THE CITY OF KEY WEST
3140 Flagler St,
Key West, Florida 330-40

ADDENDUM #1
Navy Mole Pier Electrical Distribution Upgrades
Invitation to Bid: 12-023
10 May 2012

Attached to this coversheet is Addendum #1 dated 9 May 2012 as Developed by CH2MHILL

All Bidders shall acknowledge receipt and acceptance of this Addendum No 1 by acknowledging Addendum in their proposal or by submitting the addendum with the bid package. Bids submitted without acknowledgement or without this Addendum may be considered non-responsive

_____	_____	_____
Signature	Company	Date

ADDENDUM NO. 1 Date: May 9, 2012
TO THE CONTRACT DOCUMENTS Project No.: 436331
for the construction of the
NAVY MOLE PIER ELECTRICAL DISTRIBUTION SYSTEM UPGRADES

CITY OF KEY WEST
KEY WEST, FLORIDA

To All Planholders and/or Prospective Bidders:

The following changes, additions, and/or deletions are hereby made a part of the Contract Documents for the construction of the Navy Mole Pier Electrical Distribution System Upgrades dated May 2012 as fully and completely as if the same were fully set forth therein:

PRE-BID MEETING

1. Attached is the Meeting Minutes from the pre-bid meeting held on May 7, 2012.
2. Attached is a copy of the Sign-In Sheet from the pre-bid meeting.

QUESTIONS AND RESPONSES

1. **Question:** Will potential Navy created delays be held against contractor completion times?

   Answer: No.

2. **Question:** Is "Buy American" required?

   Answer: Yes, see Domestic Products in Section 00 73 00, Supplementary Conditions; Paragraph 6.03.

SPECIFICATIONS

CONTENTS

1. **DELETE** in its entirety and **REPLACE** with the Revised Contents, attached.

PART 2 –CONTRACTING FORMS

SECTION 00 11 13, INVITATION TO BID

1. **DELETE** in its entirety and REPLACE with the Revised Invitation to Bid, attached.

SECTION 00 21 13, INSTRUCTIONS TO BIDDERS

1. Page 2, Paragraph 4: **DELETE** the second paragraph that starts "The Owner will make…." In its entirety.

2. Page 8, Paragraph 17: **DELETE** this paragraph in its entirety.

SECTION 00 41 13,:BID FORM

1. **DELETE** in its entirety and **REPLACE** with the Revised Bid Form, attached.

PART 3 – <u>SPECIFICATIONS</u>

SECTION 01 11 00, SUMMARY OF WORK

1. **DELETE** in its entirety and **REPLACE** with the Revised Section 01 11 00, Summary of Work, attached.

SECTION 01 31 13, PROJECT COORDINATION

1. Page 1, Paragraph 1.02.A: **ADD** the following at the end of the paragraph:

   "The following are CRITICAL tasks and need to be completed in the time allocated:

   a. SF-6 Switches to be tested and inspected within 30 calendar days of issuance of the Notice to Proceed.

   b. Coordination Study to be completed within 20 calendar days of issuance of the Notice to Proceed.

   c. Verify routing and sizes of conduits from Substation #4 to the end of Pier 8 within 10 calendar days of issuance of the Notice to Proceed."

2. Page 3, Paragraph 3.01.A: **DELETE** the paragraph in its entirety and **INSERT** the following:

   "A. Materials to be Salvaged Include:

      1. 750 MCM Cable."

SECTION 01 33 00, SUBMITTAL PROCEDURES

1. Page 7, Paragraphs 1.04.H and 1.04.J: **DELETE** in their entirety.
2. Page 8, Paragraph 1.04.P: **DELETE** in its entirety.

SECTION 01 50 00, TEMPORARY FACILITIES AND CONTROLS

1. Page 1, Paragraph 1.02.A.1.a: **DELETE** "U.S.A.R.D.E." and **INSERT** "U. S. Army Corps of Engineers".
2. Page 5; **INSERT** the following:

"3.07 SUPPLEMENT

A. The Supplement listed below, following "END OF SECTION," is part of this Specification.

1. Section 01 35 26.00 25, Governmental Safety Requirements; 09/10; NAVFAC SE VERSION."

SECTION 26 05 01, ELECTRICAL

1. **DELETE** in its entirety and **REPLACE** with the Revised Section 26 05 01, Electrical, attached.

SECTION 26 05 70, ELECTRICAL SYSTEMS ANALYSIS

1. Page 1, Paragraph 1.03.A, second line, after manufacturer, **ADD** "…(Eaton)"

2. After the paragraph **ADD** the following:

1. Contact: Robert Miller
954 571 8282, ext 13
RobertAMiller@eaton.com

SECTION 26 08 00, COMMISSIONING OF ELECTRICAL SYSTEMS

1. **DELETE** in its entirety and **REPLACE** with the Revised Section 26 08 0, Commissioning of Electrical Systems, attached.

DRAWINGS

1. Drawing E-101: North Mole Site Plan: **DELETE** in its entirety and **REPLACE** with Revised Drawing E-10,1 attached.

1. Drawing E-104: Shore Site Plan: **DELETE** in its entirety and **REPLACE** with Revised Drawing E-104, attached.

2. Drawing E-105: Pier 8 Site Plan: **DELETE** in its entirety and **REPLACE** with Revised Drawing E-105, attached.

All Bidders shall acknowledge receipt of Addendum No. 1 in the Bid Form. Bids submitted without this acknowledgement will be considered informal.

CH2M HILL

_____

Andrew Smyth, P.E.

ATTACHMENTS:

Pre-Bid Meeting Minutes, attached.
Pre-Bid Meeting Sign-In Sheet, attached.
Section 00 01 10: Contents, attached.
Section 00 11 13: Invitation to Bid, attached.
Section 00 41 13, Bid Form, attached.
Section 01 11 00, Summary of Work, attached
Section 01 50 00, Supplement, Section 01 35 26.00 25, Governmental Safety Requirements; 09/10; NAVFAC SE VERSION, attached.
Section 26 05 01, Electrical, attached.
Section 26 08 00, Commissioning of Electrical Systems, attached.

Drawing E-101: North Mole Site Plan, attached
Drawing E-104: Shore Site Plan, attached.
Drawing E-105: Pier 8 Site Plan, attached.

END OF ADDENDUM

NON_MANDATORY PRE-BID MEETING MINUTES

CITY OF KEY WEST

Navy Mole Pier Electrical Distribution System Upgrades
Truman Annex
Monday, May 7, 2012 at 10:00 AM

1. Introductions (sign-in)

   See attached sign-in sheet.

2. Project Summary

   The project consists of the upgrades to the existing electrical distribution equipment at the Navy Mole Pier. Project includes the removal and installation of approximately 22,000 LF of 750 MCM cable, 4,000 LF of #2 ground, 5,000 LF of Multiconductor 12/#12 600V control cable, installation of 168 CT's, 9 relays, testing and commissioning of entire system as well as purchase of spare parts.

   See section 01 11 00 for additional details

3. Contract Time and Estimated Schedule

   Substantial completion-90 calendar days after notice to proceed
   Final Completion-within 14 calendar days after substantial completion

   Estimated NTP: May 24, 2012

   Bids due May 16, 2012 at 3:30 PM

   Bidder's questions must be submitted by close of business May 11, 2012
   To Andrew Smyth; asmyth@ch2m.com or Fax; 305-294-4913

4. Liquidated Damages

   $1,000/day for failure to meet substantial
   $500/day for failure to meet final

5. Allowance

   A contingency allowance of $45,000 is included in the proposal for unforeseen conditions and conflicts. Payment of the contingency allowance shall be based on actual costs and authorized by Work Change Directive.

