutes, within 14 days of receipt of notice. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received by the clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000.

Petitions by the applicant or any of the persons listed below must be filed within 14 days of receipt of this written notice. Petitions filed by any persons other than those entitled to written notice under Section 120.60(3), Florida Statutes, must be filed within 14 days of publication of the notice or within 14 days of receipt of the written notice, whichever occurs first. Under Section 120.60(3), Florida Statutes, however, any person who has asked the Department for notice of agency action may file a petition within 14 days of receipt of such notice, regardless of the date of publication.

The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within 14 days of receipt of notice shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, Florida Statutes. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, Florida Administrative Code.

A petitioner that disputes the material facts on which the Department's action is based must contain the following information:

- (a) The name, address, and telephone number of each petitioner, the name, address, and telephone number of the petitioner's representative, if any; the Department permit identification number and the county in which the subject matter or activity is located;
- (b) A statement of how and when each petitioner received notice of the Department action;

PERMITTEE: Big Cypress Visitor Center

PERMIT NUMBER: 54796-002-DWC

- (c) A statement of how each petitioner's substantial interests is affected by the Department action,
- (d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
- (e) A statement of facts that the petitioner contends warrant reversal or modification of the Department action;
- (f) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and
- (g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wants the Department to take.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department have the right to petition to become a party to the proceeding, in accordance with the requirements set forth above.

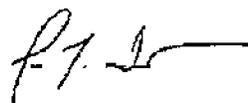
Mediation under Section 120.573, Florida Statutes, is not available for this proceeding.

This permit action is final and effective on the date filed with the clerk of the Department unless a petition is filed in accordance with the above. Upon the timely filing of a petition this permit will not be effective until further order of the Department.

Any party to the permit has the right to seek judicial review of the permit action under Section 120.68, Florida Statutes, by the filing of a notice of appeal under Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000; and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days from the date when this permit action is filed with the clerk of the Department.

Executed in Fort Myers, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION



Jon M. Iglehart
Director of District Management

PERMITTEE: Big Cypress Visitor Center

PERMIT NUMBER:

54796-002-DWC

CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this NOTICE OF PERMIT ISSUANCE and all copies were mailed before the close of business on October 17, 2005 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Rose Lynn J. LaParbera

10/17/05

Clerk

Date

JMI/AA/rjl

Copy furnished to:

Vaughn Soares, P.E. cwi@civilworks.com



Department of Environmental Protection

Jeb Bush
Governor

South District
P.O. Box 2549
Fort Myers, Florida 33902-2549

Colleen M. Castilla
Secretary

VIA ELECTRONIC MAIL

In the Matter of an
Application for Permit by:

Permittee:

National Park Service, Big Cypress National Preserve
Pedro Ramos
HCR 61 Box 110
Ochopee, Florida 34141
Pedro_ramos@nps.gov

Permit Number: 54796-002-DWC

Issued: October 17, 2005

Expires: October 16, 2010

Project: Big Cypress Visitor Center

Connected to: Big Cypress National Preserve WWTP

County: Collier

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-4 and 62-604, Florida Administrative Code (F.A.C).

The above named permittee is hereby authorized to construct the facilities shown on the application and other documents on file with the Department and made a part hereof and specifically described as follows:

DESCRIPTION OF PROJECT: 87 LF of 4" PSM SDR-35 PVC or C-900 PVC, 138 LF of 3" private PSM SDR-35 PVC or C-900 PVC, 157 LF of 2" Private Sanitary PSM SDR-35 PVC or C-900 PVC, 110 LF of 4" DI FM, 793 LF of 4" C-900 FM, 1 Private Pump Station, per application materials received October 11, 2005, with additional materials last received October 14, 2005.

LOCATION OF PROJECT: Section 33, Township 52S, Range 30E in Ochopee, Collier County, Florida.

IN ACCORDANCE WITH: The limitations, requirements and other conditions set forth in this permit.

PERMIT CONDITIONS:

1. This permit is subject to the general conditions of Rule 62-4.160, F.A.C., as applicable. This rule is available at the Department's Internet site at: <http://www.dep.state.fl.us/water/wastewater/rules.htm#domestic> [62-4.160, 5-1-03].
2. Upon completion of construction of the collection/transmission system project, and before placing the facilities into operation for any purpose other than testing for leaks or testing equipment operation, the permittee shall submit to the Department's South District Office at P.O. Box 2549, Fort Myers, FL 33902-2549 (by mail) or 2295 Victoria Avenue, Suite 364, Fort Myers, FL 33901 (by other delivery service) Form 62-604.300(8)(b), Request for Approval to Place a Domestic Wastewater Collection/Transmission System into Operation. This form is available at the Department's Internet site at: <http://www.dep.state.fl.us/water/wastewater/forms.htm> [62-604.700(2), 11-6-03].

PERMITTEE: Big Cypress Visitor Center

PERMIT NUMBER: 54796-002-DWC

PERMIT CONDITIONS:

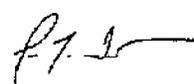
- 3. The new or modified collection/transmission facilities shall not be placed into service until the Department clears the project for use [62-604.700(3), 11-6-03].
- 4. Permit revisions shall only be made in accordance with Rule 62-4.050(4)(s), F.A.C. Request for revisions shall be made to the Department in writing and shall include the appropriate fee. Revisions not covered under Rule 62-4.050(4)(s), F.A.C., shall require a new permit [62-604.600(8), 11-6-03].
- 5. Abnormal events shall be reported to the Department's South District Office in accordance with Rule 62-604.550, F.A.C. For unauthorized spills of wastewater in excess of 1000 gallons per incident, or where information indicates that public health or the environment may be endangered, oral reports shall be provided to the STATE WARNING POINT TOLL FREE NUMBER (800) 320-0519 as soon as practical, but no later than 24 hours from the time the permittee or other designee becomes aware of the circumstances. Unauthorized releases or spills less than 1000 gallons per incident are to be reported orally to the Department's South District Office at phone number (239)-332-6975 within 24 hours from the time the permittee, or other designee becomes aware of the circumstances [62-604.550, 11-6-03].

SPECIFIC PERMIT CONDITIONS

- 1. All new wastewater collection/transmission systems and modifications of existing systems shall be located at least 100 feet from a public drinking water supply well.
- 2. Except as provided in Section 62-604.400 (3), F.A.C., sewer pipes and force mains should cross under water mains.
- 3. For sewer crossings, all crossings shall be arranged so that the sewer pipe joints are equidistant as far as possible from the water main joints. At crossings, all vacuum sewer joints must maintain a minimum distance of 3 feet from water main joints. All gravity or pressure type sanitary sewers and wastewater force main joints shall maintain a minimum distance of 6 feet from water main joints.
- 4. Except as provided under 62-604.400 (3), F.A.C. all sewers and force mains shall be laid at least 10 feet horizontally (outside to outside) from a water main and 3 feet minimum (outside to outside) from a reclaimed water pipe permitted under Part III of Chapter 62-610. F.A.C.
- 5. A vertical separation of at least 18 inches must be maintained when a sewer pipe crosses a water main, except as provided under Section 62-604.400(3), F.A.C.

Executed in Fort Myers, Florida,

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION



Jon M. Iglehart
Acting Director of District Management

10/17/05

Date Signed

JMI/AA/rjl



Department of Environmental Protection

Jeb Bush
Governor

South District
P.O. Box 2549
Fort Myers, Florida 33902-2549

Colleen M. Castille
Secretary

September 13, 2005

Pedro Ramos, Deputy Superintendent
Big Cypress National Preserve
HCR 61, Box 110
Ochopee, FL 34141

Re: Collier County – PW
Notification of Use of General Permit
Permit No. 251241-002-DSGP
Visitor Information Center
(Everglades Shores WTP)
Southwest Coast EMA

Dear Mr. Ramos:

In response to your request, this letter is to advise you that the Department has received your notice of intent to use a general permit as provided in Rule 62-555, Florida Administrative Code (F.A.C.) to construct an extension to a public water supply distribution system and does not object to your use of such general permit.

This authorization does not relieve you from the necessity of obtaining any and all other permits necessary. Specifically, this authorization does not constitute approval for work within wetland areas or alteration of mangroves subject to Chapters 373 and 403, F.S.

Please be advised that you are required to abide by all conditions in Rules 62-4.510 through 62-4.540, F.A.C., the general requirements for general permits, and Rule 62-555.405, F.A.C. This general permit will expire September 13, 2010. If the project has been started but is not complete by that time, a new permit must be obtained before the expiration date to continue work on the project per F.A.C. Rule 62-4.030.

Sincerely,

Abdul B. Ahmadi, Ph.D., P.E.
Water Facilities Administrator

ABA/HBW
Cc: Vaughn Soares, P.E., cwi@civilworks.com



**SOUTH FLORIDA WATER MANAGEMENT DISTRICT
 ENVIRONMENTAL RESOURCE
 STANDARD GENERAL PERMIT NO. 11-02076-P
 DATE ISSUED: April 11, 2008**

Form #0941
 08/95

PERMITTEE: NATIONAL PARK SERVICE BIG CYPRESS
 NATIONAL PRESERVE
 33100 TAMIAMI TRAIL E
 OCHOPEE, FL 34141

PROJECT DESCRIPTION: This application is a request for a modification of an Environmental Resource Permit to authorize Construction and Operation of a surface water management system serving a recreational project with associated offsite turn lane improvements and mitigation area, totaling 3.90 acres, known as Tamiami Trail Welcome Center, with discharge into Big Cypress Basin National Preserve via the existing canal system.

PROJECT LOCATION: COLLIER COUNTY, SEC 33 TWP 52S RGE 30E

PERMIT DURATION: See Special Condition No:1. See attached Rule 40E-4.321, Florida Administrative Code.

This is to notify you of the District's agency action concerning Notice of Intent for Permit Application No. 070607-38, dated June 7, 2007. This action is taken pursuant to Rule 40E-1.603 and Chapter 40E-40, Florida Administrative Code (F.A.C.).

Based on the information provided, District rules have been adhered to and an Environmental Resource General Permit is in effect for this project subject to:

1. Not receiving a filed request for a Chapter 120, Florida Statutes, administrative hearing.
2. the attached 19 General Conditions (See Pages : 2 - 4 of 7),
3. the attached 23 Special Conditions (See Pages : 5 - 7 of 7) and
4. the attached 5 Exhibit(s)

Should you object to these conditions, please refer to the attached "Notice of Rights" which addresses the procedures to be followed if you desire a public hearing or other review of the proposed agency action. Please contact this office if you have any questions concerning this matter. If we do not hear from you in accordance with the "Notice of Rights," we will assume that you concur with the District's action.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a "Notice of Rights" has been mailed to the Permittee (and the persons listed in the attached distribution list) no later than 5:00 p.m. on this 11th day of April, 2008, in accordance with Section 120.60(3), Florida Statutes.

BY: _____
 Ricardo A. Valera, P.E.
 Director, LWC Regulatory Division
 Collier County Service Center

Certified mail number 7006 2150 0002 5479 3612

NOTICE OF RIGHTS

As required by Sections 120.569(1), and 120.60(3), Fla. Stat., following is notice of the opportunities which may be available for administrative hearing or judicial review when the substantial interests of a party are determined by an agency. Please note that this Notice of Rights is not intended to provide legal advice. Not all the legal proceedings detailed below may be an applicable or appropriate remedy. You may wish to consult an attorney regarding your legal rights.

RIGHT TO REQUEST ADMINISTRATIVE HEARING

A person whose substantial interests are or may be affected by the South Florida Water Management District's (SFWMD or District) action has the right to request an administrative hearing on that action pursuant to Sections 120.569 and 120.57, Fla. Stat. Persons seeking a hearing on a District decision which does or may determine their substantial interests shall file a petition for hearing with the District Clerk within 21 days of receipt of written notice of the decision, unless one of the following shorter time periods apply: 1) within 14 days of the notice of consolidated intent to grant or deny concurrently reviewed applications for environmental resource permits and use of sovereign submerged lands pursuant to Section 373.427, Fla. Stat.; or 2) within 14 days of service of an Administrative Order pursuant to Subsection 373.119(1), Fla. Stat. "Receipt of written notice of agency decision" means receipt of either written notice through mail, or electronic mail, or posting that the District has or intends to take final agency action, or publication of notice that the District has or intends to take final agency action. Any person who receives written notice of a SFWMD decision and fails to file a written request for hearing within the timeframe described above waives the right to request a hearing on that decision.

Filing Instructions

The Petition must be filed with the Office of the District Clerk of the SFWMD. Filings with the District Clerk may be made by mail, hand-delivery or facsimile. **Filings by e-mail will not be accepted.** Any person wishing to receive a clerked copy with the date and time stamped must provide an additional copy. A petition for administrative hearing is deemed filed upon receipt during normal business hours by the District Clerk at SFWMD headquarters in West Palm Beach, Florida. Any document received by the office of the SFWMD Clerk after 5:00 p.m. shall be filed as of 8:00 a.m. on the next regular business day. Additional filing instructions are as follows:

- Filings by mail must be addressed to the Office of the SFWMD Clerk, P.O. Box 24680, West Palm Beach, Florida 33416.
- Filings by hand-delivery must be delivered to the Office of the SFWMD Clerk. **Delivery of a petition to the SFWMD's security desk does not constitute filing. To ensure proper filing, it will be necessary to request the SFWMD's security officer to contact the Clerk's office.** An employee of the SFWMD's Clerk's office will receive and file the petition.
- Filings by facsimile must be transmitted to the SFWMD Clerk's Office at (561) 682-6010. Pursuant to Subsections 28-106.104(7), (8) and (9), Fla. Admin. Code, a party who files a document by facsimile represents that the original physically signed document will be retained by that party for the duration of that proceeding and of any subsequent appeal or subsequent proceeding in that cause. Any party who elects to file any document by facsimile shall be responsible for any delay, disruption, or interruption of the electronic signals and accepts the full risk that the document may not be properly filed with the clerk as a result. The filing date for a document filed by facsimile shall be the date the SFWMD Clerk receives the complete document.

Initiation of an Administrative Hearing

Pursuant to Rules 28-106.201 and 28-106.301, Fla. Admin. Code, initiation of an administrative hearing shall be made by written petition to the SFWMD in legible form and on 8 and 1/2 by 11 inch white paper. All petitions shall contain:

1. Identification of the action being contested, including the permit number, application number, District file number or any other SFWMD identification number, if known.
2. The name, address and telephone number of the petitioner and petitioner's representative, if any.
3. An explanation of how the petitioner's substantial interests will be affected by the agency determination.
4. A statement of when and how the petitioner received notice of the SFWMD's decision.
5. A statement of all disputed issues of material fact. If there are none, the petition must so indicate.
6. A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the SFWMD's proposed action.
7. A statement of the specific rules or statutes the petitioner contends require reversal or modification of the SFWMD's proposed action.
8. If disputed issues of material fact exist, the statement must also include an explanation of how the alleged facts relate to the specific rules or statutes.
9. A statement of the relief sought by the petitioner, stating precisely the action the petitioner wishes the SFWMD to take with respect to the SFWMD's proposed action.

A person may file a request for an extension of time for filing a petition. The SFWMD may, for good cause, grant the request. Requests for extension of time must be filed with the SFWMD prior to the deadline for filing a petition for hearing. Such requests for extension shall contain a certificate that the moving party has consulted with all other parties concerning the extension and that the SFWMD and any other parties agree to or oppose the extension. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

If the District's Governing Board takes action with substantially different impacts on water resources from the notice of intended agency decision, the persons who may be substantially affected shall have an additional point of entry pursuant to Rule 28-106.111, Fla. Admin. Code, unless otherwise provided by law.

Mediation

The procedures for pursuing mediation are set forth in Section 120.573, Fla. Stat., and Rules 28-106.111 and 28-106.401-.405, Fla. Admin. Code. The SFWMD is not proposing mediation for this agency action under Section 120.573, Fla. Stat., at this time.

RIGHT TO SEEK JUDICIAL REVIEW

Pursuant to Sections 120.60(3) and 120.68, Fla. Stat., a party who is adversely affected by final SFWMD action may seek judicial review of the SFWMD's final decision by filing a notice of appeal pursuant to Florida Rule of Appellate Procedure 9.110 in the Fourth District Court of Appeal or in the appellate district where a party resides and filing a second copy of the notice with the SFWMD Clerk within 30 days of rendering of the final SFWMD action.

GENERAL CONDITIONS

1. All activities authorized by this permit shall be implemented as set forth in the plans, specifications and performance criteria as approved by this permit. Any deviation from the permitted activity and the conditions for undertaking that activity shall constitute a violation of this permit and Part IV, Chapter 373, F.S.
2. This permit or a copy thereof, complete with all conditions, attachments, exhibits, and modifications shall be kept at the work site of the permitted activity. The complete permit shall be available for review at the work site upon request by District staff. The permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.
3. Activities approved by this permit shall be conducted in a manner which does not cause violations of State water quality standards. The permittee shall implement best management practices for erosion and pollution control to prevent violation of State water quality standards. Temporary erosion control shall be implemented prior to and during construction, and permanent control measures shall be completed within 7 days of any construction activity. Turbidity barriers shall be installed and maintained at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the permitted work. Turbidity barriers shall remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. All practices shall be in accordance with the guidelines and specifications described in Chapter 6 of the Florida Land Development Manual; A Guide to Sound Land and Water Management (Department of Environmental Regulation, 1988), incorporated by reference in Rule 40E-4.091, F.A.C. unless a project-specific erosion and sediment control plan is approved as part of the permit. Thereafter the permittee shall be responsible for the removal of the barriers. The permittee shall correct any erosion or shoaling that causes adverse impacts to the water resources.
4. The permittee shall notify the District of the anticipated construction start date within 30 days of the date that this permit is issued. At least 48 hours prior to commencement of activity authorized by this permit, the permittee shall submit to the District an Environmental Resource Permit Construction Commencement Notice Form Number 0960 indicating the actual start date and the expected construction completion date.
5. When the duration of construction will exceed one year, the permittee shall submit construction status reports to the District on an annual basis utilizing an annual status report form. Status report forms shall be submitted the following June of each year.
6. Within 30 days after completion of construction of the permitted activity, the permittee shall submit a written statement of completion and certification by a professional engineer or other individual authorized by law, utilizing the supplied Environmental Resource/Surface Water Management Permit Construction Completion/Certification Form Number 0881A, or Environmental Resource/Surface Water Management Permit Construction Completion Certification - For Projects Permitted prior to October 3, 1995 Form No. 0881B, incorporated by reference in Rule 40E-1.659, F.A.C. The statement of completion and certification shall be based on onsite observation of construction or review of as-built drawings for the purpose of determining if the work was completed in compliance with permitted plans and specifications. This submittal shall serve to notify the District that the system is ready for inspection. Additionally, if deviation from the approved drawings are discovered during the certification process, the certification must be accompanied by a copy of the approved permit drawings with deviations noted. Both the original and revised specifications must be clearly shown. The plans must be clearly labeled as "as-built" or "record" drawings. All surveyed dimensions and elevations shall be certified by a registered surveyor.
7. The operation phase of this permit shall not become effective: until the permittee has complied with the requirements of condition (6) above, and submitted a request for conversion of Environmental Resource Permit from Construction Phase to Operation Phase, Form No. 0920; the District determines the system to be in compliance with the permitted plans and specifications; and the entity approved by the District in accordance with Sections 9.0 and 10.0 of the Basis of Review for Environmental Resource Permit

GENERAL CONDITIONS

Applications within the South Florida Water Management District, accepts responsibility for operation and maintenance of the system. The permit shall not be transferred to such approved operation and maintenance entity until the operation phase of the permit becomes effective. Following inspection and approval of the permitted system by the District, the permittee shall initiate transfer of the permit to the approved responsible operating entity if different from the permittee. Until the permit is transferred pursuant to Section 40E-1.6107, F.A.C., the permittee shall be liable for compliance with the terms of the permit.

8. Each phase or independent portion of the permitted system must be completed in accordance with the permitted plans and permit conditions prior to the initiation of the permitted use of site infrastructure located within the area served by that portion or phase of the system. Each phase or independent portion of the system must be completed in accordance with the permitted plans and permit conditions prior to transfer of responsibility for operation and maintenance of the phase or portion of the system to a local government or other responsible entity.
9. For those systems that will be operated or maintained by an entity that will require an easement or deed restriction in order to enable that entity to operate or maintain the system in conformance with this permit, such easement or deed restriction must be recorded in the public records and submitted to the District along with any other final operation and maintenance documents required by Sections 9.0 and 10.0 of the Basis of Review for Environmental Resource Permit applications within the South Florida Water Management District, prior to lot or units sales or prior to the completion of the system, whichever comes first. Other documents concerning the establishment and authority of the operating entity must be filed with the Secretary of State, county or municipal entities. Final operation and maintenance documents must be received by the District when maintenance and operation of the system is accepted by the local government entity. Failure to submit the appropriate final documents will result in the permittee remaining liable for carrying out maintenance and operation of the permitted system and any other permit conditions.
10. Should any other regulatory agency require changes to the permitted system, the permittee shall notify the District in writing of the changes prior to implementation so that a determination can be made whether a permit modification is required.
11. This permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any activity approved by this permit. This permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the permit and Chapter 40E-4 or Chapter 40E-40, F.A.C..
12. The permittee is hereby advised that Section 253.77, F.S. states that a person may not commence any excavation, construction, or other activity involving the use of sovereign or other lands of the State, the title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund without obtaining the required lease, license, easement, or other form of consent authorizing the proposed use. Therefore, the permittee is responsible for obtaining any necessary authorizations from the Board of Trustees prior to commencing activity on sovereignty lands or other state-owned lands.
13. The permittee must obtain a Water Use permit prior to construction dewatering, unless the work qualifies for a general permit pursuant to Subsection 40E-20.302(3), F.A.C., also known as the "No Notice" Rule.
14. The permittee shall hold and save the District harmless from any and all damages, claims, or liabilities which may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any system authorized by the permit.
15. Any delineation of the extent of a wetland or other surface water submitted as part of the permit

GENERAL CONDITIONS

application, including plans or other supporting documentation, shall not be considered binding, unless a specific condition of this permit or a formal determination under Section 373.421(2), F.S., provides otherwise.

16. The permittee shall notify the District in writing within 30 days of any sale, conveyance, or other transfer of ownership or control of a permitted system or the real property on which the permitted system is located. All transfers of ownership or transfers of a permit are subject to the requirements of Rules 40E-1.6105 and 40E-1.6107, F.A.C.. The permittee transferring the permit shall remain liable for corrective actions that may be required as a result of any violations prior to the sale, conveyance or other transfer of the system.
17. Upon reasonable notice to the permittee, District authorized staff with proper identification shall have permission to enter, inspect, sample and test the system to insure conformity with the plans and specifications approved by the permit.
18. If historical or archaeological artifacts are discovered at any time on the project site, the permittee shall immediately notify the appropriate District service center.
19. The permittee shall immediately notify the District in writing of any previously submitted information that is later discovered to be inaccurate.

SPECIAL CONDITIONS

1. The construction phase of this permit shall expire on April 11, 2013.
2. Operation of the surface water management system shall be the responsibility of National Park Service - Big Cypress National Preserve.
3. Discharge Facilities:

Structure: S-1

1 - 3.00" dia. CIRCULAR ORIFICE with invert at elev. 2.50' NGVD 29.
40 LF of 6" dia. POLYVINYLCHLORIDE culvert.
1 - 18" W X 18" L (open inlet area) drop inlet with overflow grate at elev. 5.10' NGVD 29.
Receiving body : Existing Canal System
Control elev : 2.50 feet NGVD 29.
4. The permittee shall be responsible for the correction of any erosion, shoaling or water quality problems that result from the construction or operation of the surface water management system.
5. Measures shall be taken during construction to insure that sedimentation and/or turbidity violations do not occur in the receiving water.
6. The District reserves the right to require that additional water quality treatment methods be incorporated into the drainage system if such measures are shown to be necessary.
7. Facilities other than those stated herein shall not be constructed without an approved modification of this permit.
8. A stable, permanent and accessible elevation reference shall be established on or within one hundred (100) feet of all permitted discharge structures no later than the submission of the certification report. The location of the elevation reference must be noted on or with the certification report.
9. The permittee shall provide routine maintenance of all of the components of the surface water management system in order to remove all trapped sediments/debris. All materials shall be properly disposed of as required by law. Failure to properly maintain the system may result in adverse flooding conditions.
10. This permit is issued based on the applicant's submitted information which reasonably demonstrates that adverse water resource related impacts will not be caused by the completed permit activity. Should any adverse impacts caused by the completed surface water management system occur, the District will require the permittee to provide appropriate mitigation to the District or other impacted party. The District will require the permittee to modify the surface water management system, if necessary, to eliminate the cause of the adverse impacts.
11. The permittee acknowledges, that pursuant to Rule 40E-4.101(2), F.A.C., a notice of Environmental Resource or Surface Water Management Permit may be recorded in the county public records. Pursuant to the specific language of the rule, this notice shall not be considered an encumbrance upon the property.
12. Minimum building floor elevation: 7.50 feet NGVD 29.
13. Minimum parking lot elevation: 5.00 feet NGVD 29.
14. The exhibits and special conditions in this permit apply only to this application. They do not supersede or delete any requirements for other applications covered in Permit No. 11-02076-P unless otherwise specified herein.

SPECIAL CONDITIONS

15. No work shall occur within the Tamiami Trail E (US 41) right-of-way for the offsite turn lane improvements until all necessary right-of-way occupancy permits from the Florida Department of Transportation (FDOT) are obtained authorizing the proposed work within the FDOT's right-of-way. The permittee shall submit a copy of the right-of-way permits from FDOT to the District, prior to commencing construction.
16. The Permittee shall utilize the criteria contained in the Construction Pollution Prevention Plan (Exhibit 4.0) and on the applicable approved construction drawings for the duration of the projects construction activities.
17. The Permittee shall utilize the criteria contained in the Stormwater Management Program (Exhibit 5.0) for post construction activities.
18. Endangered species, threatened species and/or species of special concern have been observed onsite and/or the project contains suitable habitat for these species. It shall be the permittee's responsibility to coordinate with the Florida Fish and Wildlife Conservation Commission and/or the U.S. Fish and Wildlife Service for appropriate guidance, recommendations and/or necessary permits to avoid impacts to listed species.
19. Activities associated with the implementation of the mitigation, monitoring and maintenance plan(s) shall be completed in accordance with the work schedule attached as Exhibit No. 3.1. Any deviation from these time frames will require prior approval from the District's Environmental Resource Compliance staff. Such requests must be made in writing and shall include (1) reason for the change, (2) proposed start/finish and/or completion dates; and (3) progress report on the status of the project development or mitigation effort.
20. A monitoring program shall be implemented in accordance with Exhibit No. 3.0. The monitoring program shall extend for a period of 5 years with annual reports submitted to District staff. At the end of the first monitoring period the mitigation area shall contain an 80% survival of planted vegetation. The 80% survival rate shall be maintained throughout the remainder of the monitoring program, with replanting as necessary. If native wetland, transitional, and upland species do not achieve an 80% coverage within the initial two years of the monitoring program, native species shall be planted in accordance with the maintenance program. At the end of the 5 year monitoring program the entire mitigation area shall contain an 80% survival of planted vegetation and an 80% coverage of desirable obligate and facultative wetland species.
21. A maintenance program shall be implemented in accordance with Exhibit No. 3.0 for the restored wetland area on a regular basis to ensure the integrity and viability of those areas as permitted. Maintenance shall be conducted in perpetuity to ensure that the conservation areas are maintained free from Category 1 exotic vegetation (as defined by the Florida Exotic Pest Plant Council at the time of permit issuance) immediately following a maintenance activity. Maintenance in perpetuity shall also insure that conservation areas, including buffers, maintain the species and coverage of native, desirable vegetation specified in the permit. Coverage of exotic and nuisance plant species shall not exceed 5% of total cover between maintenance activities. In addition, the permittee shall manage the conservation areas such that exotic/nuisance plant species do not dominate any one section of those areas.
22. Prior to the commencement of construction, the permittee shall conduct a pre-construction meeting with field representatives, contractors and District staff. The purpose of the meeting will be to discuss construction methods and sequencing, including [type and location of turbidity and erosion controls to be implemented during construction, mobilization and staging of contractor equipment, phasing of construction, methods of vegetation clearing, construction dewatering if required, endangered species protection with the permittee and contractors. The permittee shall contact District Environmental Resource Compliance staff from the Lower West Coast Service Center at 239-338-2929 to schedule the pre-construction meeting.

SPECIAL CONDITIONS

23. A mitigation program for Big Cypress National Preserve Tamiami Trail Welcome Center shall be implemented in accordance with Exhibit No. 3.0 and 3.1. The permittee shall restore 0.30 acres of wet prairie.

Last Date For Agency Action: 13-MAY-2008

GENERAL ENVIRONMENTAL RESOURCE PERMIT STAFF REPORT

Project Name: Tamiami Trail Welcome Center

Permit No.: 11-02076-P

Application No.: 070607-38

Associated File: 070921-18 WU

080122-15 WU

Application Type: Environmental Resource (General Permit Modification)

Location: Collier County, S33/T52S/R30E

Permittee : National Park Service Big Cypress National Preserve

Operating Entity : National Park Service Big Cypress National Preserve

Project Area: 3.9 acres

Project Land Use: Government
Recreational

Drainage Basin: EAST COLLIER

Sub Basin: MISCELLANEOUS COASTAL
BASINS

Receiving Body: BIG CYPRESS BASIN NATIONAL PRESERVE VIA
THE EXISTING CANAL SYSTEM

Class: OFW

Special Drainage District: NA

Total Acres Wetland Onsite: .02

Total Acres Impacted Onsite : .02

Total Acres Presv/Mit Compensation Onsite: .30

Conservation Easement To District : No

Sovereign Submerged Lands: No

PROJECT PURPOSE:

This application is a request for a modification of an Environmental Resource Permit to authorize Construction and Operation of a surface water management system serving a recreational project with associated offsite turn lane improvements and mitigation area, totaling 3.90 acres, known as Tamiami Trail Welcome Center, with discharge into Big Cypress Basin National Preserve via the existing canal system.

PROJECT EVALUATION:**PROJECT SITE DESCRIPTION:**

The project site is located on the south side of U.S. 41, near the entrance to the National Park Service headquarters of the Big Cypress National Preserve in Ochopee, Collier County, specifically just east of Sea Grape Drive, approximately 0.90 mile west of Birdon Road (CR 841). A location map is attached as Exhibit 1.0.

The property consists of disturbed undeveloped land within the 3.38-acre footprint of the proposed welcome center site. The natural drainage pattern across the site flows south and south east to the existing manmade canal system. The 0.22 acre of turn lane improvements consist of impacts to 0.017 acre of wetlands.

PROJECT BACKGROUND:

The site development on the subject property was originally permitted in November 2005 under Permit No. 11-02076-P/ Application No. 040622-22. The original permit authorizes construction and operation of a surface water management system serving a 3.38-acre recreational project. The originally permitted surface water management system is a dry detention system designed with the control elevation of 2.50' NGVD, discharging to the existing manmade canal system.

PROPOSED PROJECT:

The objective of the modifications proposed under this application is to modify the design of the surface water management system due to changes in site layout and land use for the originally permitted 3.38-acre welcome center, and to include offsite turn lane improvements (0.22 acre) for better access to and from the US 41/ Tamiami Trail East. The proposed facilities consists of a welcome center building with associated parking, sidewalks, related utilities and a surface water management system. The utility installation includes a directional bore under the existing canal. Site development plans and offsite turn lane improvement plans with associated details are attached as Exhibits 2.00-2.15.

Approximately half of stormwater runoff within the project site will travel via overland flow to a dry detention area located on the south of the parking lot and west of the welcome center building, prior to discharging into the canal through control structure 'S-1'. The remaining stormwater within the site will travel via overland flow to a dry treatment swale (retention system) located on the north of the parking lot, prior to overflow into the canal, located to the east of the treatment swale. The surface water management system is designed to provide the required water quality volume for the onsite development and compensatory water quality volume for the offsite turn lane improvements with an additional 50% water quality volume. In addition, the surface water management system is designed to provide flood protection for the proposed facilities within the project site.

The project is in substantial compliance with the original permit. No adverse water quality or quantity impacts are anticipated as a result from the proposed project.

LAND USE:

* The land use category 'Right-Of-Way' represents the acreage of the offsite turn lane improvements within the Tamiami Trail E (US 41) right-of-way. This area is 100% impervious surface.

Construction:**Project:**

Total Project

Building Coverage	.14	acres
Dry Detention Areas	1.03	acres
Impervious	.59	acres
Pervious	1.62	acres
Preserved	.30	acres
Right-Of-Way	.22	acres
Total:	3.90	

WATER QUANTITY :**Discharge Rate :**

The allowable discharge rate for the project is 96 CSM (0.15 cfs/ acre), based on Collier County Ordinance No. 2001-27. As shown in the table below, the peak offsite discharge rate 0.30 cfs is within the maximum allowable discharge, 0.50 cfs.

Discharge Storm Frequency : 25 YEAR-3 DAY

Design Rainfall : 11 inches

Basin	Allow Disch (cfs)	Method Of Determination	Peak Disch (cfs)	Peak Stage (ft, NGVD 29)
Site	.5	Conveyance Limitation	.3	4.73

Finished Floors :

Building Storm Frequency : 100 YEAR-3 DAY

Design Rainfall : 14 inches

Basin	Peak Stage (ft, NGVD 29)	Proposed Min. Finished Floors (ft, NGVD 29)	FEMA Elevation (ft, NGVD 29)
Site	5.52	7.5	7.3

Parking Lot Design :

Parking Lot Storm Frequency : 10 YEAR-1 DAY

Design Rainfall 7.44 inches

Basin	Peak Stage (ft, NGVD 29)	Proposed Min.Parking Elev. (ft, NGVD 29)
Site	4.57	5

Control Elevation :

Basin	Area (Acres)	Ctrl Elev (ft, NGVD 29)	WSWT Ctrl Elev (ft, NGVD 29)	Method Of Determination
Site	3.38	2.5	2.50	Previously Permitted

Receiving Body :

Basin	Str.#	Receiving Body
Site	S-1	Existing Canal System

Discharge Structures: Note: The units for all the elevation values of structures are (ft, NGVD 29)

Culverts:

Basin	Str#	Count	Type	Width	Length	Dia.
Site	S-1	1	Polyvinylchloride		40'	6"

Inlets:

Basin	Str#	Count	Type	Width	Length	Dia.	Crest Elev.
Site	S-1	1	Inlet	18"	18"		5.1

Water Quality Structures: Note: The units for all the elevation values of structures are (ft, NGVD 29)

Bleeders:

Basin	Str#	Count	Type	Width	Height	Length	Dia.	Invert Angle	Invert Elev.
Site	S-1	1	Circular Orifice				3"		2.5

WATER QUALITY :

The required water quality volume for the proposed project will be provided onsite in a dry detention area located on the south of the parking lot and west of the welcome center building, and a dry treatment swale (retention system) located on the north of the parking lot. Stormwater runoff will travel via overland flow to the dry detention area and discharge into the canal through control structure 'S-1'. This dry detention area will treat approximately half of the stormwater from the site.

The remaining stormwater will travel via overland flow to the dry treatment swale, located on the north of the parking lot. Recovery for this treatment swale is accomplished through percolation into the soil profile, prior to overflow into the canal, located to the east of the treatment swale. The surface water management system is designed to provide not only the required water quality volume for the onsite development, based on the first inch (1") of the runoff over the project area, but also compensatory water quality volume for the offsite turn lane improvements, based on 2.50 inches times the additional impervious surface (0.22 acre), with an additional 50% water quality volume.