6. Subcontracting

   All subcontractors shall be identified in proposal

7. Permits

No permits are required for this project

8. Construction Sequencing

All construction related shut downs shall be coordinated with Navy 72 hours in advance. All primary power switching will be performed by Navy.

Contractor shall be responsible for coordinating with Navy and City for work on or around the Mole pier while cruise ships are in port.

Contractor to coordinate with Navy for work on/access to Pier 8.

9. Staging Area

Contractor shall work with Navy staff for coordination of staging area.

Contractor is responsible for safety of public and materials on sites.

10. Working Hours

City of Key West has a noise ordinance that allows working hours between 8:00 AM to 7:00 PM, Monday through Friday and 9:00 AM to 5:00 PM Saturday.

11. Job Site Security

Contractor and all subcontractors shall be required to obtain RapidGate passes for access to the Navy facilities.

TWIC card may be required (Navy to verify)

Parking and vehicle access shall be coordinated with Navy, prior to accessing site.

Job site shall be secured at end of each day.

12. Existing Utilities

Contractor is responsible for utility location.

Notify Navy and any utility offices which are affected by construction operations a minimum of 48 hrs in advance.

13. General Requirements

Contractor shall comply with Federal Law 29 CFR 1926; US Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1.

Contractor shall be required to meet the City's Domestic Partner ordinance.

Public safety and property is of utmost importance.

Contractor shall employ and pay for all independent testing as required by the specifications.

Contractor shall verify elevations and location of existing facilities shown on drawings prior to start of construction.

14. Technical requirements

    All stainless steel components to be 316, all electrical enclosures to be NEMA 4X 316 SST.

    All conductors shall be THWN (wet location rated)

    Coordination studies shall be completed by switchgear manufacturer.

15. Engineers Cost estimate $1.3M

16. City/Navy Comments

    - Navy may require daily tailgate meetings to coordinate daily operations with the contractor.
    - Vessels to arrive in port week of September 15-21.

17. Contractor Questions/Comments

    Q: Will potential Navy created delays be held against contractor completion times?
    A: No

    Q: Is "Buy American" required?
    A: Yes, see Domestic Products in Supplemental Conditions section 00 73 00.6.03

18. Site Visit

    A site visit was held to allow all potential contractors to view the existing equipment. Navy staff opened all substations, multiple hand holes/man holes, cubicles and igloos.

19. Meeting Adjourned 12:05

PLEASE PRINT Clearly

NON MANDATORY PRE-BID MEETING
NAVY MOLE ELECTRIC UPGRADES MAY 7, 2012

PLEASE PRINT Clearly

Name (First Last)	Phone Number	eMail Address	Home Address
MIKE SMITH	C: H: 305-296-4028	msmith@flkeyselectric.com	5730 2ND AVE KEY WEST
NORMA Shortridge	C: 407-557-0760 H: 407-682-8744	nshortridge@testingsg.com	516 Douglas Ave. Suite 1110 Altamonte Springs. FL 32714
ERIC SCHUMANN	C: 407-782-9595 H: 407-682-8704	ESCHUMANN@TESTINGSG.COM	516 DOUGLAS AV SUITE ALTAMONTE SPRINGS 32714
GREGORY GOMBERT	C: 904-317-5618 H: 904-509-9552	MARKTHOMPSON@MIL-CON.COM GREGORY.GOMBERT@YAHOO.COM	6142 LAKE GRAY Blvd JAX, FLA 32244
Lisa Brenner	C: 305 7933590 H:	Lisa@Lisas construction.com	6310 Appaloosa trail Southwest Ranches, FL
Al Brenner	C: 305 586 4564 H:	abrenner@megawattage.com	13530 SW 77TH Ave Miami, FL 33156
Greg Holifield	C: 954 2328858 H:	holifield@megawattage.com	5296 NW 94TH Terrace Sunrise, FL 33351
Mike Terango Imperial Electrical	C: 954-325-2133 H:	MTerango@aol.com	11871 NW 11 St Plantation FL 33323
BOB AUSBROOK	C: H: 305 872 2200	PEDRO FALCON ELECTRICAL CONTRACTOR REXEL KEY WEST	3160 AVE C BIG PINE KEY FL 33043
JIM GROFF	C: 3059237121 H:		504 Angela St. KEY WEST FL 33040
Jeff Kirk	C: 305-747-2601 H: 305-294-3991	Nearshore@Bellsouth.net	5680 1st Ave #5 Key West Fl. 33040
DAVE FLYNN	C: 561-422-7040 H: 561-689-7066	EDWARDS Electrical Corp dflynn EEC@aol.com	11231 So. Blvd West Fl. 33413
Omar Delgado	C: 954-410-7028 H: 954-382-5711	odelgado@mceco.com	6825 S.W 21st CT Davie, FL 33317

~~Walk Thru~~

PLEASE PRINT Clearly PLEASE PRINT Clearly

Name (First Last)	Phone Number	eMail Address	Home Address
RAY COTTOM	C: 850 814 7060 H:	MELVIN.COTTOM.CTR@NAVY.MIL	NAS KEY WEST KEY. WEST, FL 33040
WILL KNETGE	C: H: 305 393 2133	william.knetge@navy.mil	NAS KWEST
Jerry Collett	C: 561.654.6347 H:	j.collett@eps-international.com	6068 Bellagio Lane Boynton Beach FL
GARY Zamaites	C: 904-759-0069 H:	gzamaites@cogentknocks.com	JAX, FL
JACK BARTON CH2MHILL	C: H: 5619047415	jbarton@ch2m.com	
ANDRON SMYTH	C: H: 305-294-1645	asmyth@ch2m.com	
	C: H:		
	C: H:		
	C: H:		
	C: H:		
	C: H:		
	C: H:		
	C: H:		

Pages

CONTENTS

Pages

END OF SECTION

INVITATION TO BID

Sealed bids for the City of Key West Navy Mole Pier Electrical Distribution System Upgrades, addressed to the City of Key West, will be received at the Office of the City Clerk, City of Key West, 3140 Flagler Ave., Key West Florida, 33040 until **3:30 p.m., local time, May 16, 2012** and then will be publicly opened and read. Any bids received after the time and date specified will not be considered.

Please submit three (3) originals and three (3) CD-ROMS or USB Drives with one single PDF file of the entire bid package on each CD-ROM. Bid package is to be enclosed in a sealed envelope, clearly marked on the outside "**Navy Mole Pier Electrical Distribution System Upgrades"** addressed and delivered to the City Clerk at the address noted above.