In addition to the required water quality, Construction Pollution Prevention Plan and Stormwater Management Program specifications and guidelines are part of the required water quality. Construction and daily operation of the project shall be conducted in accordance with special conditions number 16 and 17 and Exhibits 4.0 and 5.0.

No adverse water quality impacts are anticipated as a result of the proposed project.

Basin	Treatment Method	Vol Req.d (ac-ft)	Vol Prov'd
Site	Treatment Dry Detention	.5	.5

WETLANDS:

The proposed project will result in impacts to approximately 0.017 acres of freshwater marsh/saw grass wetlands. Impacts occur between the existing and proposed toe of slope of the proposed turning lane. The extent of wetland impacts are shown in Exhibit 2.09 and 2.10. Secondary wetland impacts have been assessed to a 50' wide (0.22 acre area) corridor adjacent to the proposed turn lane improvements.

Mitigation Proposal:

The applicant proposes to restore 0.3 acres of disturbed land to wet prairie habitat. The restoration area is located within the Big Cypress National Preserve, approximately 2000 feet away from the Welcome Center project site. The location of the restoration area in relation to the impacted wetlands is shown on page 8 of Exhibit 3.0. The proposed restoration site was previously issued a No Notice General Permit (Application No. 060112-4) to remove 2 feet of fill and return the area to the original wetland elevation. Any exotic or nuisance plant species which remain following the excavation will be removed. The site is proposed to naturally revegetate to wet prairie species, including maiden cane (*Panicum hemitomon*), fleabane (*Pluchea rosea*), saw grass (*Cladium jamaicense*), and button bush (*Cephalanthus occidentalis*). Supplemental planting is proposed if 80% coverage of desirable wetland species does not occur within 3 years.

Monitoring/Maintenance:

The mitigation and monitoring plan, including methods for fill removal and best management practices, is shown as Exhibit 3.0. This plan provides for the maintenance of the offsite restoration area and monitoring the success of the restoration area for a period of five (5) years. The activities associated with the implementation of the monitoring and maintenance plan shall be completed in accordance with the work schedule attached as Exhibit No. 3.1.

Wetland Inventory :

CONSTRUCTION MOD -Tamiami Trail Welcome Center

Site Id	Site Type	Pre-Development				Post-Development						
		Pre Fluc cs	AA Type	Acreage (Acres)	Current Wo Pres	With Project	Time Lag (Yrs)	Risk Factor	Pres. Adj. Factor	Post Fluc cs	Adj Delta	Functional Gain / Loss
W3	OFF	643	Secondary	.22	.83	.60					-.230	-.051
W1	ON	643	Direct	.02	.83	.00					-.830	-.017
W2	ON	740	Restoration/Creation	.30	.35	.77	1	1.50		643	.280	.084
Total:				.54								.02

<u>Fluc cs Code</u>	<u>Description</u>
643	Wet Prairies
740	Disturbed Lands

Wildlife Issues:

The project site contains preferred habitat for wetland-dependent endangered or threatened wildlife species or species of special concern. The proposed project is not expected to adversely affect listed species and the proposed onsite mitigation will enhance wildlife utilization. This permit does not relieve the applicant from complying with all applicable rules and any other agencies' requirements if, in the future, endangered/threatened species or species of special concern are discovered on the site.

LEGAL ISSUES:

No construction activities shall occur within the Tamiami Trail E (US 41) right-of-way for the offsite turn lane improvements until all necessary right-of-way occupancy permits from the Florida Department of Transportation (FDOT) are obtained authorizing the proposed work within the FDOT's right-of-way

pursuant to Special Condition No. 15.

CERTIFICATION AND MAINTENANCE OF THE WATER MANAGEMENT SYSTEM:

It is suggested that the permittee retain the services of a Professional Engineer registered in the State of Florida for periodic observation of construction of the surface water management (SWM) system. This will facilitate the completion of construction completion certification Form #0881 which is required pursuant to Section 10 of the Basis of Review for Environmental Resource Permit Applications within the South Florida Water Management District, and Rule 40E-4.361(2), Florida Administrative Code (F.A.C.).

Pursuant to Chapter 40E-4 F.A.C., this permit may not be converted from the construction phase to the operation phase until certification of the SWM system is submitted to and accepted by this District. Rule 40E-4.321(7) F.A.C. states that failure to complete construction of the SWM system and obtain operation phase approval from the District within the permit duration shall require a new permit authorization unless a permit extension is granted.

For SWM systems permitted with an operating entity who is different from the permittee, it should be noted that until the permit is transferred to the operating entity pursuant to Rule 40E-1.6107, F.A.C., the permittee is liable for compliance with the terms of this permit.

The permittee is advised that the efficiency of a SWM system will normally decrease over time unless the system is periodically maintained. A significant reduction in flow capacity can usually be attributed to partial blockages of the conveyance system. Once flow capacity is compromised, flooding of the project may result. Maintenance of the SWM system is required to protect the public health, safety and the natural resources of the state. Therefore, the permittee must have periodic inspections of the SWM system performed to ensure performance for flood protection and water quality purposes. If deficiencies are found, it is the responsibility of the permittee to correct these deficiencies in a timely manner.

RELATED CONCERNS:

Water Use Permit Status:

The applicant has indicated that no permanent irrigation system is proposed for the project.

Water use application number 070921-18 is being processed concurrently with this application, to renew an expired water use permit for public water supply for Big Cypress National Preserve (Permit number 11-01451-W). Withdrawals are from the water table aquifer via two existing withdrawal facilities.

The applicant has indicated that dewatering may be required for construction activities for this project. Water use application number 080122-15 is being processed. No construction activities involving dewatering can occur without issuance of the dewatering permit.

This permit does not release the permittee from obtaining all necessary Water Use authorization(s) prior to the commencement of activities which will require such authorization, including construction dewatering and irrigation, unless the work qualifies for a No-Notice Short-Term Dewatering permit pursuant to Chapter 40E-20.302(3) or is exempt pursuant to Section 40E-2.051, F.A.C.

CERP:

A portion of the proposed project is within the area of the Tamiami Trail Culverts Project, an element of the Comprehensive Everglades Restoration Plan (CERP). Staff has coordinated with the CERP project manager and it has been determined that the proposed project will not have adverse impact to the Tamiami Trail Culverts Project.

Potable Water Supplier:

Big Cypress National Preserve

Waste Water System/Supplier:

Big Cypress National Preserve

Right-Of-Way Permit Status:

A Right-of-Way Permit is not required for this project.

DRI Status:

This project is not a DRI.

Historical/Archeological Resources:

The District has received correspondence from the Florida Department of State, Division of Historical Resources indicating that the agency has no objections to the issuance of this permit.

DCA/GZM Consistency Review:

The District has not received a finding of inconsistency from the Florida Department of Environmental Protection or other commenting agencies regarding the provisions of the federal Coastal Zone Management Plan.

Third Party Interest:

No third party has contacted the District with concerns about this application.

Enforcement:

There has been no enforcement activity associated with this application.

STAFF REVIEW:

DIVISION APPROVAL:

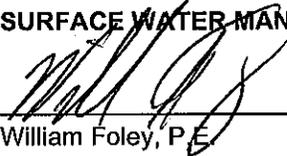
NATURAL RESOURCE MANAGEMENT:



Laura Layman

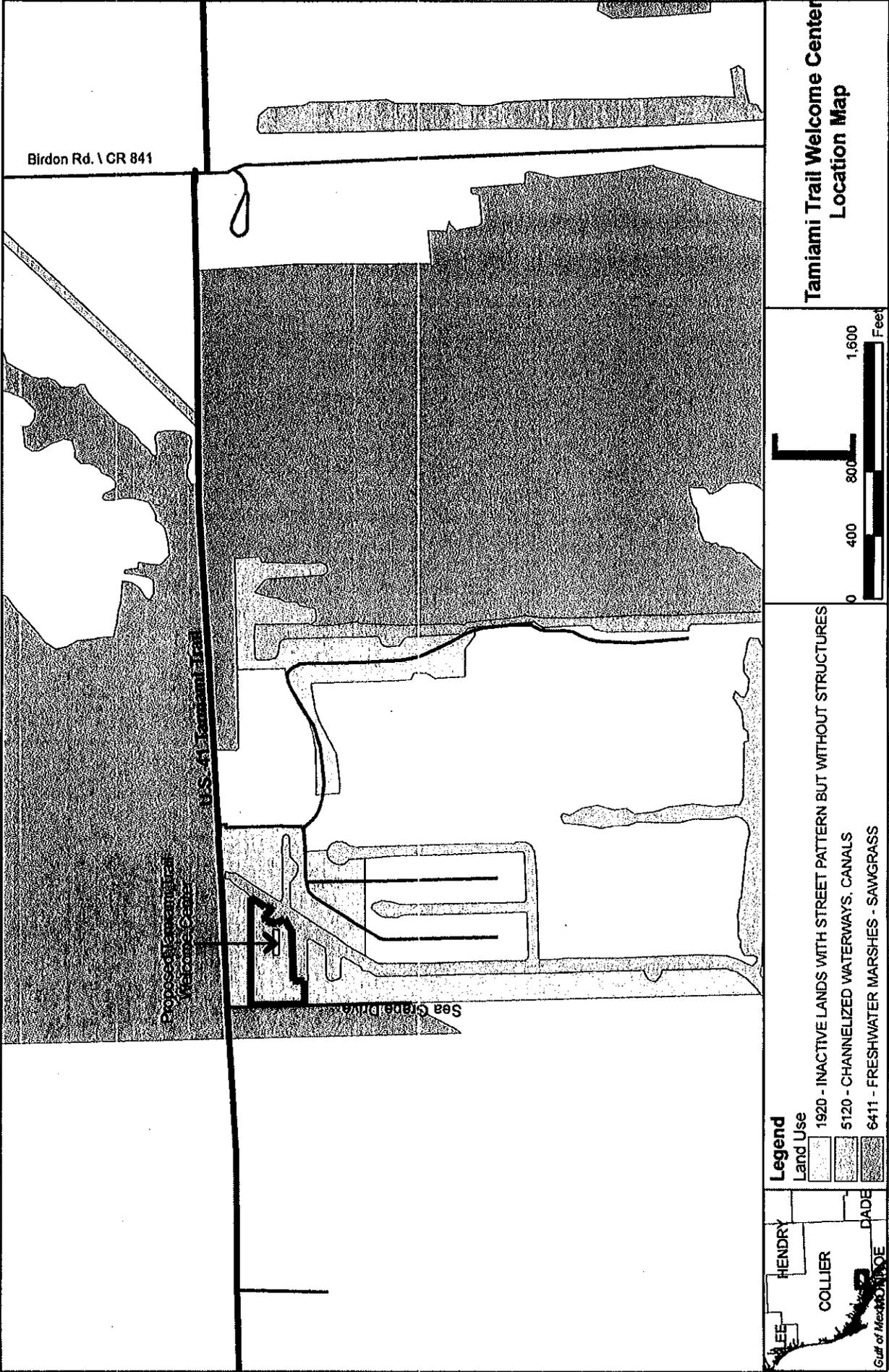
DATE: 4/10/08

SURFACE WATER MANAGEMENT:



William Foley, P.E.

DATE: 4/10/08

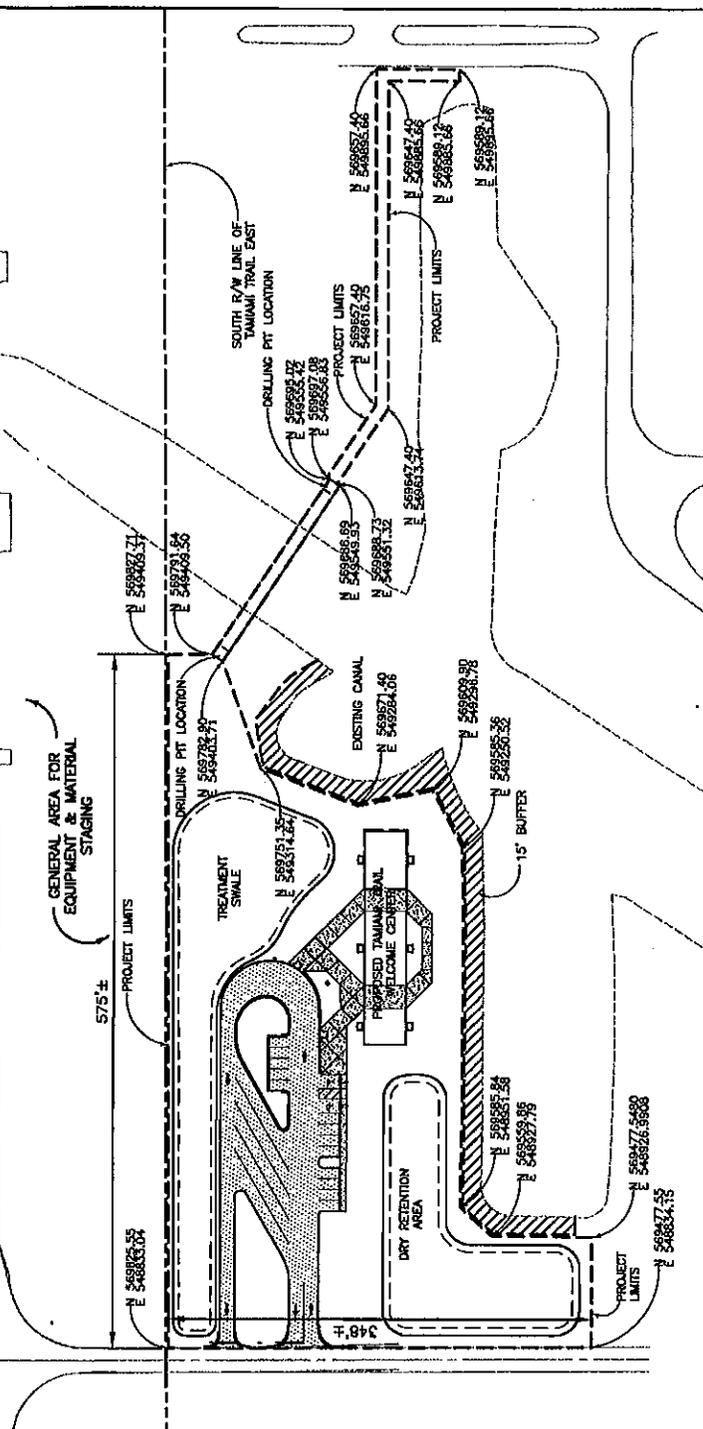


**Tamiami Trail Welcome Center
Location Map**

- Legend**
- Land Use
- 1920 - INACTIVE LANDS WITH STREET PATTERN BUT WITHOUT STRUCTURES
 - 5120 - CHANNELIZED WATERWAYS, CANALS
 - 6411 - FRESHWATER MARSHES - SAWGRASS

NOTE:
SEE SHEET C11 FOR TURN LANE LAYOUT INFORMATION

S.R. 90 / US NO. 41
TAMIAMI TRAIL EAST



- GENERAL NOTES**
FOR BIDDING PURPOSES, WORK IS ORGANIZED INTO BASE BID WORK AND OPTIONS.
- BASE BID ITEMS**
- 1.) COMFORT STATION AND VISITOR CONTACT AREA.
 - 2.) PARKING AREA INCLUDING WALKWAYS & STRIPING.
 - 3.) SEEDING AND MULCHING OF DISTURBED AREAS.
 - 4.) SITE GRADING AND DETENTION POND.
 - 5.) TURN LANE INCLUDING STRIPING AND SIGNAGE.
 - 6.) SITE UTILITIES INCLUDING COMMUNICATIONS AND FORCE-MAIN DIRECTIONAL BORES.
- OPTIONS**
- 7.) OPTION A - MULTIPURPOSE BUILDING
 - 8.) OPTION B - OUTSIDE PAVILION.
 - 9.) OPTION C - LANDSCAPING
- **FOR LOCATION OF OPTIONS A, & B, WORK, REFER TO SHEET C3.

**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**

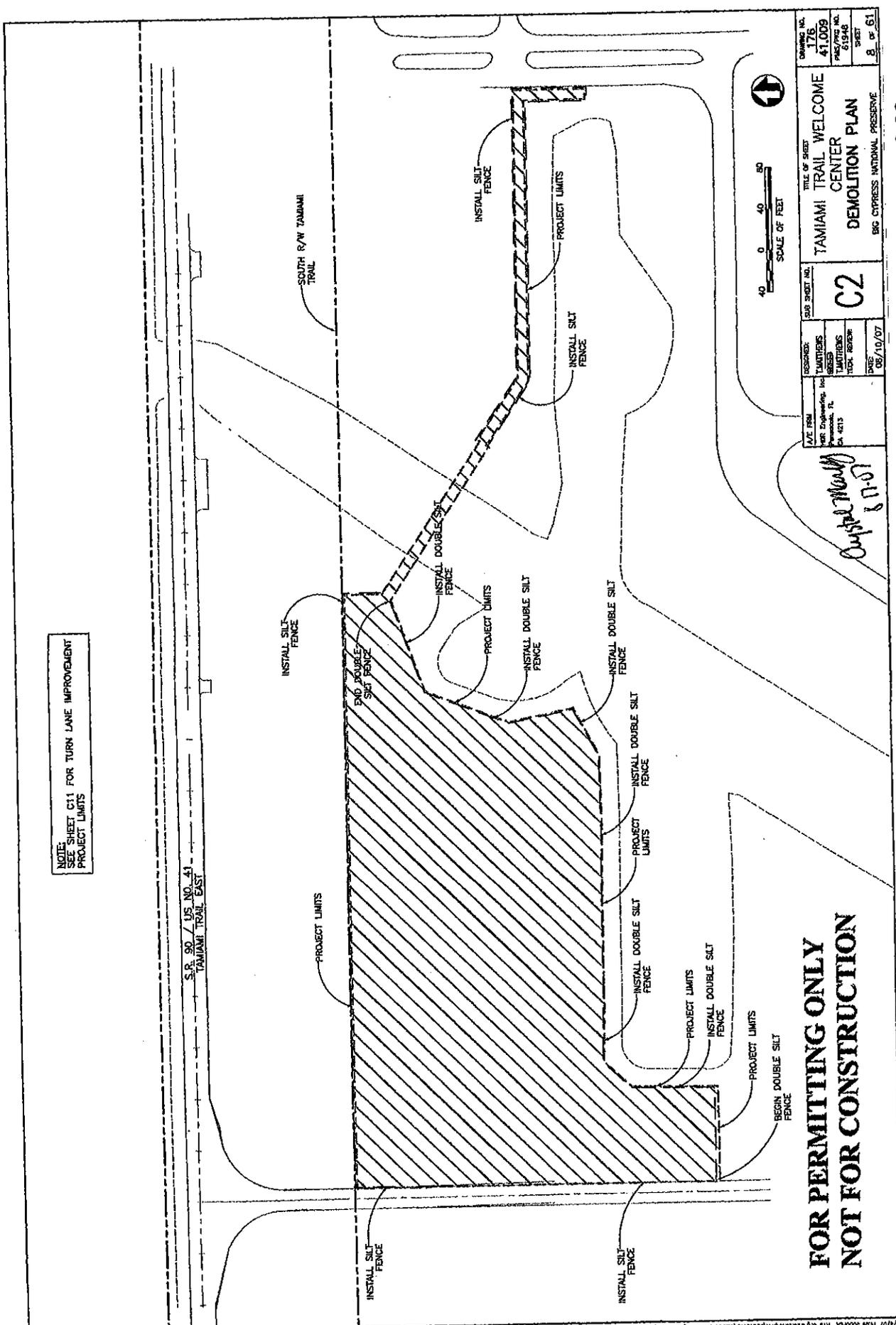
A/E FIRM TAMMITHENS INC. TAMMITHENS ENGINEERS, P.C. TAMMITHENS TECH. SERVICE DA. 0213	DESIGNED BY TAMMITHENS INC.	SUB SHEET NO. C1	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER OVERALL SITE LAYOUT	DRAWING NO. 175
				PROJECT NO. 41,009
DATE 08/10/07			SHEET 7 of 61	

Outback
8-17-07

NOTE:
SEE SHEET C11 FOR TURN LANE IMPROVEMENT
PROJECT LIMITS

S.R. 90 / US NO. 41
TAMIAMI TRAIL EAST

SOUTH R/W TAMAMI
TRAIL



**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**



DATE	08/19/07
DESIGNED BY	W. Z. ZACHRY, INC.
CHECKED BY	W. Z. ZACHRY, INC.
PROJECT NO.	07-07
SHEET NO.	C2
TITLE OF SHEET	TAMIAMI TRAIL WELCOME CENTER DEMOLITION PLAN
DRAWING NO.	176
DATE	6/19/08
SCALE	AS SHOWN
SHEET	8 OF 61
BIG CYPRESS NATIONAL PRESERVE	

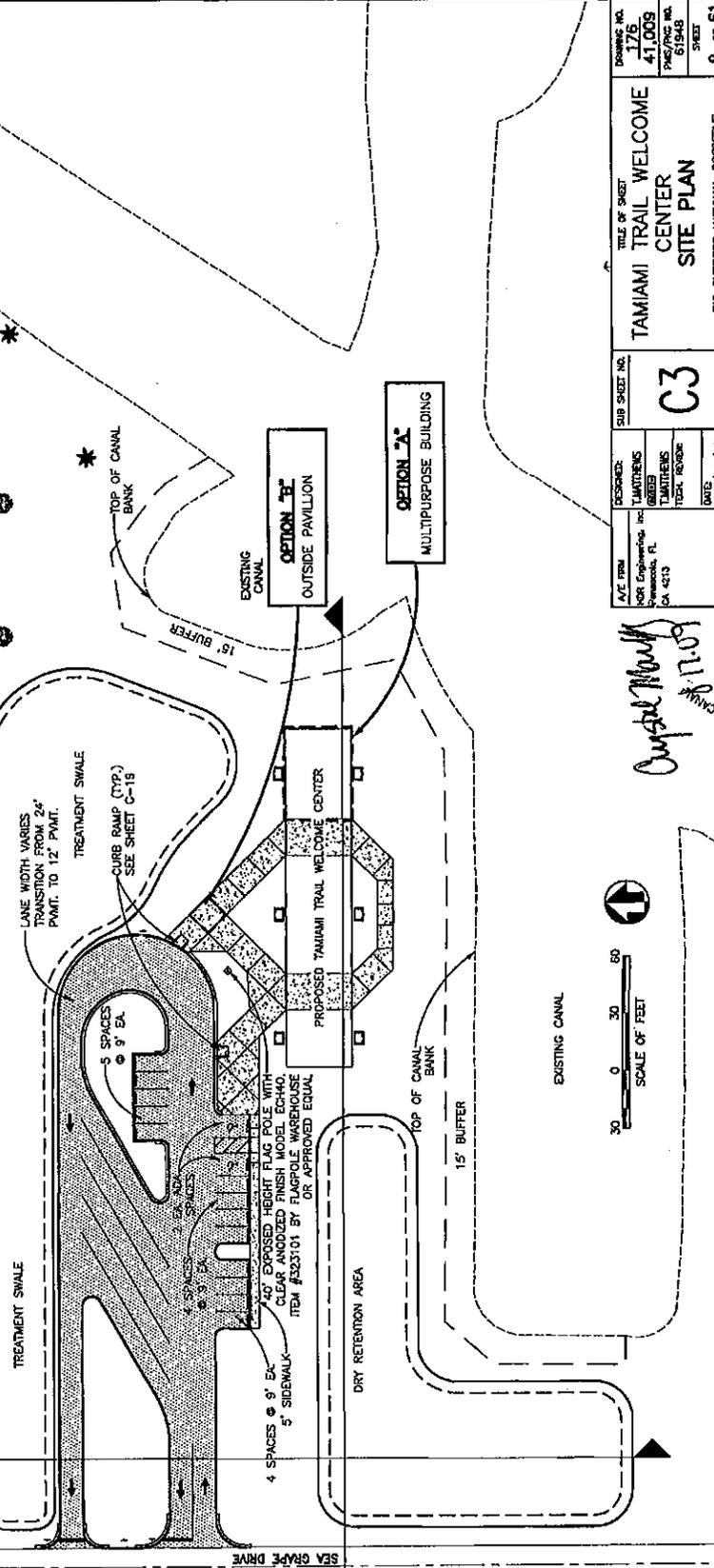
Accepted Monthly 8-17-07

NOTE:
SEE SHEET C11 FOR TURN LANE IMPROVEMENT
PROJECT LIMITS

SR 80 / US NO. 41
TAMIAMI TRAIL EAST

FOR PERMITTING ONLY NOT FOR CONSTRUCTION

"B"
C3/C15



NOTE:
WHEN CONSTRUCTION IS COMPLETE,
SEA GRAPE DRIVE SHOULD BE
RETURNED TO EXISTING CONDITION
OUTSIDE MILLING LIMITS. SEE SHEET
C11 FOR MILLING LIMITS.

"A"
C3/C15



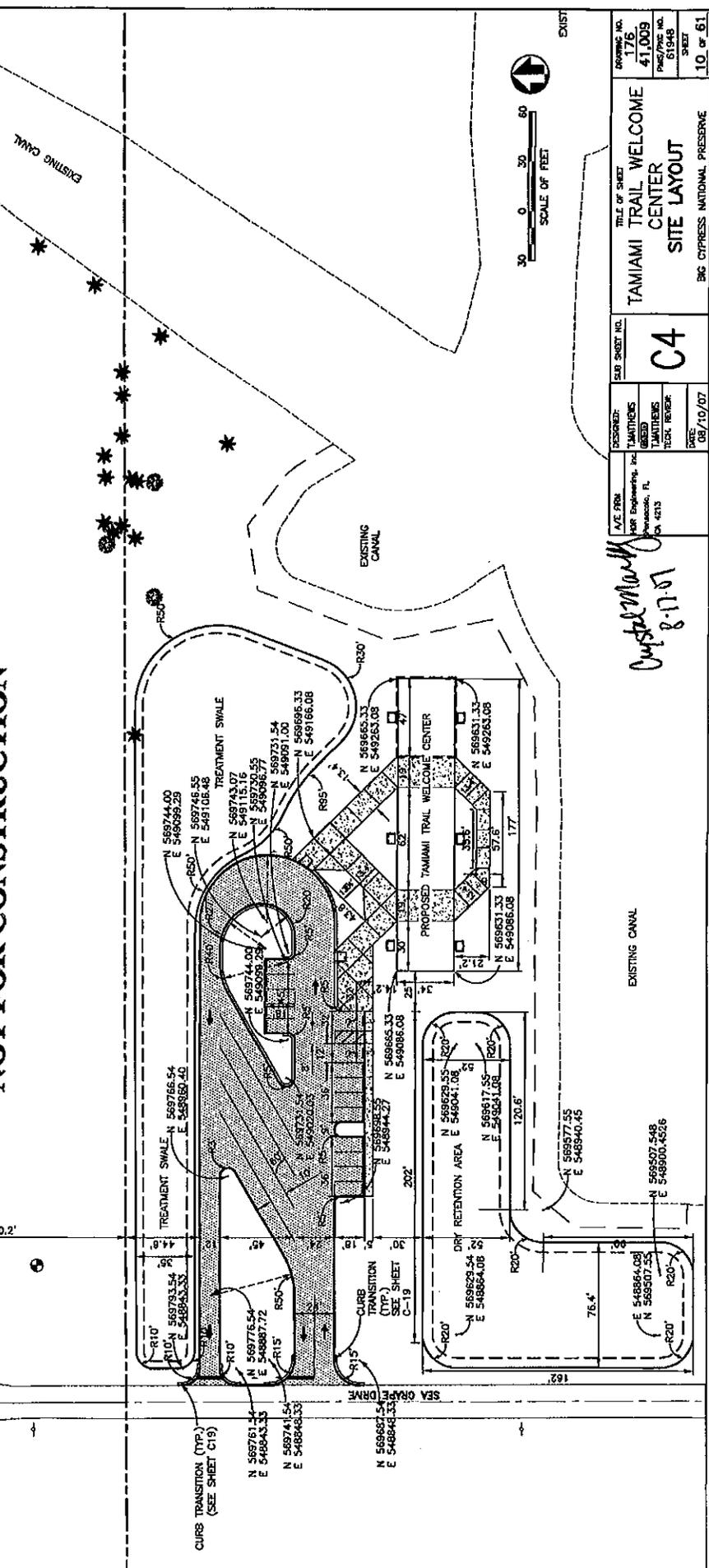
*Outside Pavillion
C-15 11.10.09*

DESIGNED BY TAMMIEBENS	DATE 09/10/07	SUB SHEET NO. C3	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER SITE PLAN	DRAWING NO. 176 41.009	SHEET 9 OF 61
CHECKED BY TAMMIEBENS	DATE 09/10/07				
AUT. FROM TAMMIEBENS	DATE 09/10/07	BIC CYPRESS NATIONAL PRESERVE			

NOTE:
SEE SHEET C11 FOR TURN LANE LAYOUT
INFORMATION

N 569272.84
E 548922.82
N89°43'13"E
STA. 21+00
S.P. 88 / USE NO. 41
TAMIAMI TRAIL EAST

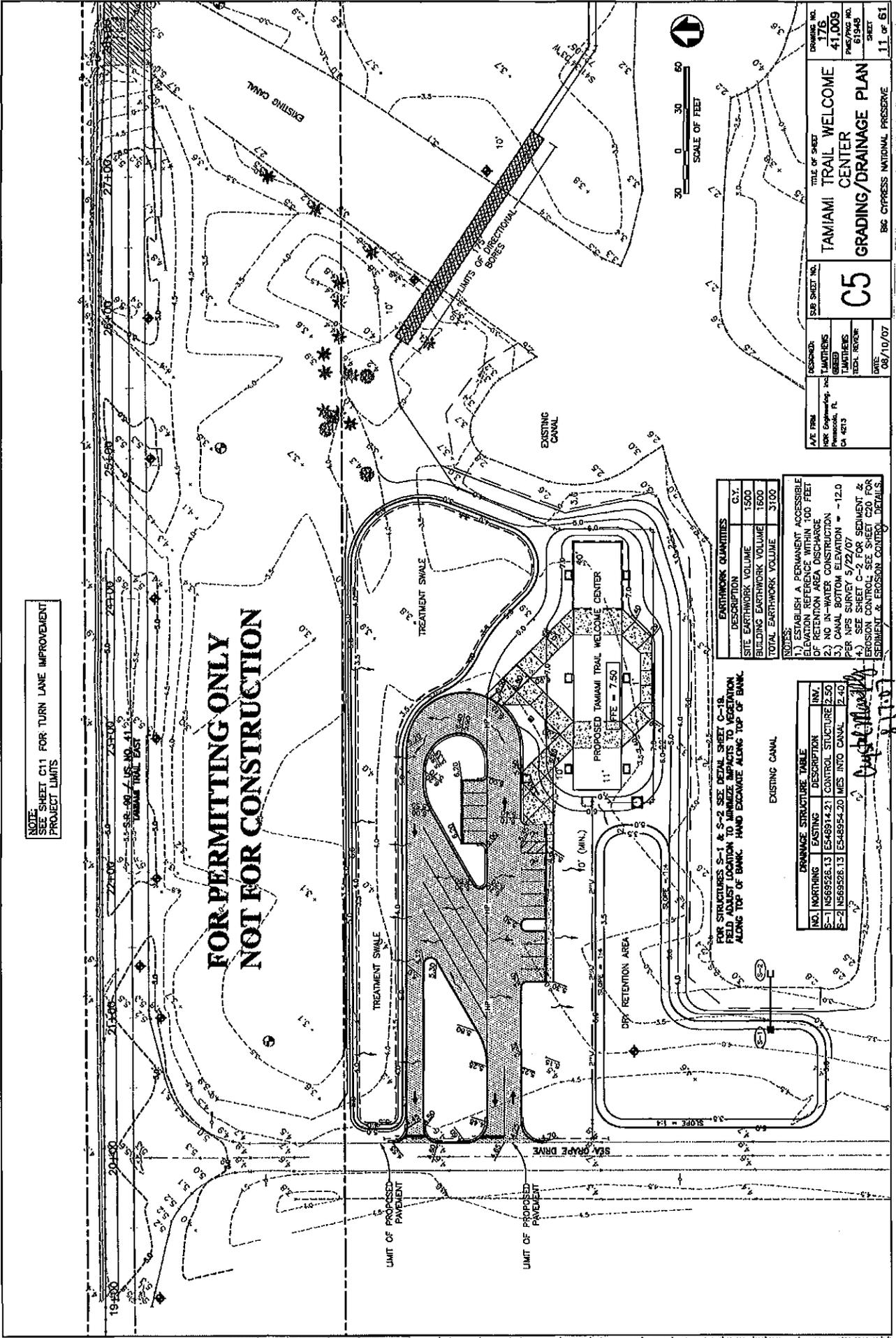
**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**



DESIGNED BY J. MATTHEWS TAMMIENS TUSK, TEXAS	DATE 08/10/07	SCALE SHEET NO. C4	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER SITE LAYOUT	WORKING NO. 176
A/E FIRM J&K Engineering, Inc. 10000 Brownsdale, FL 33413	DATE 08/10/07			PAGE/PRICE NO. 01364 SHEET
			PROJECT NAME BIG CYPRESS NATIONAL PRESERVE	NO. OF SHEET 10 OF 51

NOTE:
SEE SHEET C11 FOR TURN LANE IMPROVEMENT
PROJECT LIMITS

**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**



EARTHWORK QUANTITIES	
DESCRIPTION	C.Y.
SITE EARTHWORK VOLUME	1500
BUILDING EARTHWORK VOLUME	1500
TOTAL EARTHWORK VOLUME	3100

- NOTES:
- ESTABLISH A PERMANENT ACCESSIBLE ELEVATION REFERENCE WITHIN 100 FEET OF THE RETENTION AREA DISCHARGE.
 - NO. 100 GRAVEL FILL TO BE PLACED IN CANAL BOTTOM DISCHARGE.
 - PER NPS SURVEY 5/72/07 ELEVATION = -12.0.
 - SEE SHEET C-2 FOR SEDIMENT & EROSION CONTROL. SEE SHEET C20 FOR SEDIMENT & EROSION CONTROL DETAILS.