The completed Work will provide the Owner with a functioning electrical system located on the Navy Mole Pier and Pier 8. The project includes the following major components:

- Removal and salvage of approximately 22,000 LF of 750 MCM cable
- Installation of approximately 22,000 LF of 750 MCM cable with terminations.
- Installation of 4,000 LF of #2 ground
- Installation of 5,000 LF Multi-Conductor 12/#12 600V control cable
- Removal and replacement of 9 new relays
- Calibration and adjustment of all protective relays
- Removal and replacement of 168 C/T's
- Removal and replacement of 8 receptacle cover safety switches
- Removal and replacement of 23 control switches
- Removal and replacement of 4 momentary lock switches
- Cable racking in 10 existing electrical manholes
- Calibrate and reset 56 existing relays
- Electrical system testing (Electrical system analysis, Coordination study, Arch flash study, etc.)and commissioning
- Other miscellaneous electrical to complete the project

This project is located is located on Navy property and will require the Contractor and all employees to adhere to the Navy security requirements and to the Navy safety and health requirements EM – 385.

Drawings and Specifications may be obtained from Demand Star by Onvia. Please contact Demand Star at www.demandstar.com or call 1-800-711-1712.

A nonmandatory Site Visit will be held at **10 a.m. on May 7, 2012** at the US Navy Mole, Truman Annex, Key West, Florida.

Each Bid must be submitted on the prescribed form and accompanied by bid security as prescribed in the Instructions to Bidders, payable to the City of Key West, Florida, in an amount not less than (5) five percent of the amount of the bid. The contractor shall be a licensed contractor by the State of Florida and submit proof of such with the bid.

The successful Bidder will be required to furnish the necessary additional bond(s) for the faithful performance of the Contract, as prescribed in the Bidding Documents. The Bidder will also be required to furnish documentation showing that he is in compliance with the licensing requirements of the State and the provisions of Chapter 66 section 87 of the Code of Ordinances of the City of Key West. Compliance with these provisions is required before the Contractor can enter into the agreement contained in the Contract Documents. Specifically, Bidder shall demonstrate that he holds, as a minimum, the following licenses and certificates required by State Statute and local codes.

EACH BID MUST BE SUBMITTED ON THE PRESCRIBED FORM AND ACCOMPANIED BY BID SECURITY AS PRESCRIBED IN THE INSTRUCTIONS TO BIDDERS, PAYABLE TO THE CITY OF KEY WEST, FLORIDA, IN AN AMOUNT NOT LESS THAN FIVE (5) PERCENT OF THE AMOUNT BID.

THE BIDDER MUST BE A LICENSED CONTRACTOR BY THE STATE OF FLORIDA AND SUBMIT PROOF OF SUCH WITH THE BID.

The Bidder shall furnish documentation showing that he is in compliance with the Requirement for City Contractors to Provide Equal Benefits for Domestic Partners per City Ordnance Section 2.799within 10 days following the Notice of Award:

All bid bonds, contract bonds, insurance contracts, and certificates of insurance shall be either executed by or countersigned by a licensed resident agent of the Surety or Insurance Company having his place of business in the State of Florida, and in all ways complying with the insurance laws of the State of Florida. Further, the said Surety or Insurance Company shall be duly licensed and qualified to do business in the State of Florida.

Before a Contract will be awarded for the work contemplated herein, the CITY will conduct such investigation as is necessary to determine the performance record and ability of the apparent low Bidder to perform the size and type of work specified under this Contract. Upon request, the Bidder shall submit such information as deemed necessary by the CITY to evaluate the Bidder's qualifications.

For information concerning the proposed work, or for appointment to visit the site of the proposed work, contact the designated Engineer by the General Services and Utilities Department of the City of Key West.

As stated above at the time of the bid submittal the Bidder must provide satisfactory documentation of State Licenses. The Bidder shall furnish documentation showing that he is in compliance with the licensing requirements of County, and City licenses as would be required within ten days of the award. The successful Bidder must also be able to satisfy the City Attorney as to such insurance coverage and legal requirements as may be demanded by the Bid in question.

The City may reject bids for any and/or all of the following reasons: (1) for budgetary reasons, (2) if the bidder misstates or conceals a material fact in its bid, (3) if the bid does not strictly conform to the law or is non-responsive to the bid requirements, (4) if the bid is conditional, or (5) if a change of circumstances occurs making the purpose of the bid unnecessary to the City. The City may also waive any minor formalities or irregularities in any bid, (6) if such rejection is in the best interest of the City. The City may also waive any minor formalities or irregularities in any bid.

Dated this ___ day of _____ 20___.

CITY OF KEY WEST

By_____
Jim Scholl, City Manager

* * * * * *

NOTE TO BIDDER: Use preferably BLACK ink for completing this Bid form.

BID FORM

To: The City of Key West

Address: 3140 Flagler Ave, Key West, Florida 33040

Project Title: Navy Mole Pier Electrical Distribution System Upgrades

City of Key West Project No.: ITB # 12-023

Bidder's person to contact for additional information on this Bid:

Name: _____

Telephone: _____

BIDDER'S DECLARATION AND UNDERSTANDING

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Bid are those named herein, that this Bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the Owner, and that the Bid is made without any connection or collusion with any person submitting another Bid on this Contract.

The Bidder further declares that he has carefully examined the Contract Documents for the construction of the project, that he has personally inspected the site, that he has satisfied himself as to the quantities involved, including materials and equipment, and conditions of work involved, including the fact that the description of the quantities of work and materials, as included herein, is brief and is intended only to indicate the general nature of the Work and to identify the said quantities with the detailed requirements of the Contract Documents, and that this Bid is made according to the provisions and under the terms of the Contract Documents, which Documents are hereby made a part of this Bid.

The Bidder further agrees, as evidenced by signing the Bid, that if awarded a Contract, the Florida Trench Safety Act and applicable trench safety standards will be complied with.

CONTRACT EXECUTION AND BONDS

The Bidder agrees that if this Bid is accepted, he will, within 10 days, not including Sundays and legal holidays, after Notice of Award, sign the Contract in the form annexed hereto, and will at that time, deliver to the Owner examples of the Performance Bond and Payment Bond required herein, and evidence of holding required licenses and certificates, and will, to the extent of his Bid, furnish all machinery, tools, apparatus, and other means of construction and do the Work and furnish all the materials necessary to complete all work as specified or indicated in the Contract Documents.

CERTIFICATES OF INSURANCE

Bidder agrees to furnish the Owner, before commencing the Work under this Contract, the certificates of insurance as specified in these Documents.

START OF CONSTRUCTION AND CONTRACT COMPLETION TIMES

The Bidder agrees to begin work within 10 calendar days after the date of the Notice to Proceed and to achieve Substantial Completion within 90 calendar days from the date when the Contract Times commence to run as provided in paragraph 2.03.A of the General Conditions, and Work will be completed and ready for final payment and acceptance in accordance with paragraph 14.07 of the General Conditions within 104 calendar days from the date when the Contract Times commence to run.

LIQUIDATED DAMAGES

In the event the Bidder is awarded the Contract, Owner and Bidder recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in paragraph Start of Construction and Contract Completion Times above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. Owner and Bidder also recognize the delays, expense, and difficulties involved in proving in a legal or other dispute resolution preceding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Bidder agree that as liquidated damages for delay (but not as a penalty) Bidder shall pay Owner $1000 per day for each day that expires after the time specified for substantial completion.

After Substantial Completion, if Bidder neglects, refuses, or fails to complete the remaining Work within the Contract Times or any Owner-granted extension thereof, Bidder shall pay Owner $500 for each day that expires after the time specified in paragraph Start of Construction and Contract Completion Times, above for completion and readiness for final payment. Liquidated damages shall run concurrent.

Owner will recover such liquidated damages by deducting the amount owed from the final payment or any retainage held by Owner.

ADDENDA

The Bidder hereby acknowledges that he has received Addenda Nos. _____, _____, ____, _____, ____, (Bidder shall insert No. of each Addendum received) and agrees that all addenda issued are hereby made part of the Contract Documents, and the Bidder further agrees that his Bid(s) includes all impacts resulting from said addenda.

SALES AND USE TAXES

The Bidder agrees that all federal, state, and local sales and use taxes are included in the stated Bid Prices for the Work. Cash allowances DO NOT include any sales and use tax. Equipment allowance includes taxes as shown in Equipment Suppliers' Bid.

PUBLIC ENTITY CRIMES

"A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list."

COMBINED UNIT PRICE AND LUMP SUM WORK

The Bidder further proposes to accept as full payment for the Work proposed herein the amounts computed under the provisions of the Contract Documents. For unit price bid items, the estimate of quantities of work to be done is tabulated in the Proposal and, although stated with as much accuracy as possible, is approximate only and is assumed solely for the basis of calculation upon which the award of Contract shall be made. For lump sum bid items, it is expressly understood that the amounts are independent of the exact quantities involved. The Bidder agrees that the amounts for both unit price and lump sum work represent a true measure of labor and materials required to perform the Work, including all allowances for inspection, testing, overhead and profit for each type of work called for in these Contract Documents. The amounts shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.

750 MCM CABLE

The unit price includes all labor, material and equipment necessary to remove the existing cable, inspect and clean the cable conduits, provide and install the new cable, and terminate all connections. Also included are any appurtenances necessary to perform this task.

SALVAGE 750 MCM CABLE

The Bidder agrees to salvage the existing 750 MCM cable and provide an amount to deduct from the Lump Sum Bid. This deduct includes transporting the cable for salvage.

ADDITIONAL BASLER RELAYS

The unit price includes all material and appurtenances required for installation and the required warranty.

ADDITIONAL CTs

The unit price includes all material and appurtenances required for installation and the required warranty.

ADDITIONAL 3200-AMP BREAKER

Bidder agrees to furnish to Owner 1 Each Eaton/Cutler Hammer – Style DSLII 632, 3200A frame, electrically operated, drawout breaker with DSLII FT32 Fuse Truck and with all appurtenances required for installation and the required warranty.

ADDITIONAL 1600-AMP BREAKER

Bidder agrees to furnish to Owner 3 Each Eaton/Cutler Hammer – Style DSLII 516, 1600A frame, electrically operated, drawout breaker with all appurtenances required for installation and the required warranty.

ADDITONAL 800-AMP BREAKER

Bidder agrees to furnish to Owner 1 Each Eaton/Cutler Hammer – Style DSLII 308, 800A frame, electronically operated, drawout breaker with all appurtenances required for installation and the required warranty.

ADDITIONAL CONTROL SWITCHES

Bidder agrees to furnish to Owner 6 Each Control Switches with all appurtenances required for installation and the required warranty.

CONTINGENCY ALLOWANCE

Bidder further agrees that the amount shown is an estimated amount to be included in the Total Base Bid for unforeseen conditions and conflicts. Bidder further acknowledges that payment will be based on actual costs as determined in conformance with the Contract Documents and as authorized by Owner. The Owner will negotiate with the Contractor how each Contingency Allowance will be spent prior to performing the work as authorized by Work Change Directive (WCD).

POST COMMISSIONING ALLOWANCE

Bidder further agrees that the amount shown is an estimated amount to be included in the Total Base Bid for unforeseen work that is identified after the system is commissioned. Bidder further acknowledges that payment will be based on actual costs as determined in conformance with the Contract Documents and as authorized by Owner. The Owner will negotiate with the Contractor how each Commissioning Allowance will be spent prior to performing the work as authorized by Work Change Directive (WCD).

Bidder will complete the Work in accordance with the Contract Documents for a fixed fee price.

LUMP SUM BASE BID

A. Electrical Distribution System Upgrades including but not limited to the replacement of defective Conductors (excluding 750 MCM Cable), , installation of nine (9) new relays, calibration and adjustment of all protective relays, removal and replacement of one-hundred and sixty-eight (168) C/Ts, removal and replacement of eight (8) receptacle cover switches (cubicles), removal and replacement of twenty-three (23) control switches, removal and replacement of four (4) momentary lock switches testing and rehabilitation of six (6) SF-6 switches, electrical system testing, and commissioning,

$_____

B.	750 MCM Cable	22,000 LF	$_____/LF	$_____
C.	Salvage 750 MCM Cable	22,000 LF	$_____/LF	($_____)_
D.	Additional Basler Relays	6 EA	$_____/EA	$_____
E.	Additional CTs	15 EA	S_____/EA	$_____
F.	Additional 3200-amp Breaker with Fuse Truck	1 EA	$_____/EA	$_____
G.	Additional 1600-amp Breaker	3 EA	$_____/EA	$_____
H.	Additional 800-amp Breaker	1 EA	$_____/EA	$_____
I.	Additional Control Switches	6 EA	$_____/EA	$_____

J.	Contingency Allowance	$ 100,000.00
K.	Post Commissioning Allowance	$ $30,000.00
	TOTAL LUMP SUM BID	$_____ (numerals)

_____Dollars
(Amount written in words has precedence)

and _____Cents
(Amount written in words has precedence)

SUBCONTRACTORS

The Bidder further proposes that the following subcontracting firms or businesses will be awarded subcontracts for the following portions of the Work in the event that the Bidder is awarded the Contract:

_____
Name

_____ _____ _____
Street City State Zip

_____
Name

_____ _____ _____
Street City State Zip

_____
Name

_____ _____ _____
Street City State Zip

_____
Name

_____ _____ _____
Street City State Zip

_____
Name

_____ _____ _____
Street City State Zip

Surety

_____ whose address is

_____ _____ _____

Street City State Zip

Bidder

The name of the Bidder submitting this Bid is _____

_____ doing business at

_____ _____ _____

Street City State Zip

which is the address to which all communications concerned with this Bid and with the Contract shall be sent.

The names of the principal officers of the corporation submitting this Bid, or of the partnership, or of all persons interested in this Bid as principals are as follows:

_____ _____

_____ _____

_____ _____

If Sole Proprietor or Partnership

IN WITNESS hereto the undersigned has set his (its) hand this ___ day of _____ 20___.

_____

Signature of Bidder

_____

Title

If Corporation

IN WITNESS WHEREOF the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this ___ day of 20___.

(SEAL)

_____
Name of Corporation

By: _____

Title: _____

Attest: _____
Secretary

END OF SECTION

SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

The completed Work will provide the Owner with a functioning electrical system located on the Navy Mole Pier and Pier 8. The project includes the following major components:

- Removal and salvage of approximately 22,000 LF of 750 MCM cable.
- Installation of approximately 22,000 LF of 750 MCM cable with terminations.
- Installation of 4,000 LF of #2 ground.
- Installation of 5,000 LF Multi-Conductor 12/#12 600V control cable.
- Removal and replacement of 9 new relays.
- Calibration and adjustment of all protective relays.
- Removal and replacement of 168 C/Ts.
- Removal and replacement of 8 receptacle cover safety switches.
- Removal and replacement of 23 control switches.
- Removal and replacement of 4 momentary lock switches.
- Cable racking in 10 existing electrical manholes.
- Calibrate and reset 56 existing relays.
- Electrical system testing (Electrical system analysis, Coordination study, Arch flash study, etc.)and commissioning.
- Other miscellaneous electrical to complete the project.