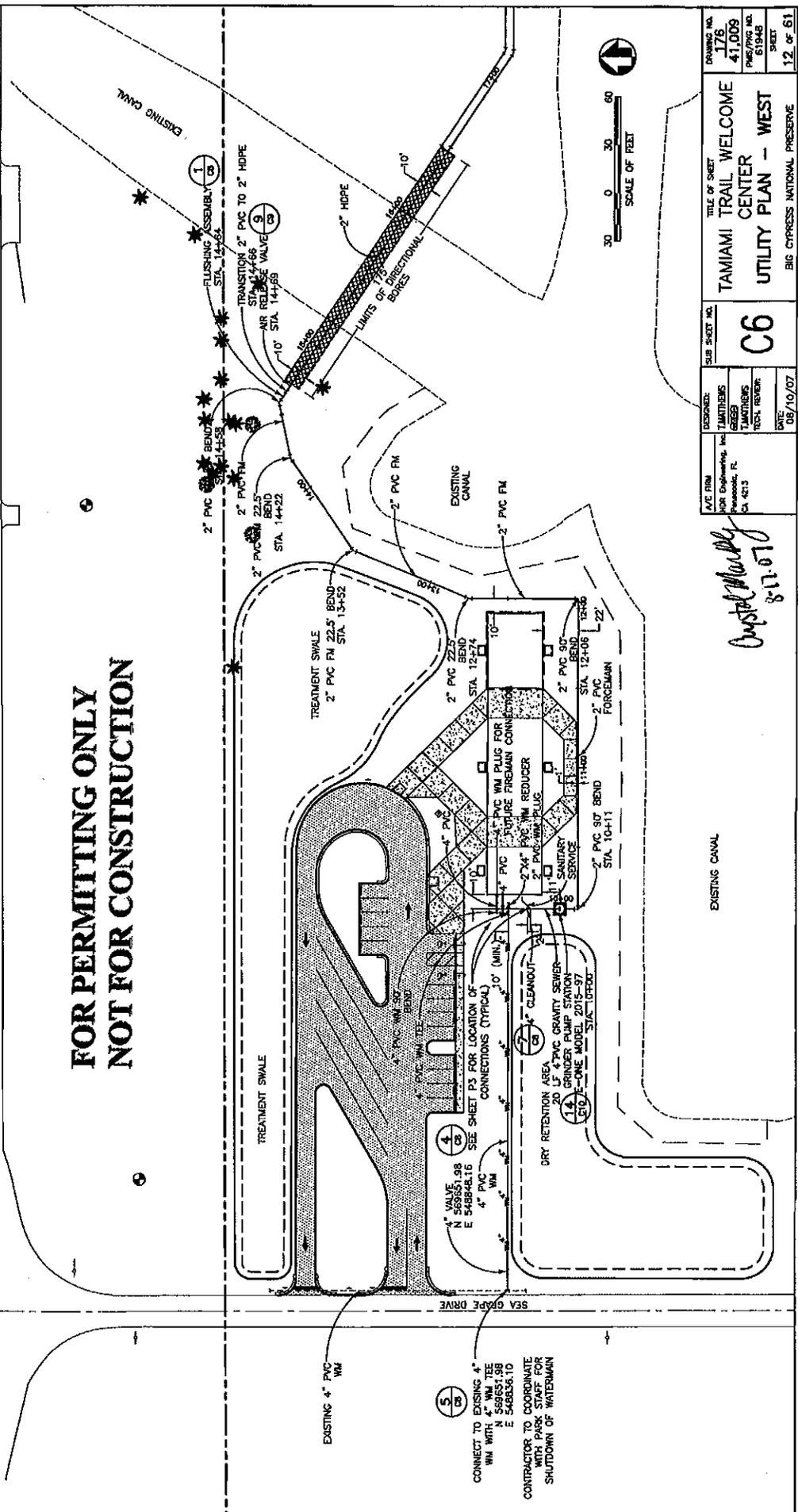
DRAINAGE STRUCTURE TABLE			
NO.	EASTING	DESCRIPTION	INT.
S-1	1569528.13	E-63914-2.1 CONTROL STRUCTURE	2.50
S-2	1569528.13	E-63954-2.0 MES INTO CANAL	2.40

DATE	08/10/07
TECH. REVIEWER	TJ/THREMS
DESIGNED BY	TJ/THREMS
DRAMAING NO.	176
PROJECT NO.	61945
SHEET NO.	11 OF 61
C5	
TAMAMI TRAIL WELCOME CENTER GRADING/DRAINAGE PLAN	
BIC CIPRESS NATIONAL PRESERVE	

NOTE:
SEE SHEET C11 FOR TURN LANE IMPROVEMENT
PROJECT LIMITS

S.R. 90 / U.S. NO. 41
TAMIAMI TRAIL EAST

**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**



DESIGNED BY: TAMMINGS GEGES	DATE: 08/10/07	DRIVING NO. 176	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER UTILITY PLAN - WEST
APPROVED BY: TAMMINGS TECH. REVIEWER:		PROJECT NO. 61948	
		SHEET 12 OF 61	

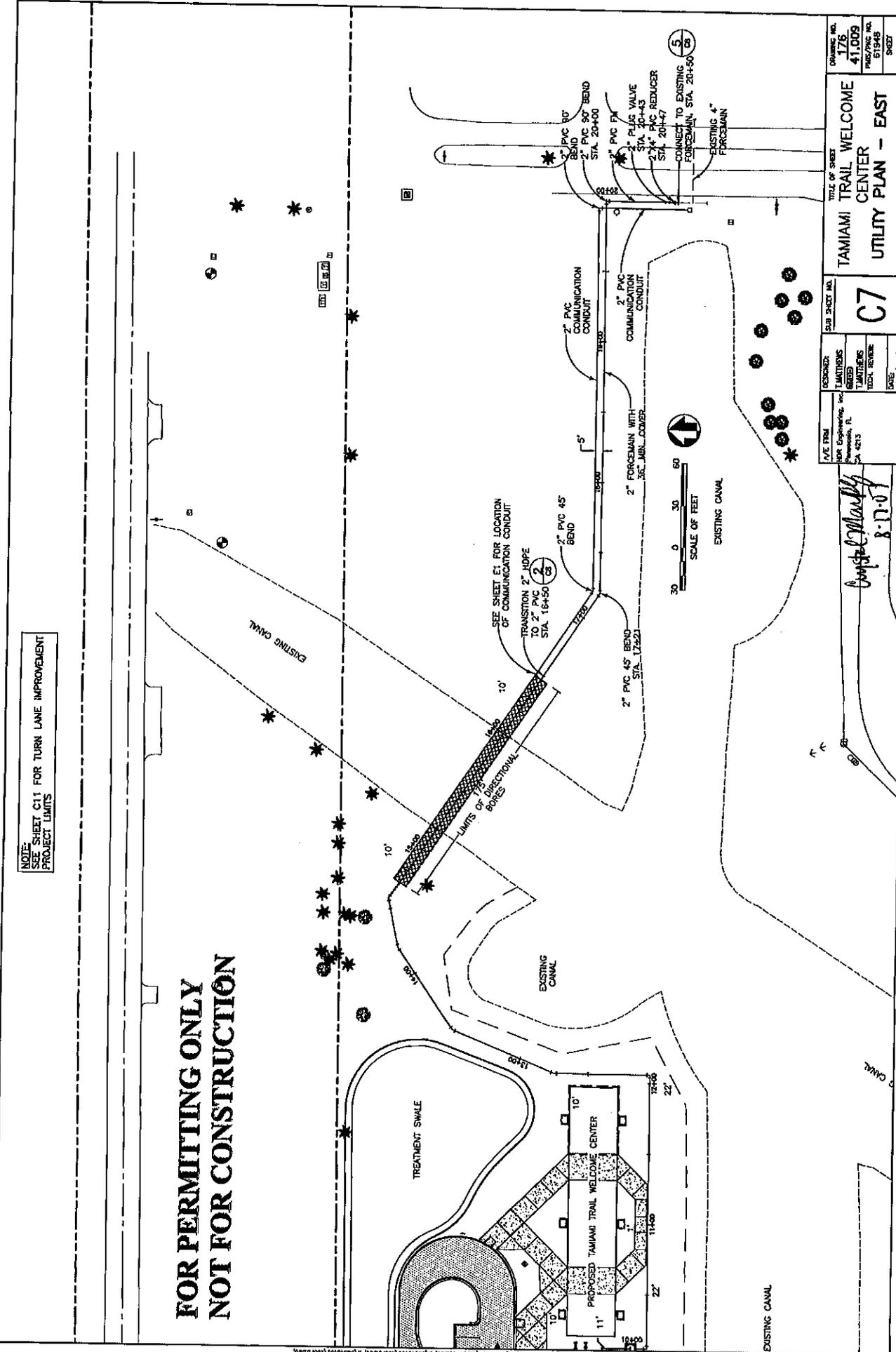
Justin Murphy
8-11-07

11/07/07 10:30 AM C:\WORKING\TAMMINGS\070607-38\070607-38.dwg (PLOT) 11/07/07 10:30 AM

NOTE:
SEE SHEET C11 FOR TURN LANE IMPROVEMENT
PROJECT LIMITS

**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**

11/07 1:54 ROOM 118 C:\PWS000\PROJECTS\070607-38\070607-38.dwg (PLOT) 11/07/07 1:54

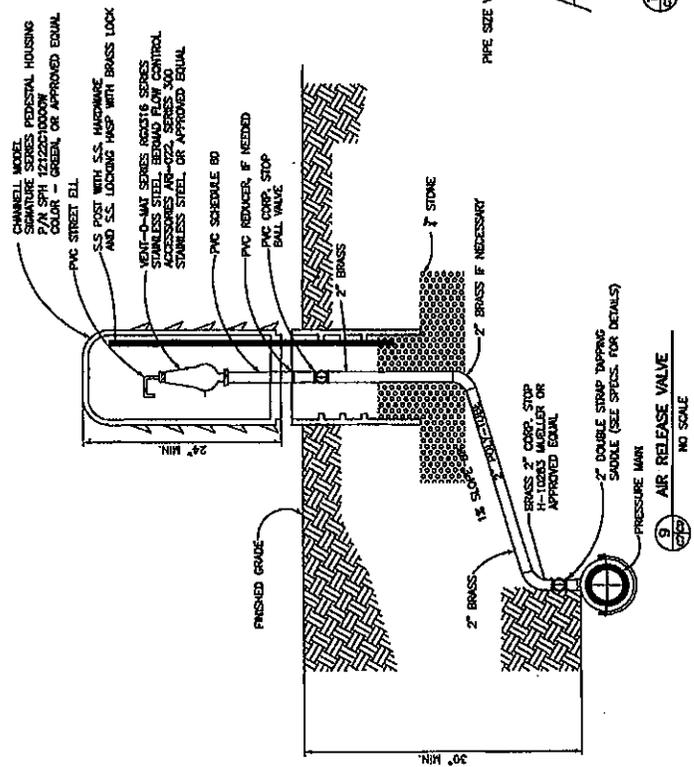
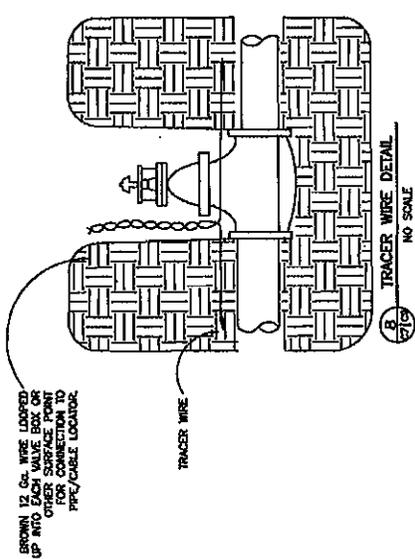
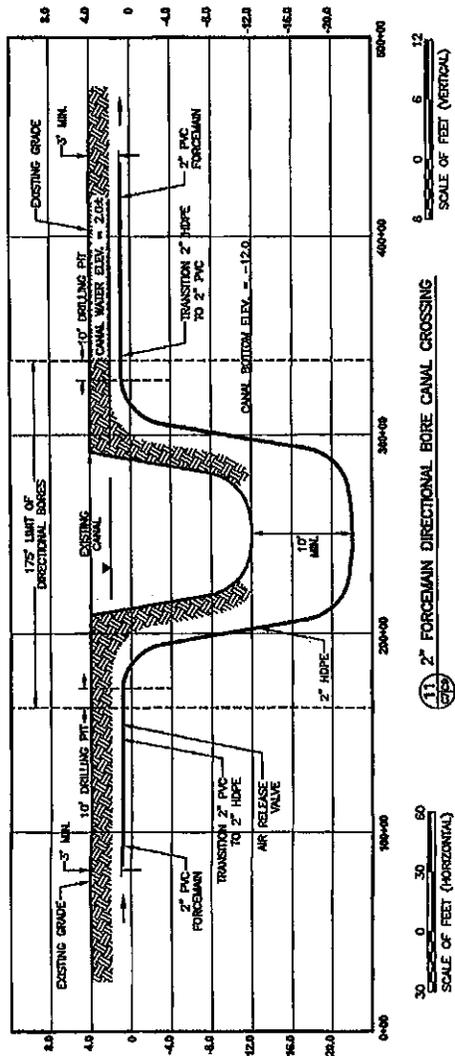


DRAWING NO.	1776
PROJECT NO.	411009
PWD/PAC NO.	67948
SHEET	13 of 61

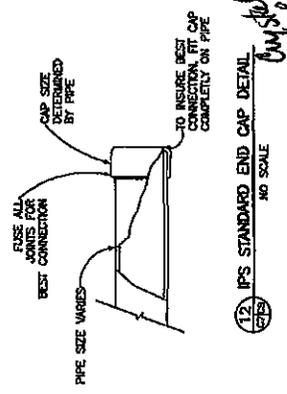
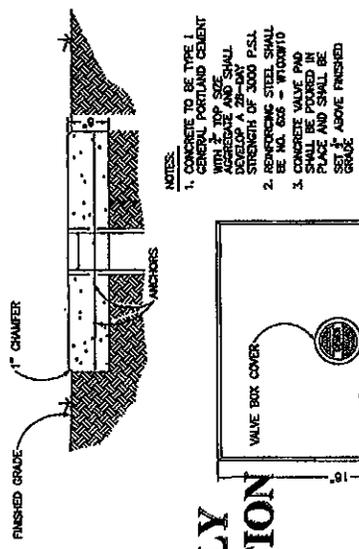
TITLE OF SHEET	TAMIAMI TRAIL WELCOME CENTER UTILITY PLAN - EAST
DESIGNED BY	T. MATTHEWS
CHECKED BY	T. MATTHEWS
DATE	08/10/07

Amber Mary
8.17.07

Exhibit 2.07
Application No. 070607-38
Page 1 of 1



**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**

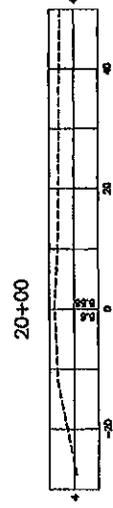
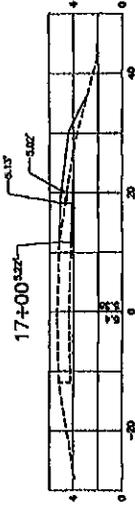
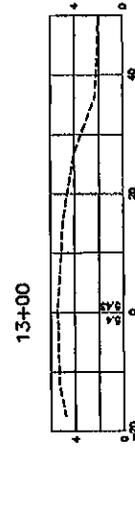
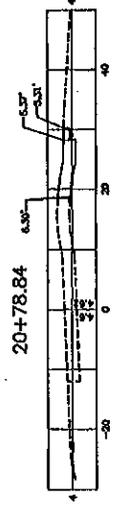
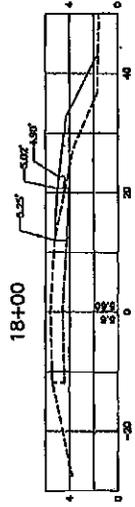
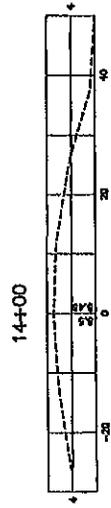
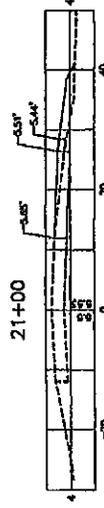
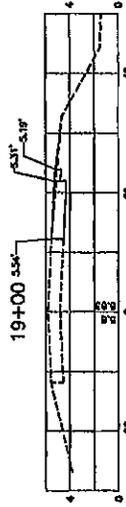
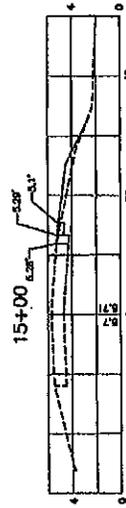
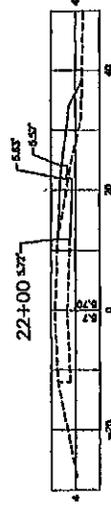
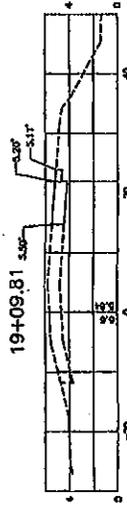


- NOTES:**
1. CONCRETE TO BE TYPE I, PORTLAND CEMENT ADMIXTURE AND SHALL DEVELOP A 28-DAY STRENGTH OF 3000 P.S.I.
 2. REINFORCING STEEL SHALL BE NO. 6'S - #10@18" O.C.
 3. CHAMFER SHALL BE SET 1" ABOVE FINISHED GRADE

DRIVING NO.	178
DATE	41,009
PMS/PC NO.	61945
SHEET	15 of 61
TITLE OF SHEET	TAMIAMI TRAIL WELCOME CENTER FORCEMAIN/ARV DETAILS
SUB SHEET NO.	C9
RESPOND:	ORLENER
DESIGNER:	ORLENER
CHECK ENGINEER:	ORLENER
DATE	08/19/07

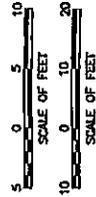
9/17/10 11:35 AM R10 (C:\WORK\77\77\MS\10493\CR20)

**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**



GOVERNING STANDARDS AND SPECIFICATIONS OF FLORIDA DEPARTMENT OF TRANSPORTATION DESIGN STANDARDS DATED 2006, AND STANDARDS FOR ROAD AND BRIDGE CONSTRUCTION DATED 2006 AS AMENDED BY CONTRACT DOCUMENTS.