This project is located is located on Navy property and will require the Contractor and all employees to adhere to the Navy security requirements and to the Navy safety and health requirements EM – 385.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 35 26.00 25

GOVERNMENTAL SAFETY REQUIREMENTS
09/10
NAVFAC SE VERSION

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

ASSE/SAFE A10.32	(2004) Fall Protection
ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASME INTERNATIONAL (ASME)

ASME B30.22	(2005) Articulating Boom Cranes
ASME B30.3	(2009) Construction Tower Cranes
ASME B30.5	(2007) Mobile and Locomotive Cranes
ASME B30.8	(2004) Floating Cranes and Floating Derricks

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2010) Standard for Portable Fire Extinguishers
NFPA 241	(2009) Standard for Safeguarding Construction,Alteration, and Demolition Operations
NFPA 51B	(2009) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70E	(2009; Errata 2009) Standard for Electrical Safety in the Workplace

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2008) Safety and Health Requirements Manual

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

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1919	Gear Certification
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.500	Fall Protection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00.00 25 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

Activity Hazard Analysis (AHA); G

Crane Critical Lift Plan; G

Proof of qualification for Crane Operators; G

SD-06 Test Reports

Reports; G

Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."

Accident Reports; G

Crane Reports; G

SD-07 Certificates

Confined Space Entry Permit; G

Hot work permit; G

Contractor Safety Self-Evaluation Checklist; G

Third Party Certification of Barge-Mounted Mobile Cranes; G, if applicable.

Certificate of Compliance; G (Crane)

Submit one copy of each permit/certificate attached to each

Daily Production Report.

SD-11 Closeout Submittals

OSHA Form 300A "Summary of Work-Related Injuries and Illnesses"; G

OSHA Form "Calculating Injury and Illness Incidence Rates"; G

1.3 DEFINITIONS

a. Competent Person for Fall Protection. A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.

b. High Visibility Accident. Any mishap which may generate publicity and/or high visibility.

c. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

d. Operating Envelope. The area surrounding any crane. Inside this "envelope" is the crane, the operator, riggers and crane walkers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).

e. Qualified Person for Fall Protection. A person with a recognized degree or professional certificate, and with extensive knowledge, training and experience in the field of fall protection; who is capable of performing design, analysis, and evaluation of fall protection systems and equipment.

f. Recordable Injuries or Illnesses. Any work-related injury or illness that results in:

(1) Death, regardless of the time between the injury and death, or the length of the illness;

(2) Days away from work (any time lost after day of injury/illness onset);

(3) Restricted work;

(4) Transfer to another job;

(5) Medical treatment beyond first aid;

(6) Loss of consciousness; or

(7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

g. "USACE" property and equipment specified in USACE EM 385-1-1 should be interpreted as Government property and equipment.

h. Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.) Any mishap meeting the criteria described above shall be documented in both the Contractor Significant Incident Report (CSIR) and using the NAVFAC prescribed Navy Crane Center (NCC) form submitted within five days both as provided by the Contracting Officer.

1.4 CONTRACTOR SAFETY SELF-EVALUATION CHECKLIST

Contracting Officer will provide a "Contractor Safety Self-Evaluation checklist" to the Contractor at the pre-construction conference. The checklist will be completed monthly by the Contractor and submitted with each request for payment voucher. Additionally, monthly exposure reporting to the Contracting Officer is required to be attached to the monthly billing request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. The Contracting Officer will provide copies of any special forms. An acceptable score of 90 or greater is required. Failure to submit the completed safety self-evaluation checklist or achieve a score of at least 90, will result in a retention of up to 10 percent of the voucher.

1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this contract, comply with the most recent addition of USACE EM 385-1-1, and federal, state, and local, laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.5.1 Subcontractor Safety Requirements

Neither Contractor nor any subcontractor shall enter into contract with any subcontractor who fails to meet the following requirement. The term subcontractor in the following paragraphs shall mean all subcontractors on the project, whether in contract with the Contractor or any subcontractor.

1.5.1.1 Experience Modification Rate (EMR)

No subcontractor on the project shall have an effective EMR greater than 1.10 when entering into a subcontract agreement with the prime contractor or a subcontractor at any tier as computed by the National Council on Compensation Insurance (NCCI) or if not available, as computed by the state agency's rating bureau in the state where the subcontractor is registered. Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable EMR range cannot be achieved for a particular subcontractor whose performance is uniquely

critical to the construction project. Relaxation of the EMR range shall only be considered and/or granted on a case-by-base basis for special conditions and shall not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) shall collect and maintain certified EMR ratings for ALL subcontractors on the project and shall make them available to the Government at the Government's request.

1.5.1.2 OSHA Days Away From Work, Restricted Duty, or Job Transfer (DART) Rate

No subcontractor on the project shall have a DART rate calculated from the most recent, complete calendar year greater than 3.0 when entering into a subcontract agreement with the prime contractor or a subcontractor at any tier. The OSHA Dart Rate is calculated using the following formula:

$$(N/EH) \times 200{,}000$$

where:

N = number of injuries and/or illnesses with days away, restricted work, or job transfer
EH = total hours worked by all employees during most recent, complete calendar year
200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year)

Prime Contractor may submit a written request for additional consideration to the Contracting Officer where the specified acceptable OSHA Dart rate range cannot be achieved for a particular subcontractor whose performance is uniquely critical to the construction project. Relaxation of the OSHA DART rate range shall only be considered and/or granted on a case-by-case basis for special conditions and shall not be anticipated as tacit approval. Contractor's Site Safety and Health Officer (SSHO) shall collect and maintain self-certified OSHA DART rates for ALL subcontractors on the project and shall make them available to the Government at the Government's request.

1.6 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

The contractor shall provide a Safety oversight team that includes a minimum of one (1) Competent Person at each project site to function as the Safety and Health Officer (SSHO). The SSHO shall be at the work site at all times, unless specified differently in the contract, to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor, and their training, experience, and qualifications shall be as required by EM 385-1-1 paragraph 01.A.17 and all associated sub-paragraphs. A Competent Personal shall be provided for all of the hazards identified in the Contractor's Safety and Health Program in accordance with the accepted Accident Prevention Plan, and shall be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. The credentials of the Competent Persons(s) shall be approved by the Contracting Officer in consultation with the Safety Office.

The Contractor Quality Control (QC) person can be the SSHO on this project.

1.6.1.2 Crane Operators

Meet the crane operators requirements in USACE EM 385-1-1, Section 16 and Appendix I. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacitates of 50,000 pounds or greater, designate crane operators as qualified by a source that qualifies crane operators (i.e., union, a government agency, or and organization that tests and qualifies crane operators). Provide proof of current qualification.