For Design Standards Modifications click on "Design Standards" at the following web site: <http://www.dot.state.fl.us/design>



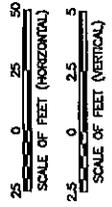
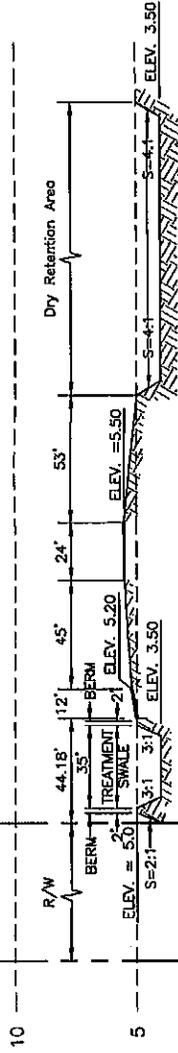
VERTICAL SCALE

HORIZONTAL SCALE

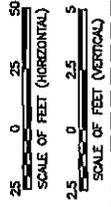
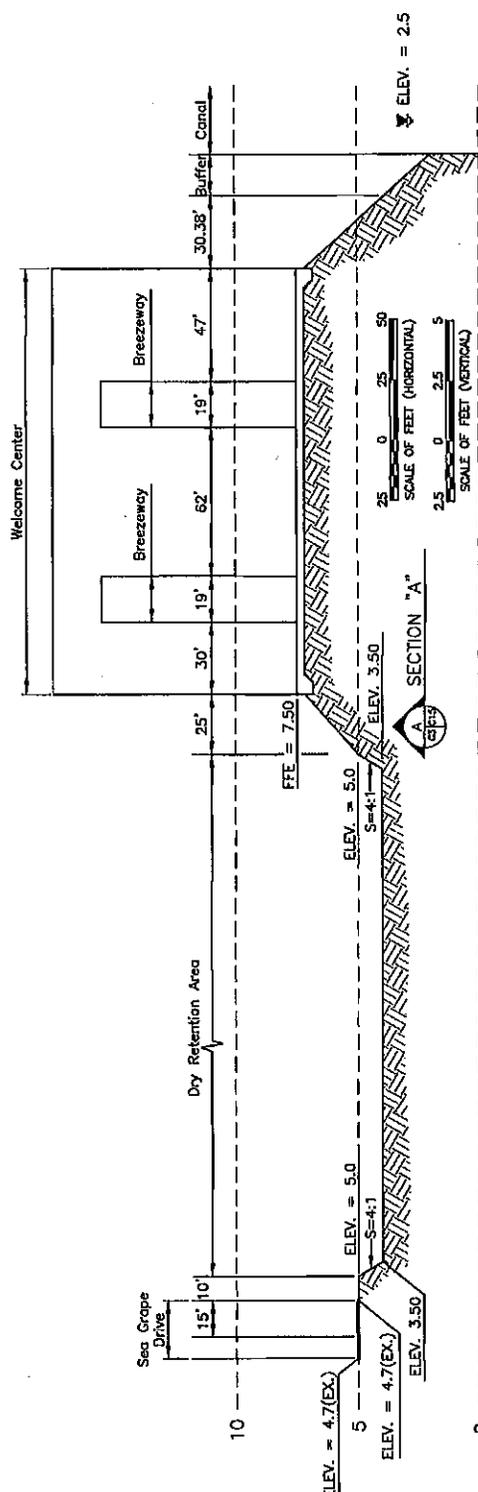
Handwritten signature: Mike Murphy
Date: 8-17-07

DATE PLOTTED 08/10/07	DESIGNER GREEN	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER	DRAWING NO. 176
DATE PLOTTED 08/10/07	TITLE OF SHEET C13 CROSS SECTIONS U.S. 41	PROJECT NO. 110159	SHEET NO. 19 OF 61
DATE PLOTTED 08/10/07	PROJECT NO. 110159	PROJECT NAME TAMIAMI TRAIL WELCOME CENTER	PROJECT LOCATION EGC CYPRESS NATIONAL PRESERVE

**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**



B
SECTION "B"



A
SECTION "A"

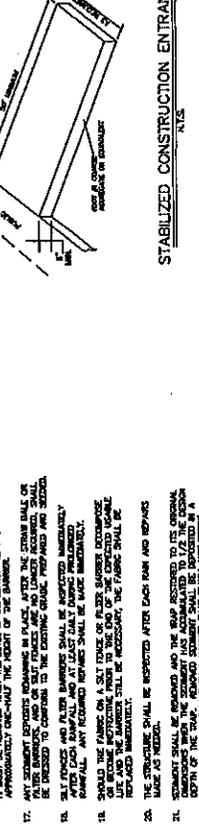
Crystal Hardy
8.17.07

DATE 08/10/07	DESIGNED BY WATKINS	SHEET NO. C15	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER	DRAWING NO. 178
DATE 08/10/07	DESIGNED BY WATKINS	SHEET NO. C15	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER	DRAWING NO. 41,009
DATE 08/10/07	DESIGNED BY WATKINS	SHEET NO. C15	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER	DRAWING NO. 61948
DATE 08/10/07	DESIGNED BY WATKINS	SHEET NO. C15	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER	DRAWING NO. 21 of 61

SEDIMENT AND EROSION CONTROL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SILT FROM SITE IF NOT REMOVED BY THE CONTRACTOR'S EROSION CONTROL MEASURES.
2. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING THE TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND ONLY WHEN AREAS HAVE BEEN STABILIZED.
3. ADDITIONAL PREVENTION - SLOPE PROTECTION - SLOPE PROTECTION SHALL BE INSTALLED TO PREVENT EROSION OF EXPOSED SLOPES. THE PROTECTIVE MEASURES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
4. CONTRACTOR SHALL ENSURE THAT ALL DRAINAGE STRUCTURES, TRENCHES, ETC. ARE CLEANED OUT AND REMAIN FREE OF ALL DEBRIS.
5. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
6. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
7. IF THE SLOPE PROTECTION IS DAMAGED OR REMOVED, THE CONTRACTOR SHALL REPAIR OR REPLACE THE SLOPE PROTECTION WITHIN 24 HOURS OF THE DAMAGE OR REMOVAL.
8. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
9. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
10. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
11. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
12. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
13. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
14. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
15. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
16. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
17. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
18. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
19. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
20. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
21. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
22. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
23. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
24. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
25. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
26. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
27. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
28. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
29. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
30. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
31. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
32. SLOPE PROTECTION SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.

33. THE CONTRACTOR IS RESPONSIBLE FOR FOLLOWING THE BEST EROSION AND SEDIMENT CONTROL PRACTICES AS OUTLINED IN THE PLAN AND SPECIFICATIONS AND ANY OTHER APPLICABLE REGULATIONS.
34. EROSION AND SEDIMENT CONTROL BARRIERS SHALL BE PLACED ALONG ALL EXPOSED SLOPES AND AREAS WHERE EROSION IS LIKELY TO OCCUR. BARRIERS SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION.
35. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
36. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
37. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
38. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
39. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
40. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
41. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
42. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
43. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
44. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
45. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
46. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
47. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
48. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
49. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.
50. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL DEVICES THROUGHOUT CONSTRUCTION AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY DEVICES THAT ARE DAMAGED OR REMOVED.



PROPER PLACEMENT OF A FILTER BARRIER IN DRAINAGE WAY
N.T.S.



CONSTRUCTION OF A STRAW BALE BARRIER
N.T.S.

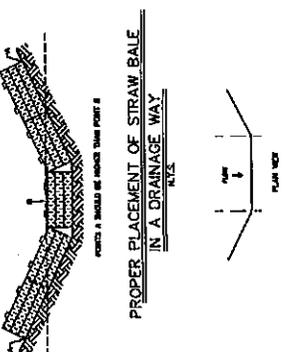


CONSTRUCTION OF A FILTER BARRIER
N.T.S.



CROSS-SECTION OF A PROPERLY INSTALLED STRAW BALE
N.T.S.

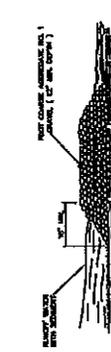
CONSTRUCTION OF SILT FENCE



CONSTRUCTION OF SILT FENCE
N.T.S.



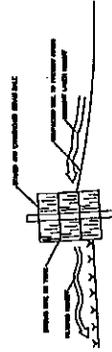
PROPER PLACEMENT OF A STRAW BALE BARRIER IN A DRAINAGE WAY
N.T.S.



CONSTRUCTION OF A STRAW BALE BARRIER
N.T.S.



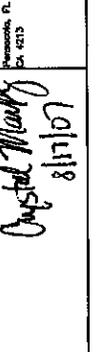
CONSTRUCTION OF A FILTER BARRIER
N.T.S.



CROSS-SECTION OF A PROPERLY INSTALLED STRAW BALE
N.T.S.



CONSTRUCTION OF A STRAW BALE BARRIER
N.T.S.



CONSTRUCTION OF A FILTER BARRIER
N.T.S.

DESIGNED BY: M. J. BROWN	CHECKED BY: M. J. BROWN	DATE: 09/10/07	DRAWING NO. 176
FOR ENGINEERING AND CONSTRUCTION: M. J. BROWN	DATE: 09/10/07	TITLE OF SHEET TAMIAMI TRAIL WELCOME CENTER SEDIMENT & EROSION CONTROL DETAILS	PROJECT NO. 615448
SHEET NO. C20		SHEET TOTAL 26 OF 61	

Crystal Mundy
8/17/07

**FOR PERMITTING ONLY
NOT FOR CONSTRUCTION**

HDR

Wetland Mitigation/
Monitoring/Maintenance Plan

TAMIAMI TRAIL WELCOME CENTER
COLLIER COUNTY, FL

FOR
NATIONAL PARK SERVICE

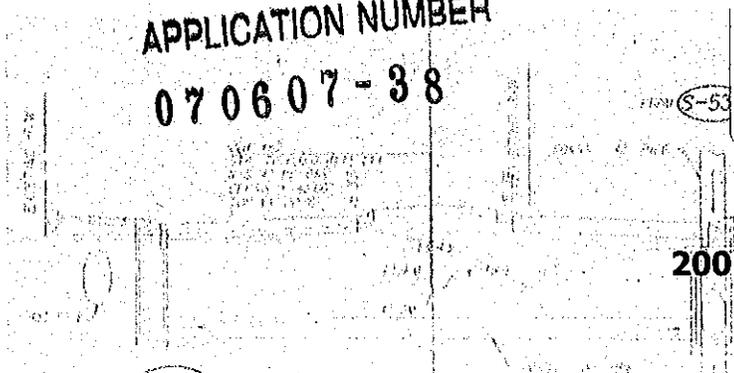
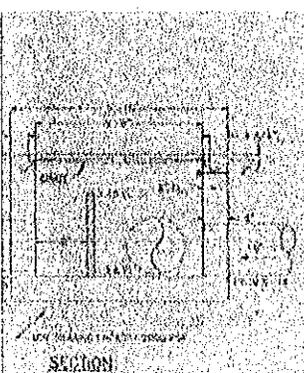
Environmental Resource Permit
Application No.: 070607-38

10/07

APPLICATION NUMBER
070607-38

Exhibit 3.0
Application No. 070607-38
Page 1 of 11

Prepared by
HDR Engineering, Inc.
200 W. Forsyth Street, Suite 800
Jacksonville, FL 32202



WETLAND MITIGATION/MONITORING/MAINTENANCE PLAN

Introduction

As part of the National Park Service's (NPS) plans to construct the Tamiami Trail Welcome Center project, the following outlines the wetland mitigation plan for wetland impacts due to the turn lane improvements constructed as part of the welcome center. The turn lane improvements will result in impacts to approximately 0.017 ac of South Florida Water Management District Jurisdictional wetlands. In order to offset the loss of these wetlands, an area of off-site wetlands, approximately 0.3 ac, will be restored and preserved. The restoration area is located within the Big Cypress National Preserve, about 2000 feet away from the Welcome Center project Site.

Project History

The proposed restoration site was previously issued a no notice general permit for activities in uplands to remove 2 feet of fill and return the area to the original wetlands elevation. The No Notice Application (No. was 060112-4), was issued from SFWMD on February 9, 2006.

Off-Site Mitigation Plan

The mitigation plan involves restoring 0.3 ac of off-site uplands located near the Big Cypress National Preserve headquarters, near the proposed welcome center project. Table 1 provides a summary of the area within the mitigation area.

Table 1. Mitigation area summary and existing and proposed habitats

Mitigation Area	Existing Habitat	Exotic Coverage	Existing FLUCFCS Code	Mitigation Area Target Habitat	Approximate Mitigation Acreage
Uplands	Open Land, Disturbed	0-24%	194	Wet Prairie (643)	0.3

ADD/REVISED SUBMITTAL
OCT 22 2007
LWC SERVICE CENTER

APPLICATION NUMBER
070607-38

Existing Habitat:

The following lists some of the vascular plants commonly found on the Tamiami Trail Welcome Center mitigation site. The site substrate is mostly calcareous spoil that supports ruderal ground cover with occasional shrubs and trees. Exotic plants are common.

The following plants dominate the ground cover community:

<i>Bidens alba</i>	beggar ticks
<i>Cladium jamaicense</i>	sawgrass
<i>Eustachys petraea</i>	grass
<i>Flaveria linearis</i>	yellowtop
<i>Gaura angustifolia</i>	gaura
<i>Lantana depressa</i>	lantana
<i>Pluchea rosea</i>	fleabane
<i>Samolus ebracteatus</i>	pimpernel
* <i>Spermacoce verticillata</i>	--
<i>Sporobolus virginicus</i>	smutgrass
<i>Stachytarpheta jamaicense</i>	porterweed

The following plants were found as groundcover or shrubs and trees:

<i>Ambrosia artemisiifolia</i>	ragweed
<i>Ampelopsis arborea</i>	pepper vine
<i>Baccharis halimifolia</i>	saltbush
<i>Cenchrus incertus</i>	sandspur
<i>Cornus foemina</i>	Florida dogwood
<i>Crotalaria rotundifolia</i>	rabbit bells
<i>Desmanthus virgatus</i>	wild tantan
* <i>Desmodium tortuosum</i>	--
<i>Fimbristilis spathacea</i>	hurricane grass
<i>Lippia nodiflora</i>	carpetweed
<i>Myrica cerifera</i>	wax myrtle
<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Persea borbonia</i>	red bay
<i>Polygala grandiflora</i>	candyroot
<i>Polypremum procumbens</i>	rustweed
<i>Randia aculeata</i>	indigo berry
<i>Rapanea punctata</i>	myrsine
<i>Rudbeckia hirta</i>	blackeyed Susan
<i>Sabal palmetto</i>	sabal palm
* <i>Schinus terebinthifolius</i>	Brazilian pepper
<i>Sideroxylon celastrina</i>	buckthorn
<i>Solidago stricta</i>	goldenrod
<i>Stenotaphrum secundatum</i>	St. Augustine grass
<i>Stylosanthes hamata</i>	cheesytoes
* <i>Syzygium cumini</i>	Java plum
<i>Toxicodendron radicans</i>	poison ivy
<i>Vitis cineria</i>	graybark grape
<i>Waltheria indica</i>	sleepy morning

* non-native plant

Proposed Habitat:

The following lists some of the vascular plants commonly found in the wet prairie communities adjacent to the Tamiami Trail Welcome Center mitigation site. These are plants that are representative of this community and may be expected to populate the mitigation site through natural recruitment and establishment; these populations can be expected to change with time and succession.

<i>Acer rubrum</i>	red maple
<i>Annona glabra</i>	pond apple
<i>Aster tenuifolius</i>	aster
<i>Baccharis halimifolia</i>	salt bush
<i>Bacopa caroliniana</i>	hyssop
<i>Cephalanthus occidentalis</i>	button bush
<i>Cladium jamaicense</i>	saw grass
<i>Conocarpus erectus</i>	buttonwood
<i>Cornus foemina</i>	Florida dogwood
<i>Crinum americanum</i>	swamp lilly
<i>Diodia virginiana</i>	button weed
<i>Eleocharis cellulosa</i>	spike rush
<i>Erianthus giganteus</i>	plumegrass
<i>Eupatorium mikanioides</i>	semaphore eupatorium
<i>Flaveria linearis</i>	yellowtop
<i>Ipomoea sagittata</i>	morning glory
<i>Juncus roemerianus</i>	beakrush
<i>Kosteletzkya virginica</i>	saltmarsh mallow
<i>Lobelia glandulosa</i>	--
<i>Ludwigia octovalvis</i>	water primrose
<i>Ludwigia repens</i>	red ludwigia
<i>Lythrum alatum</i>	loosestrife
<i>Mikania scandens</i>	hempweed
<i>Muhlenbergia capillaris</i>	muhly grass
<i>Myrica cerifera</i>	wax myrtle
<i>Panicum hemitomom</i>	maiden cane
<i>Phragmites australis</i>	reed
<i>Piriqueta caroliniana</i>	stripeseed
<i>Pluchea odorata</i>	fleabane
<i>Pluchea rosea</i>	fleabane
<i>Proserpinaca pectinata</i>	mermaid weed
<i>Rhynchospora divergens</i>	beakrush
<i>Sagittaria lancifolia</i>	duck potato
<i>Salix caroliniana</i>	willow
<i>Schizachyrium rhizomatum</i>	south Florida bluestem
<i>Spartina bakeri</i>	sand cord grass
<i>Typha domingensis</i>	cat tail
<i>Utricularia foliosa</i>	bladderwort

During the monitoring program, regular observations of wildlife will be made in the restoration area through both visual means and inspection of physical evidence.

Rainfall Monitoring

Rainfall will be monitored during the program by use of a NOAA weather monitoring location near the restoration site. This data will be included in the annual monitoring report submitted to SFWMD.

Photographic Documentation

Photograph stations have been identified in the restoration area. These locations will be used to document the physical condition of the restoration area during the five year monitoring program. Figure 4 shows the location of the photographic stations.

Monitoring Reports

Annual monitoring reports will be prepared by the permittee and submitted to the SFWMD. These annual reports will provide documentation of the success of the mitigation program and the general condition of the enhanced area. Within 60 days of permit issuance, the baseline monitoring for the wetland enhancement area will be submitted to SFWMD. The time zero report will be submitted within 60 days of the fill excavation activities.

Annual monitoring reports will consist of the following information:

1. Narrative description of the enhancement activities performed since the last report
2. Explanation of maintenance work to be conducted over the next year
3. List of wildlife species observed
4. Results of vegetative monitoring
5. Photographs taken at photo station locations
6. Rainfall data from local NOAA weather station

Long Term Maintenance

Following the removal of 2 ft of fill on the site, annual inspections of the mitigation area will occur for the five years of the monitoring program. The inspections will be performed by a qualified ecologist. The mitigation site will be inspected, and locations of exotic and/or nuisance species identified to be treated and removed. Notations will be made of any potential problems identified during the inspection. The site will be continually maintained to ensure no more than five percent total cover by exotics and nuisance species.