1.6.2 Personnel Duties

1.6.2.1 Site Safety and Health Officer (SSHO)

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

b. Conduct mishap investigations and complete required reports. Maintain the one OSHA Form 300 "Log of Work-Related Injuries and Illnesses" and one OSHA Form 300A "Summary of Work-Related Injuries and Illnesses" for prime and all subcontractors. Update OSHA Form 300A on a monthly basis and post it at the Contractor's construction trailer throughout the construction period. Submit final OSHA Form 300A along with OSHA Form "Calculating Injury and Illness Incidence Rates", which includes the Total Recordable Cases Incidence Rate and DART Incidence Rate, at project closeout.

c. Collect and maintain certified EMR ratings and DART rates for all subcontractors on the project and make them available to the Government at the Government's request.

d. Maintain Daily Production Reports for prime and subcontractors.

e. Maintain applicable safety reference material on the job site.

f. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.

g. Implement and enforce accepted APPS and AHAs.

h. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. Post a list of unresolved safety and health deficiencies on the safety bulletin board.

i. Ensure sub-contractor compliance with safety and health requirements.

Failure to perform the above duties will result in dismissal of the superintendent, QC Manager, and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

j. Maintain a list of hazardous chemicals on site and their material safety data sheets.

1.6.3 Meetings

1.6.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.

c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

1.6.3.2 Safety Meetings

Conduct and document meetings as required by EM 385-1-1. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractors' daily production report.

1.7 ACCIDENT PREVENTION PLAN (APP)

Use a qualified person to prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of USACE EM 385-1-1 and as supplemented herein. Cover all paragraph and subparagraph elements in USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan". Specific requirements for some of the APP elements are described below. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer, the Contractor Quality control Manager, and any designated CSP and/or CIH.

Submit the APP to the Contracting Officer 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP.

Once accepted by the Contracting Officer, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and quality control manager. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34,) and the environment.

Copies of the accepted plan will be maintained at the Contracting Officer's office and at the job site. Continuously reviewed and amended the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

1.7.1 EM 385-1-1 Contents

In addition to the requirements outlines in Appendix A of USACE EM 385-1-1, the following is required:

a. Names and qualifications (resumes including education, training, experience and certifications) of all site safety and health personnel designated to perform work on this project to include the designated site safety and health officer and other competent and qualified personnel to be used such as CSPs, CIHs, STSs, CHSTs. Specify the duties of each position.

b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; personal protective equipment and clothing to include selection, use and maintenance.

c. Confined Space Entry Plan. Develop a confined and/or enclosed space entry plan in accordance with USACE EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive 2.100, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

d. Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75 percent of the capacity of the crane or hoist (or lifts over 50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts involving more than one

crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. Submit 15 calendar days prior to on-site work and include the requirements of USACE EM 385-1-1, paragraph 16.H. and the following:

(1) For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.550(g).

(2) For barge mounted mobile cranes, barge stability calculations identifying barge list and trim based on anticipated loading; and load charts based on calculated list and trim. The amount of list and trim shall be within the crane manufacturer's requirements.

e. Fall Protection and Prevention (FP&P) Program Documentation. The program documentation shall be site specific and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A qualified person for fall protection shall prepare and sign the program documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Revise the Fall Protection and Prevention Program documentation every six months for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Program documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Program documentation in the Accident Prevention Plan (APP).

f. Site Safety and Health Plan. The safety and health aspects prepared in accordance with USACE EM 385-1-1.

g. Site Demolition Plan. The safety and health aspects prepared in accordance with Section 02 41 00 DEMOLITION and referenced sources. Include engineering survey as applicable.

h. Excavation Plan. The safety and health aspects prepared in accordance with Section 31 00 00 EARTHWORK.

1.8 ACTIVITY HAZARD ANALYSIS (AHA)

The Activity Hazard Analysis (AHA) format shall be in accordance with USACE EM 385-1-1, Section 1. Submit the AHA for review at least 15 calendar days prior to the start of each phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.

The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

Develop the activity hazard analyses using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or subcontractor and provided to the prime contractor for submittal to the Contracting Officer.

1.9 DISPLAY OF SAFETY INFORMATION

Within 1 calendar days after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, shall be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, section 01.A.06. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.10 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

1.11 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment.

1.12 REPORTS

1.12.1 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, as defined in 1.3.h and property damage accidents resulting in at least $2,000 in damages, to establish the root cause(s) of the accident, complete the Navy Contractor Significant Incident Report (CSIR) from and provide the report to the Contracting Officer within 5 calendar day(s) of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Conduct an accident investigation for any weight handling equipment accident (including rigging gear accidents) to establish the root cause(s) of the accident, complete the WHE Accident Report (Crane and Rigging Gear) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer. The Contracting Officer will provide a blank copy of the accident report form.

1.12.2 Accident Notification

Notify the Contracting Officer as soon as practical, but not later than four hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than $2,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used,

etc.). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted.

1.12.3 Crane Reports

Submit crane inspection reports required in accordance with USACE EM 385-1-1, Appendix I and as specified herein with Daily Reports of Inspections.

1.12.4 Certificate of Compliance

Provide a Certificate of Compliance for each crane entering an activity under this contract (see Contracting Officer for a blank certificate). State within the certificate that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance comply with 29 CFR 1926 and USACE EM 385-1-1 Section 16 and Appendix I. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. Also certify that all of its crane operators working on the DOD activity have been trained in the proper use of all safety devices (e.g., anti-two block devices). Post certifications on the crane.

1.12.5 Third Party Certification of Barge-Mounted Mobile Cranes

Certify barge-mounted mobile cranes in accordance with 29 CFR 1919 by an OSHA accredited person.

1.13 HOT WORK

Submit and obtain a written permit prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, from the Fire Division. A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency Fire Division phone number. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE RESPONSIBLE FIRE DIVISION IMMEDIATELY.

1.14 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the Government shall not be closed or obstructed without written permission from the Contracting Officer.

1.15 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

a. Secure outside equipment and materials and place materials that could

be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

2.1 CONFINED SPACE SIGNAGE

Provide permanent signs integral to or securely attached to access covers for new permit-required confined spaces. Signs wording: "DANGER--PERMIT-REQUIRED CONFINED SPACE - DO NOT ENTER -" in bold letters a minimum of one inch in height and constructed to be clearly legible with all paint removed. The signal word "DANGER" shall be red and readable from 5 feet.

2.2 FALL PROTECTION ANCHORAGE

Leave in place fall protection anchorage, conforming to ASSE/SAFE Z359.1, installed under the supervision of a qualified person in fall protection, for continued customer use and so identified by signage stating the capacity of the anchorage (strength and number of persons who may be tied-off to it at any one time).

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

Comply with USACE EM 385-1-1, NFPA 241, the APP, the AHA, Federal and/or State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

3.1.1 Hazardous Material Use

Each hazardous material must receive approval from the Contracting Office or their designated representative prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. The Radiation Safety Officer (RSO) must be notified prior to excepted items of radioactive material and devices being brought on base.

3.1.3 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 15 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the Contracting Officer to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Contractor shall ensure that each employee is familiar with and complies with these procedures and USACE EM 385-1-1, Section 12, Control of Hazardous Energy.

Contracting Officer will, at the Contractor's request, apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on for government owned and operated systems.

No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section. No person shall work on any energized equipment including, but not limited to activities such as erecting, installing, constructing, repairing, adjusting, inspecting, un-jamming, setting up, trouble shooting, testing, cleaning, dismantling, servicing and maintaining machines equipment of processes until an evaluation has been conducted identifying the energy source and the procedures which will be taken to ensure the safety of personnel.

When work is to be performed on electrical circuits, only qualified personnel shall perform work on electrical circuits.