Work Schedule Plan

The following work schedule outlines activities and dates for monitoring program execution:

MITIGATION ACTIVITY	DUE DATE
Baseline Monitoring Report	Within 60 days of permit issuance
Excavation of 2 ft site fill	November 2007
Time Zero monitoring report	January 2008
First monitoring report	January 2009
Second monitoring report	January 2010
Third monitoring report	January 2011
Fourth monitoring report	January 2012
Fifth monitoring report	January 2013

Financial Responsibility Requirements

The permittee for this project is a government agency (National Park Service) therefore documentation of financial responsibility is not required.



Figure 1. Site Map

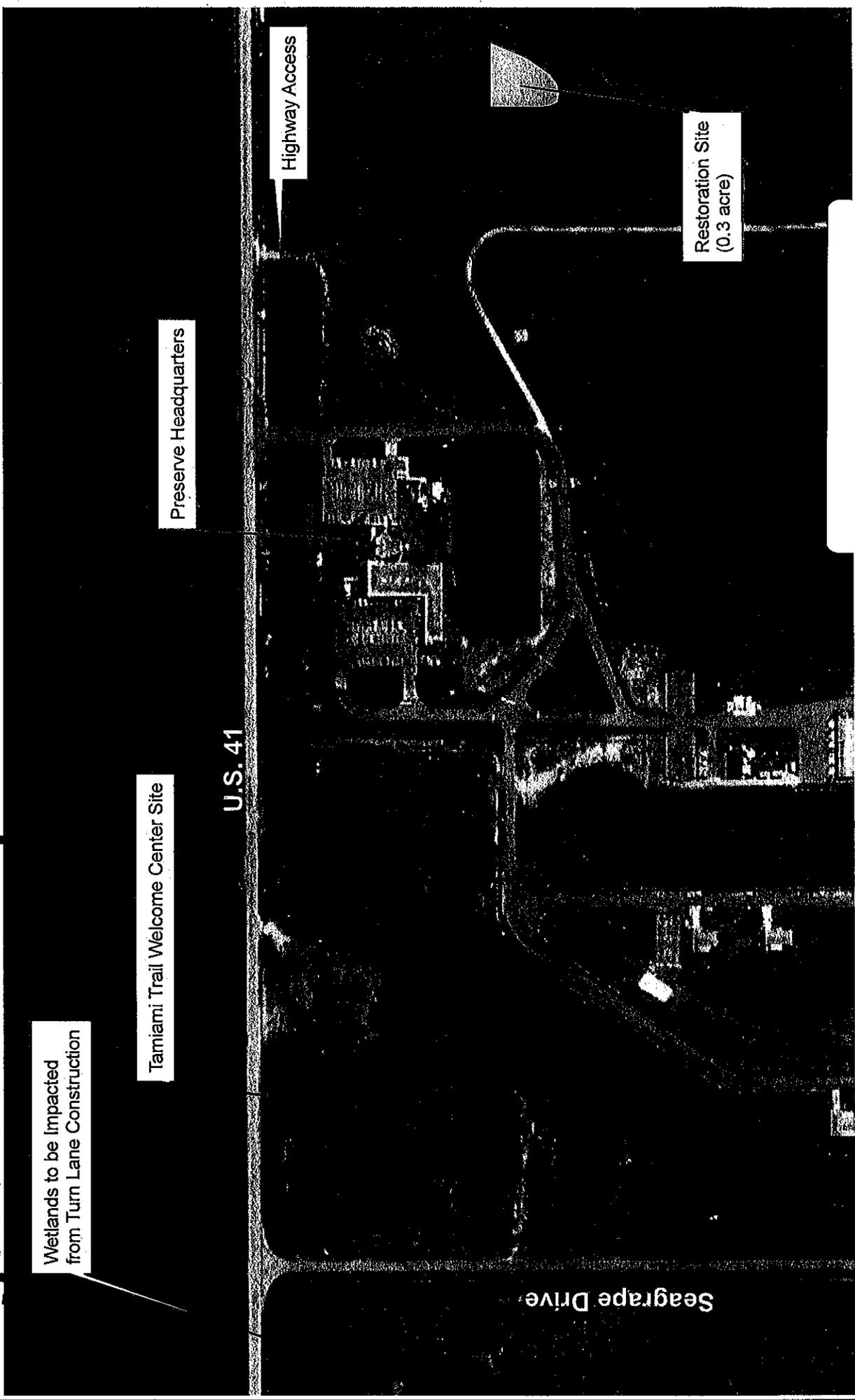


Figure 2. Wetland Restoration Site

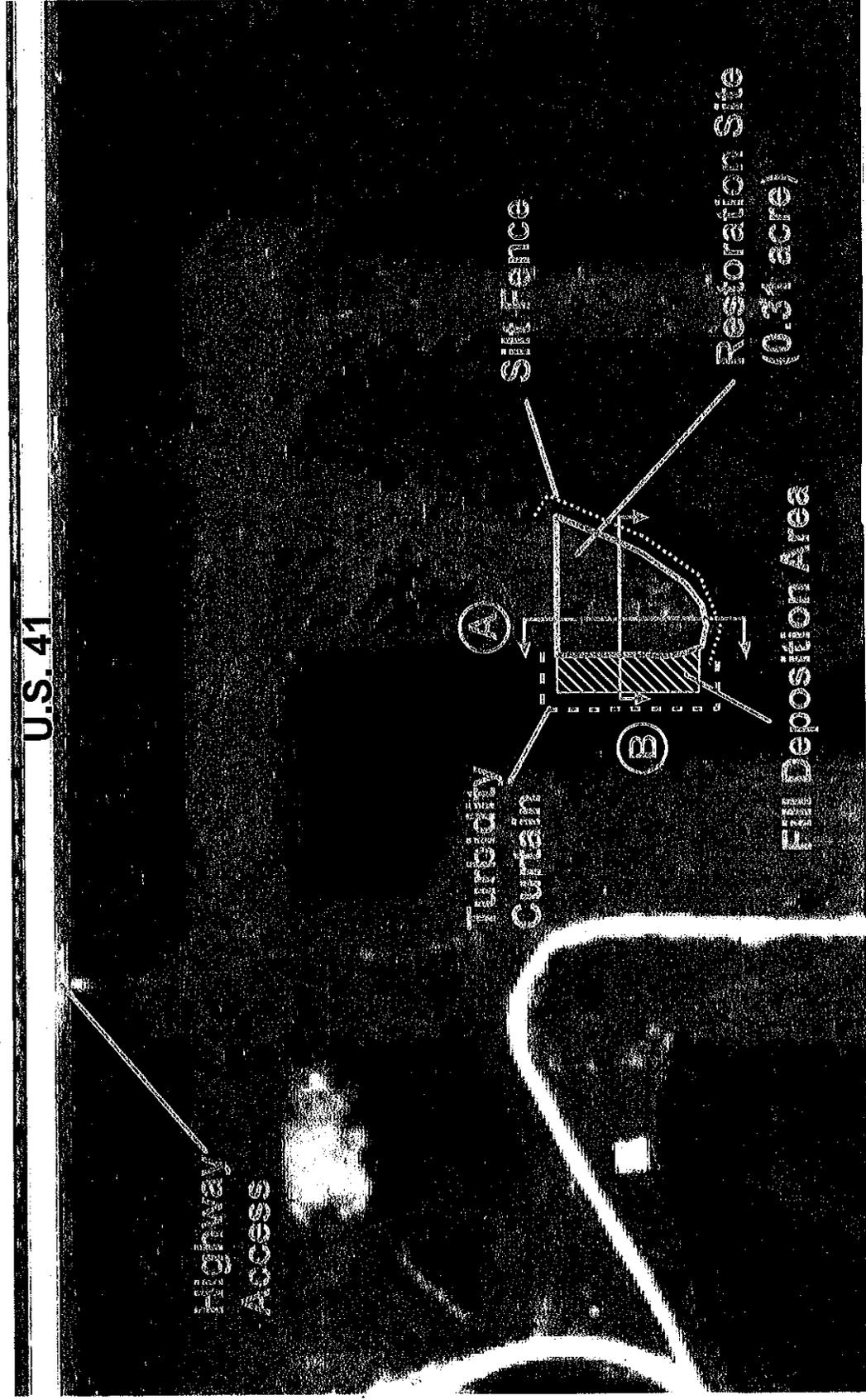
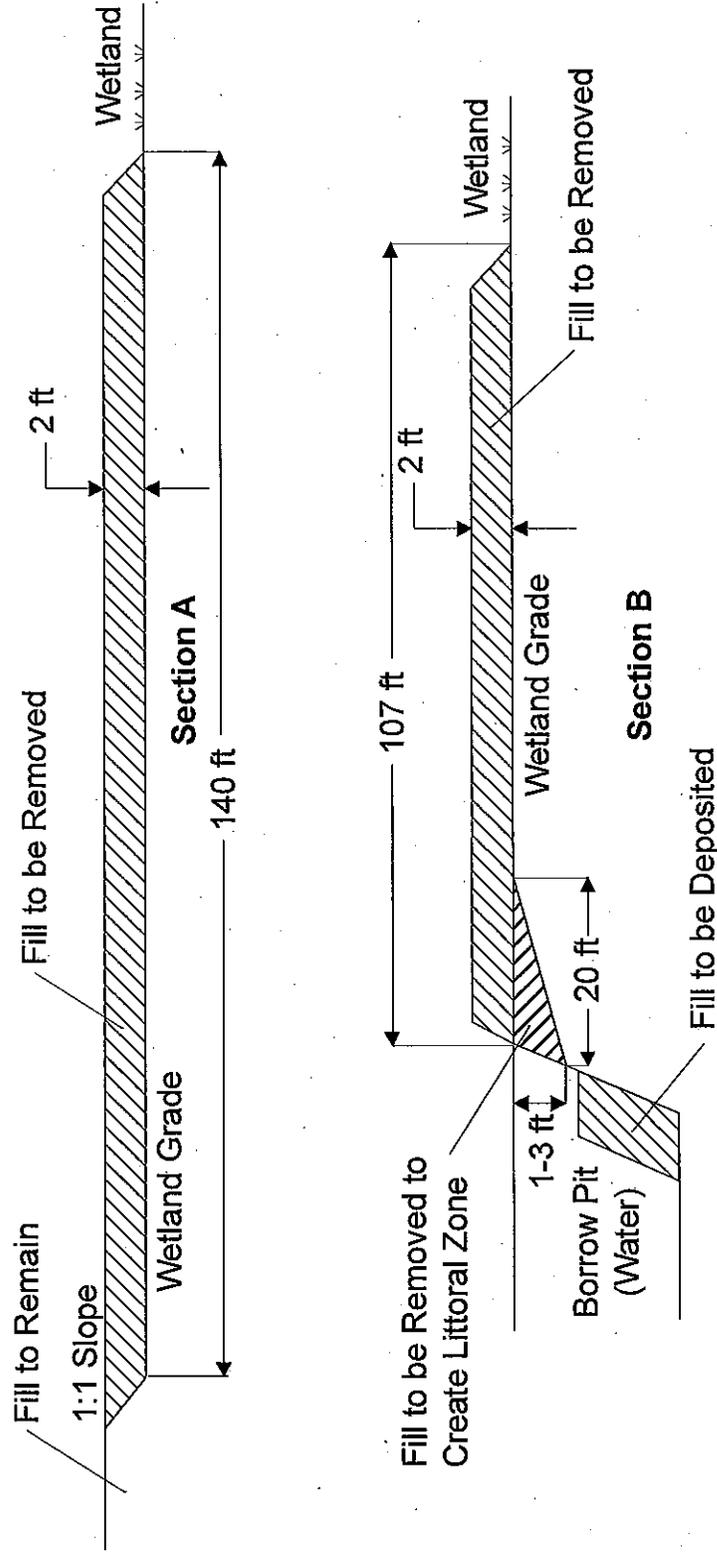


Figure 3. Restoration Site Cross-sections



Not to Scale



Figure 4. Photopoints and Transect

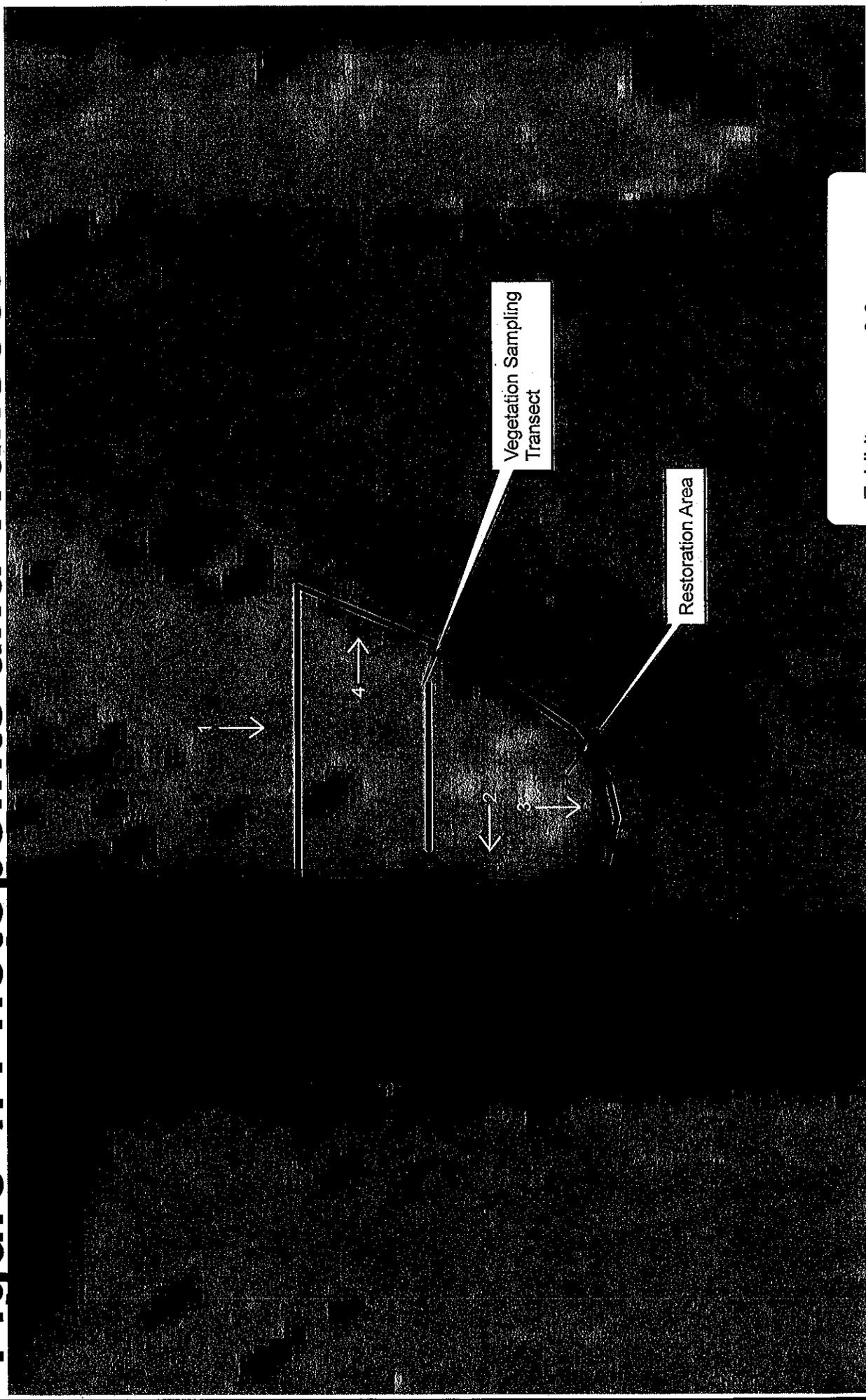


Exhibit 3.0
Application No. 070607-38
Page 11 of 11

October 2007

**South Florida Water Management District
Work Schedule Requirements**

Application No : 070607-38

Page 1 of 1

Mitigation Plan ID: WELCOME CENTER

Activity	Due Date
SUBMIT BASELINE MONITORING REPORT	30-JUN-08
EXCAVATION OF 2-FT SITE FILL	30-JUL-08
SUBMIT TIME ZERO MONITORING REPORT	30-SEP-08
SUBMIT FIRST MONITORING REPORT	30-SEP-09
SUBMIT SECOND MONITORING REPORT	30-SEP-10
SUBMIT THIRD MONITORING REPORT	30-SEP-11
SUBMIT FOURTH MONITORING REPORT	30-SEP-12
SUBMIT FIFTH MONITORING REPORT	30-SEP-13

CONSTRUCTION POLLUTION PREVENTION PLAN
for
Tamiami Trail Welcome Center

SITE DESCRIPTION			
Project Name and Location: (Latitude, Longitude, or Address)	Tamiami Trail Welcome Center Big Cypress National Preserve Ochopee, FL 34141	Owner Name and Address:	National Park Service- Big Cypress National Preserve 33100 Tamiami Trail E Ochopee, FL 34141
Description: (Purpose and Types of Soil Disturbing Activities)	<p>Construction in this project will generally consist of site clearing, stormwater pond and swale excavation, and construction of turn lane, parking lot, utility infrastructure, and welcome center construction.</p> <p>Soil disturbing activities will include: clearing and grubbing, perimeter berming and other erosion and sediment controls; grading; excavation for the storm water management facilities, utilities, and building foundations; construction of curb and gutter, road, and parking areas; and preparation for final planting, sodding, seeding and mulching.</p>		
Runoff Coefficient:	0.84		
Site Area:	3.38 acres		
Sequence of Major Activities:			
The order of activities will be as follows:			
<ol style="list-style-type: none"> 1. Install erosion control BMP's 2. Clear and Grub, construct swale and dry retention area and bleeder. 3. Install utilities. 4. Construct buildings. 5. Construct parking lot and sidewalks 6. Install landscaping. 7. Remove erosion control BMP's 			
Name of Receiving Waters:	Big Cypress National Preserve, via an existing canal		
CONTROLS			
Erosion and Sediment Controls			
Stabilization Practices			
<p>Temporary Stabilization: Top soil stock piles and disturbed portions of the site where construction activity temporarily cease for at least 21 days will be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in that area. The seed shall be Bahia, millet, rye, or other fast-growing grasses. Prior to seeding, fertilizer or agricultural limestone shall be applied to each area to be temporarily stabilized. After seeding, each area shall be mulched with the mulch disked into place. Areas of the site which will be paved will be temporarily stabilized by applying limerock subgrade until bituminous pavement can be applied.</p> <p>Permanent Stabilization: Disturbed portions of the site, where construction activities permanently cease, shall be stabilized with sod, seed and mulch, landscaping, and/or other equivalent stabilization measures (e.g., rip-rap, geotextiles) no later than 14 days after the date of the last construction activity. After seeding, each area shall be mulched with the mulch disked into place.</p>			

APPLICATION NUMBER

070607-38 =

ADD/REVISED SUBMITTAL

OCT 22

LWC SERVICE

Exhibit 4.0
Application No. 070607-38
Page 1 of 10

CONTROLS (Continued)

Structural Practices

Silt Fence / Straw Bale Barrier - will be constructed along those areas of the project that border adjacent wetlands. At a minimum, the silt fence and/or straw bale barrier will be placed along all wetlands as shown in the plans.

Along the canal, a double layer of staked silt fence will be installed. Turbidity barrier will be placed as needed.

Storm Water Management

The project will utilize a system of retention area and swales to provide the required water quality treatment and attenuation. Discharges from the retention area will be regulated by a control structure. The control structure will be used to restrict the discharges from the project as described above. Pre-treatment will be provided via overland flow prior to discharge into the retention area and swale.

OTHER CONTROLS

Waste disposal:

Waste Materials:

All waste materials will be collected and stored in a trash dumpster which will meet all local and State solid waste management regulations. All trash and construction debris from the site will be deposited in this dumpster. The dumpster will be emptied as required due to use and/or State and local regulations, with the trash disposed of at the appropriate landfill operation. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the construction office trailer.

Hazardous Waste:

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices.

Sanitary Waste:

All sanitary waste will be collected from the portable units by a local, licensed, waste management contractor, as required by local regulation.

Offsite Vehicle Tracking:

A clearly marked entrance will be provided to help reduce vehicle tracking of sediment. As they are completed, paved streets will be swept as needed to remove any excess muck, dirt, or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

TIMING OF CONTROLS/MEASURES

Installation of hay bail / silt fence barriers (around wetlands) will be constructed prior to extensive clearing or grading of any other portions of the site. Areas where construction activity temporarily ceases for more than 21 days will be stabilized with a temporary seed and mulch within 14 days of the last disturbance. Once construction activity ceases permanently in an area, that area will be stabilized with permanent sod, seed and mulch, landscaping, and/or other equivalent stabilization measures (e.g., rip-rap, geotextiles). After the entire site is stabilized, the silt fence / straw bale barriers can be removed.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

The storm water pollution prevention plan reflects the United States Environmental Protection Agency and the South Florida Water Management District (SFWWD) requirements for storm water management and erosion and sediment control, as established in the Chapter 40E-4 FAC and Chapter 373 FS.

Exhibit 4.0
Application No. 070607-38
Page 2 of 10

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls.

- ◆ All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater.
- ◆ All measures will be maintained in good working order; if a repair is necessary, it shall be corrected as soon as possible, but in no case later than 7 days after the inspection.
- ◆ Built up sediment will be removed from silt fence when it has reached one-half the height of the fence.
- ◆ Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- ◆ Temporary seeding and permanent sodding and planting will be inspected for bare spots, washouts, and healthy growth.
- ◆ A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.
- ◆ The Owner will appoint one individual who will be responsible for inspections, maintenance and repair activities, and for completing the inspection and maintenance reports.
- ◆ Personnel selected for inspection and maintenance responsibilities will receive training from the site superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

Non-Storm Water Discharge

It is expected that the following non-storm water discharges will occur from the site during the construction period:

- ◆ Water from water line flushings.
- ◆ Pavement wash waters (when no spills or leaks of toxic or hazardous materials have occurred).
- ◆ Uncontaminated groundwater (from dewatering excavation).
- ◆ All non-storm water discharges will be directed to the storm water management facilities prior to discharge.

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

- | | |
|-----------------------------|----------------------------|
| ◆ Concrete | ◆ Fertilizers |
| ◆ Detergents | ◆ Petroleum Based Products |
| ◆ Paints (enamel and latex) | ◆ Cleaning Solvents |
| ◆ Metal Studs | ◆ Wood |
| ◆ Asphalt | ◆ Masonry Block |
| ◆ Roofing Shingles | |

Exhibit 4.0
Application No. 070607-38
Page 3 of 10

Spill Prevention

Material Management Practices

The following are the materials management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

Good Housekeeping:

The following good housekeeping practices will be followed onsite during the construction project:

- ◆ An effort will be made to store only enough product required to do the job.
- ◆ All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers, and if possible, under a roof or other enclosure.
- ◆ Products will be kept in their original containers with the original manufacturer's label.
- ◆ Substances will not be mixed with one another unless recommended by the manufacturer.
- ◆ Whenever possible, all of a product will be used up before disposing of the container.
- ◆ Manufacturers' recommendations for proper use and disposal will be followed.
- ◆ The site superintendent will inspect to ensure proper use and disposal of materials onsite.

Hazardous Products:

These practices are used to reduce the risks associated with hazardous materials:

- ◆ Products will be kept in original containers unless they are not resealable.
- ◆ Original labels and material safety data will be retained; they contain important product information.
- ◆ If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

Product Specific Practices

The following product specific practices will be followed onsite:

Petroleum Products:

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which will be clearly labeled. Any asphalt substances used onsite will be applied in accordance with the manufacturer's recommendations and standard construction practices.

Fertilizers:

Fertilizers will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints:

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturers' instructions and/or state and local regulations.

Exhibit 4.0
Application No. 070607-38
Page 4 of 10

SPILL PREVENTION (Continued)

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup.

- ◆ Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- ◆ Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include--but not be limited to--rags, gloves, goggles, kitty litter, sand, and plastic and metal trash containers specifically for this purpose.
- ◆ All spills will be cleaned up as soon as possible after discovery.
- ◆ The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- ◆ Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, regardless of the size.
- ◆ The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
- ◆ The Contractor's site superintendent will be responsible for the day-to-day site operations and will be the spill prevention and cleanup coordinator. He will designate at least two other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.

Exhibit 4.0
Application No. 070607-38
Page 5 of 10

POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Print Name: _____

Title: _____

Date: _____

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signature	For	Responsible for
_____ Date: _____		

Exhibit 4.0
Application No. 070607-38
Page 6 of 10

CONSTRUCTION POLLUTION PREVENTION PLAN
for

Inspection And Maintenance Report Form

CHANGES REQUIRED TO THE POLLUTION PREVENTION PLAN:

REASONS FOR CHANGES:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature

Date

Exhibit 4.0
Application No. 070607-38
Page 10 of 10

**TAMIAMI TRAIL WELCOME CENTER
STORMWATER MANAGEMENT PROGRAM**

INTRODUCTION

This document provides details of the Urban Stormwater Management Program for the Tamiami Trail Welcome Center in Collier County. This Plan discusses non-structural controls, intended to improve the quality of stormwater runoff by reducing the generation and accumulation of potential stormwater runoff contaminants at or near the respective sources for each constituent, along with significant structural components of the primary stormwater treatment system. Although many of the methodologies and procedures outlined in this document are general Best Management Practices (BMP's) which can be useful in attenuating pollutants, the implementation of these practices has been optimized, to the maximum extent possible, to reflect the unique character of the Tamiami Trail Welcome Center and the surrounding hydrologic features.

Pollution prevention guidelines are provided for the areas of (1) nutrient and pesticide management; (2) solid waste management; (3) operation and maintenance of the stormwater management and treatment system; and (4) construction activities. A discussion of each of these activities is given in the following sections.

1.0 NUTRIENT AND PESTICIDE MANAGEMENT

Nutrient and pesticide management consists of a series of practices designed to manage the use of fertilizers and pesticides so as to minimize loss of these compounds into stormwater runoff and the resulting water quality impacts on adjacent water bodies. Implementation of a management plan will also maximize the effectiveness of the nutrients and pesticides that are applied.

The National Park Service must commit themselves to the practice of responsible and careful landscape design and maintenance of the site to prevent contamination of surface waters. These maintenance and management guidelines are meant to promote preserve the health of adjacent waterways and environmental features.

1.1 General Requirements

A landscape plan will be developed and implemented.

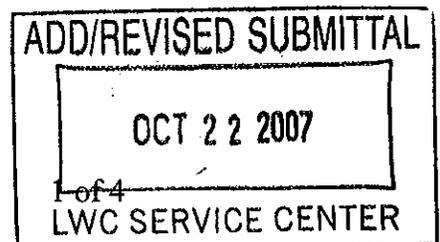
Commercial applicators of chemical lawn products must register with the National Park Service annually and provide a copy of their current occupational license, proof of business liability insurance, and proof of compliance with applicable education and licensing requirements. Individual employees working under the direction of a licensed commercial applicator are exempt from the educational requirements.

Exhibit	5.0
Application No.	070607-38
Page	1 of 4

APPLICATION NUMBER

070607-38

Tamiami Trail Welcome Center Stormwater Management Program



Only registered commercial applicators and properly trained National Park Service Maintenance Personnel are permitted to apply chemicals within the property. All chemical products must be used in accordance with the manufacturer's recommendations. The application of any chemical product within five (5) feet of any surface water including but not limited to ponds, lakes, drainage ditches or canals, is prohibited. The use of any chemical product in a manner that will allow airborne or waterborne entry of such products into surface water is prohibited. This rule shall not apply to the use of chemical agents, by certified lake management specialists, for the control of algae and vegetation within the stormwater lakes or ponds.

1.2 Nutrient Management Program

Management and application of nutrients and fertilizers in the Tamiami Trail Welcome Center will adhere to the following guidelines.

- A. All fertilizers shall be stored in a dry storage area protected from rainfall and ponding.
- B. No fertilizer containing in excess of 2% phosphate/phosphorus (P_2O_5) per guaranteed analysis label (as defined by Chapter 576, Florida Statutes) shall be applied to turn grass unless justified by a soil test.
- C. Fertilizer containing in excess of 2% phosphate/phosphorus (P_2O_5) per guaranteed analysis label shall not be applied within 5 feet of the edge of water or within 5 feet of a drainage facility.
- D. All fertilizer shall be applied such that spreading of fertilizer on all impervious surfaces is minimized.
- E. Liquid fertilizers containing in excess of 2% phosphate/phosphorus (P_2O_5) per guaranteed analysis label shall not be applied through an irrigation system within 10 feet of the edge of water or within 10 feet of a drainage facility.
- F. Liquid fertilizers containing in excess of 2% phosphate/phosphorus (P_2O_5) per guaranteed analysis label shall not be applied through high or medium mist application or directed spray application within 10 feet of the edge of water or within 10 feet of a drainage facility.

1.3 Pest Management Program

Proper maintenance of plants and turf areas will minimize the ability of pests to successfully attack landscaping. Several general guidelines follow:

- A. Apply fertilizer and water only when needed and in moderate amounts. Excessive amounts of either can cause rapid growth that is attractive to insects and disease.
- B. Mow St. Augustine grass to a height of 3-4 inches. If cut shorter, the plants may become stressed and more vulnerable to pest infestation. Each mowing should remove no more than one-third of the leaf blade, and those cuttings should remain on the lawn to decompose

Exhibit 5.0
Application No. 070607-38
Page 2 of 4

- C. It is recommended that pesticides, fungicides, and herbicides be used only in response to a specific problem and in the manner and amount recommended by the manufacturer to address the specific problem. Broad application of pesticides, fungicides and herbicides as a preventative measure is strongly discouraged.

The use of pesticides, fungicides, or herbicides is limited to products that meet the following criteria:

- A. Must be consistent with the USDA-NRCS Soil Rating for Selecting Pesticides
- B. Must have the minimum potential for leaching into groundwater or loss from runoff
- C. Products must be EPA approved
- D. The half-life of products used shall not exceed seventy (70) days

2.0 SOLID WASTE MANAGEMENT

In general, solid waste management involves issues related to the management and handling of refuse, litter and leaves that will minimize the impact of these constituents as water pollutants.

Maintenance of adequate sanitary facilities for temporarily storing refuse on private premises prior to collection is considered the responsibility of the owner.

The National Park Service shall maintain solid waste receptacles in accordance with the plans and their on-going maintenance schedule.

3.0 STORMWATER MANAGEMENT AND TREATMENT SYSTEM

The stormwater management system for the Tamiami Trail Welcome Center is designed to maximize the attenuation of stormwater generated pollutants prior to discharge to the off-site wetland systems. Operational details and maintenance requirements of the various system components are given in the following sections.

3.1 Dry Detention Pond and Interconnect Pipe

The basic element of the stormwater management system consists of dry detention pond that provides stormwater treatment through a variety of physical, biological, and chemical processes. A dry detention pond acts similar to a swale by temporarily detaining stormwater runoff, allowing opportunities for treatment processes to occur, prior to slow controlled discharge of the treated water through infiltration. Pollutant removal processes in dry detention systems occur during the quiescent period between storm events. Significant removal processes include settling of particulate matter; biological uptake of nutrients and other ions by plants, algae and microorganisms; along with natural chemical flocculation and complexation processes.

Exhibit	5.0
Application No.	070607-38
Page	3 of 4

Maintenance of the dry detention pond will consist of an annual inspection. During each annual inspection, the following items will be reviewed and corrected as necessary:

- A. Review the banks of the pond to ensure proper side slope stabilization and inspect for signs of excessive seepage that may indicate areas of excessive groundwater flow and possible subsurface channeling.
- B. Physically evaluate the pond for evidence of excessive sediment accumulation or erosion.

At the completion of the inspections, a written inspection report will be prepared, listing any deficiencies that need to be addressed or corrected by the National Park Service.

3.2 Grassed Water Detention Area

These provide for surface storage of stormwater. With age, these areas usually fill in with vegetation and sediment. The existing slope and dimensions of the area should be compared with the permitted design plans prior to the removal of excess sediment or regarding. Areas that show erosion should be stabilized with appropriate material such as sod, planting, rock, sand bags, or other synthetic geotextile material.

Regular mowing of the area is essential. These areas also improve water quality by catching sediment and assimilating nutrients, and recharge the underground water table. Remove any undesirable exotic vegetation. After a storm, the area may remain wet for an extended period of time. This is normal and the water will recede gradually.

3.3 Discharged Control Structure

This structure should be routinely inspected to determine if any obstructions are present or repairs are needed. Trash or vegetation impeding water flow through the structure should be removed. The structure should have a "baffle" to prevent flow blockage and also hold back any floating oils from moving downstream. Elevations and dimensions should be verified annually with all current permit information. Periodic inspections should then be regularly conducted to make sure these structures maintain the proper water levels and the ability to discharge.

4.0 CONSTRUCTION ACTIVITIES

Stormwater Pollution Prevention BMP's have been prepared for construction activities to minimize contamination that may be caused by erosion and sedimentation during the construction process. The BMP's include provisions related to soil stabilization, structural erosion controls, waste collection disposal, offsite vehicle tracking, spill prevention and maintenance and inspection procedures. A copy of the Stormwater Pollution Prevention BMP's are attached hereto and made a part of hereof.

Exhibit	5.0
Application No.	070607-38
Page	4 of 4

STAFF REPORT DISTRIBUTION LIST

TAMIAMI TRAIL WELCOME CENTER

Application No: 070607-38

Permit No: 11-02076-P

INTERNAL DISTRIBUTION

- X Karyn Allman - 1650
- X Pakorn Sutitarnnontr, P.E. - 2261
- X Laura Layman - 2261
- X William Foley, P.E. - 2261
- X C. Tears - 6862
- X ERC Engineering - 6861
- X ERC Environmental - 6861
- X Fort Myers Backup File - 6861
- X Permit File

EXTERNAL DISTRIBUTION

- X Permittee - National Park Service Big Cypress National Preserve
- X Agent - H D R Engineering Inc

GOVERNMENT AGENCIES

- X Collier County - Agricultural Agent
- X Collier County Compliance Services
- X Collier County Engineer Engineering Review Services
- X Div of Recreation and Park - District 4 - FDEP
- X FDEP Division of Recreation and Park
- X FDEP Lucy Blair
- X Florida Department of Comm Affairs Mr. D. Ray Eubanks
- X S.W.F.R.P.C. Jim Beever
- X Stan Chrzanowski - Collier County

OTHER INTERESTED PARTIES

- X Audubon of Florida - Charles Lee

STAFF REPORT DISTRIBUTION LIST

ADDRESSES

H D R Engineering Inc
200 W Forsyth St Ste 800
Jacksonville FL 32202

Collier County - Agricultural Agent
14700 Immokalee Road
Naples FL 34120-1468

Collier County Engineer Engineering Review Services
3301 Tamiami Trail
Naples FL 34112

FDEP Division of Recreation and Park
1843 S. Tamiami Trail
Osprey FL 34229

Florida Department of Comm Affairs Mr. D. Ray Eubanks
2555 Shumard Oak Blvd
Tallahassee FL 32399-2100

Stan Chrzanowski - Collier County
2800 N. Horseshoe Drive
Naples FL 34104

Audubon of Florida - Charles Lee
1101 Audubon Way
Maitland FL 32751

National Park Service Big Cypress National Preserve
33100 Tamiami Trail E
Ochopee FL 34141

Collier County Compliance Services
2800 N. Horseshoes Dr
Naples FL 33942

Div of Recreation and Park - District 4 - FDEP
1843 South Tamiami Trail
Osprey FL 34229

FDEP Lucy Blair
2295 Victoria Avenue
Fort Myers FL 33901

S.W.F.R.P.C. Jim Beaver
1926 Victoria Ave.
Ft. Myers FL 33917