A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area.

Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.

Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks.

Pressurized or vacuum systems shall be vented to relieve differential pressure completely.

Vent valves shall be tagged open during the course of the work.

Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

3.3.1 Tag Placement

Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist.

If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached.

When it is required that certain equipment be tagged, the Government will review the characteristics of the various systems involved that affect the safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

3.3.2 Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the Contracting Officer. That group's or individual's lockout/tagout tags on equipment may then be removed on authorization by the Contracting Officer.

3.4 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

Establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

3.4.1 Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with USACE EM 385-1-1, Section 21.B.

3.4.2 Fall Protection Equipment and Systems

Enforce use of the fall protection equipment and systems designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in EM 385-1-1, Section 21. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with USACE EM 385-1-1, Paragraphs 21.N through 21.N.04. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with 29 CFR 1926.500, Subpart M, USACE EM 385-1-1 and ASSE/SAFE A10.32.

3.4.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ASSE/SAFE Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed 6 feet. The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

3.4.3 Horizontal Lifelines

Design, install, certify and use under the supervision of a qualified person horizontal lifelines for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500).

3.4.4 Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with EM 385-1-1 and 29 CFR 1926 Subpart M.

3.4.5 Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contractor must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.5 SCAFFOLDING

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Access scaffold platforms greater than 20 feet maximum in height by use of a scaffold stair system. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than 20 feet maximum in height. The use of an adequate gate is required. Ensure that employees are qualified to perform scaffold erection and dismantling. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Give special care to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.6 EQUIPMENT

3.6.1 Material Handling Equipment

a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.

c. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

3.6.2 Weight Handling Equipment

a. Equip cranes and derricks as specified in EM 385-1-1, section 16.

b. Notify the Contracting Officer 15 days in advance of any cranes entering the activity so that necessary quality assurance spot checks can be coordinated. Contractor's operator shall remain with the crane during the spot check.

c. Comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes and floating derricks.

e. Under no circumstance shall a Contractor make a lift at or above 90 percent of the cranes rated capacity in any configuration.

f. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and follow the requirements of USACE EM 385-1-1 Section 11 and ASME B30.5 or ASME B30.22 as applicable.

g. Do not crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane.

h. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

i. All employees must keep clear of loads about to be lifted and of suspended loads.

j. Use cribbing when performing lifts on outriggers.

k. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

l. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

m. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by Contracting Officer personnel.

n. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by Contracting Officer personnel.

o. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

p. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. Prior to conducting lifting operations set a maximum wind speed at which a crane can be safely operated based on the equipment being used, the load being lifted, experience of operators and riggers, and hazards on the work site. This maximum wind speed determination shall be included as part of the activity hazard analysis plan for that operation.

3.6.3 Equipment and Mechanized Equipment

a. Proof of qualifications for operator shall be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment shall be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

3.7 EXCAVATIONS

Perform soil classification by a competent person in accordance with 29 CFR 1926.

3.7.1 Utility Locations

Prior to digging, the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by a private utility locating service in addition to any station locating service and coordinated with the station utility department. Any markings made during the utility investigation must be maintained throughout the contract.

3.7.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within 2 feet of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility expose the utility by hand digging every 100 feet if parallel within 5 feet of the excavation.

3.7.3 Shoring Systems

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on-site for review. Job-made shoring or shielding must have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

3.7.4 Trenching Machinery

Operate trenching machines with digging chain drives only when the spotters/laborers are in plain view of the operator. Provide operator and spotters/laborers training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Keep documentation of the training on file at the project site.

3.8 UTILITIES WITHIN CONCRETE SLABS

Utilities located within concrete slabs or pier structures, bridges, and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with station utility departments in addition to a private locating service. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the contractor from meeting this requirement.

3.9 ELECTRICAL

3.9.1 Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Immediately removed from service all damaged extension cords. Portable extension cords shall meet the requirements of NFPA 70E and OSHA electrical standards.

3.10 WORK IN CONFINED SPACES

Comply with the requirements in Section 34 of USACE EM 385-1-1, OSHA 29 CFR 1910.146 and OSHA 29 CFR 1926.21(b)(6). Any potential for a hazard in the confined space requires a permit system to be used.

a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. (See Section 34 of USACE EM 385-1-1 for entry procedures.) All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.

b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.

c. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

-- End of Section --

SECTION 26 05 01
ELECTRICAL

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American Association of State Highway Transportation Officials (AASHTO).
2. ASTM International (ASTM):
   a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
   b. A240/A240M, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
   c. A1011/A1011M, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   d. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
   e. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
3. Electronic Industries Association (EIA/TIA): 569, Commercial Building Standard for Telecommunications Pathways and Spaces.
4. Federal Specifications (FS):
   a. W-C-596, Connector, Electrical, Power, General Specification for.
   b. W-S-896, Switch, Toggle (Toggle and Lock), Flush Mounted (General Specification).
5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
   b. PC62.41.1, Draft Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits.
   c. 112, Standard Test Procedure for Polyphase Induction Motors and Generators.
   d. 114, Standard Test Procedures for Single-Phase Induction Motors.
6. International Electrical Testing Association (NETA): ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
7. National Electrical Contractors Association, Inc. (NECA): 1, Standard Practices for Good Workmanship in Electrical Contracting.
8. National Electrical Manufacturers Association (NEMA):
   a. C80.1, Rigid Steel Conduit-Zinc Coated.

b. C80.3, Electrical Metallic Tubing-Zinc Coated.
c. C80.6, Intermediate Metal Conduit-Zinc Coated (IMC).
d. 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
e. CC1, Electrical Power Connectors for Substations.
f. ICS 1, Industrial Control and Systems: General Requirements.
g. ICS 2, Industrial Control and Systems: Controllers, Contactors, and Overload Relays Rated Not More Than 2000 Volts AC or 750 Volts DC.
h. ICS 2.3, Industrial Control and Systems: Instructions for the Handling, Installation, Operation and Maintenance of Motor Control Centers.
i. MG 1, Motors and Generators.
j. PB 1, Panelboards.
k. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
l. ST 20, Dry Type Transformers for General Applications.
m. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
n. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.
o. WC 55, Instrumentation Cables and Thermocouple Wire.
p. WC 70, Standard for Non-Shielded Power Cables Rated 2000 V or Less for the Distribution of Electrical Energy.
q. WC 71, Standard for Non-Shielded Cables Rated 2001-5000 Volts for use in the Distribution of Electrical Energy.
r. WC 74, 5-46 KV Shielded Power Cable for use in the Transmission and Distribution of Electric Energy.
s. WD 1, General Color Requirements for Wiring Devices.

9. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
10. Underwriters Laboratories, Inc. (UL):
    a. 1, Flexible Metal Conduit.
    b. 6, Electrical Rigid Metal Conduit—Steel.
    c. 13, Power-Limited Circuit Cables.
    d. 44, Thermoset Insulated Wires and Cables.
    e. 62, Flexible Cord and Fixture Wire.
    f. 67, Panelboards.
    g. 98, Enclosed and Dead-Front Switches.
    h. 198C, High Interrupting Capacity Fuses, Current Limiting Types.
    i. 198E, Class R Fuses.
    j. 360, Liquid-Tight Flexible Steel Conduit.
    k. 486A, Wire Connectors and Soldering Lugs for Use with Copper Conductors.
    l. 486C, Splicing Wire Connectors.
    m. 489, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures.
    n. 508, Industrial Control Equipment.

o. 510, Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
p. 514B, Fittings for Cable and Conduit.
q. 651, Schedule 40 and 80 PVC Conduit.
r. 674, Electric Motors And Generators for use in Division 1 Hazardous (Classified) Locations.
s. 797, Electrical Metallic Tubing.
t. 854, Service-Entrance Cables.
u. 870, Wireways, Auxiliary Gutters, and Associated Fittings.
v. 943, Ground-Fault Circuit Interrupters.
w. 1059, Terminal Blocks.
x. 1242, Intermediate Metal Conduit.
y. 1277, Electrical Power and Control Tray Cables with Optional Optical-Fibre Members.
z. 1449, Transient Voltage Surge Suppressors.
aa. 1561, Dry-Type General Purpose and Power Transformers.
bb. 2111, Overheating Protection for Motors.

1.02 SUBMITTALS

A. Action Submittals:

1. Protective Relays
2. Current transformers
3. Stainless Steel box extensions .
4. Cable Racking System for Handholes
5. Circuit breakers.
6. Control devices, terminal blocks, and relays.
7. Support and framing channels.
8. Nameplates and nameplate schedule.
9. Conductors, cable, and accessories.
10. Grounding materials

B. Informational Submittals:

1. Field test reports.
2. Signed permits indicating Work is acceptable to regulatory authorities having jurisdiction.
3. Operation and Maintenance Data:
   a. Provide for all equipment, as well as each device having features that can require adjustment, configuration, or maintenance.
   b. Minimum information shall include manufacturer’s preprinted instruction manual, one copy of the approved submittal information for the item, tabulation of any settings, and copies of any test reports.

4. As-Built Drawings: The as-built drawings shall update the one line diagrams showing any field changes; substation/switchboard location for replaced protective relays (Basler Be1-951); field modifications to circuit breakers; Pier 8 cubicle modifications; and feeder routing and manhole identification for the feeders from Substation 4 to the end of Pier 8.

1.03 APPROVAL BY AUTHORITY HAVING JURISDICTION

A. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC).

B. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark or label.

1.04 QUALIFICATIONS

A. Contractor shall have a minimum of 10 years experience in the installation repair and of electrical distribution systems in a marine infrastructure. Contractor shall be familiar with and meet all security requirements of the US Navy and the City of Key West Contractors on site supervisor personal shall be a licensed master electrician or a licensed journeyman electrician with a minimum of 10 years as a certified journeyman.

1.05 EXTRA MATERIALS

A. Spare parts as recommended by Eaton Electrical Manufacturing.

PART 2 PRODUCTS

2.01 GENERAL

A. Products shall comply with all applicable provisions of NFPA 70.

B. Like Items of Equipment: End products of one manufacturer in order to achieve standardization for appearance, operation, maintenance, spare parts, and manufacturer’s service.

C. Equipment and Devices Installed Outdoors or in Unheated Enclosures: Capable of continuous operation within ambient temperature range of 44 degrees F to 120 degrees F.

2.02 STAINLESS STEEL BOX EXTENSION

A. Contractor shall field measure the four existing utility stations at Pier 8 and manufacture a box extension as shown in the details on the Drawings. Box shall allow for bending radius of new 750 Kcmil conductor.

B. All stainless shall be Type 316. Match exiting material gauge (thickness).

2.03 PUSHBUTTONS, INDICATING LIGHTS, AND SELECTOR SWITCHES

A. Type: Heavy-duty, oiltight. Provide contact arrangements, colors, inscriptions, and functions as shown.

B. Contact Rating: NEMA ICS 2, Type A600.

C. Unless otherwise shown, provide the following features:

1. Selector Switch Operating Lever: Standard.
2. Indicating Lights: Push-to-test, transformer-type.
3. Pushbutton Color:
   a. ON or START: Black.
   b. OFF or STOP: Red.
4. Pushbuttons and selector switches lockable in OFF position where indicated.

D. Legend Plate:

1. Material: Marine GradeAluminum.
2. Engraving: Indicating specific function, or as shown.
3. Letter Height 3/4 inch.

E. Attachment: Stainless fastener

F. Manufacturers and Products:

1. Eaton; Type 10250T.
2. Square D Co.; Type T.
3. General Electric Co.; Type CR 104P.

2.04 TERMINAL BLOCKS

A. Type: UL 1059. Compression screw clamp, with current bar providing direct contact with wire and yoke, with individual rail mounted terminals. Marking system shall permit use of preprinted or field-marked tags.

B. Yokes and Clamping Screws: Stainless steel.

C. Rating: 600V ac.

D. Manufacturers:

1. Weidmuller, Inc.
2. Ideal.

2.05 SUPPORT AND FRAMING CHANNELS

A. Stainless Steel Framing Channel: Rolled, ASTM A167, Type 316 stainless steel, 12 gauge.

B. Manufacturers:

1. B-Line Systems, Inc.
2. Unistrut Corp.

2.06 CABLE RACKING SYSTEM FOR HAND HOLES

A. Cable racks shall be made from 50% glass-reinforced nylon or a NON-METALLIC material having equal mechanical strength, thermal resistance, chemical resistance, dielectric strength and physical properties. The top face of the cable support arm, on which the cable rests, shall be 3 inches wide and shall be smooth and free of ridges and projections that might score or abrade the cable insulation. Holes or slots shall be provided on the top face for insertion of cable tie-downs. The mounting face of the support arm shall be 5-1/2 inches long and shall incorporate 2-bolt mounting holes. The cable support arms shall meet or exceed the manufacturer's load requirements. Mounting hardware shall be stainless steel.

1. Underground Devices Inc or equal.
2. Devices and Equipment: Name or tag shown, or as required.
3. Source serving equipment
   a. Designation.
   b. Service voltage.
   c. Phases.
4. Minimum Requirement: Label Utility Stations Existing manholes and power distribution equipment, local control panels,

B. Letter Height: 3/4 inch.

C. Ground Conductors: #4/0 bare CU for all in ground and manholes

D. Connectors:

1. Exothermic Weld Type:
   a. Outdoor Weld: Suitable for exposure to elements or direct burial.
   b. Manufacturers:
      1) Erico Products, Inc.; Cadweld and Cadweld Exolon.
      2) Thermoweld.
2. Compression Type:
   a. Compress-deforming type; wrought copper extrusion material.
   b. Single indentation for conductors 6 AWG and smaller.

c. Double indentation with extended barrel for conductors 4 AWG and larger.
d. Single barrels prefilled with oxide-inhibiting and antiseizing compound.
e. Manufacturers:
   1) Burndy Corp.
   2) Thomas and Betts Co.
   3) ILSCO.

2.07 SF6 PAD MOUNTED UNDERGROUND DISTRIBUTION SWITCHGEAR

A. Inspection and Testing (Primary Switches A, B, 1, 2, 3 and 4 see One Line Diagram E-601):

1. Perform inspection and testing in accordance with the manufacturer's recommendations, NFPA 70B and NETA ATS.

B. Check for SF6 gas leaks and repair equipment to stop leaks:

1. Check SF6 gas gauge for proper operation, replace if defective.
2. Refill switch with SF6 gas in accordance with manufacturer's instructions.

C. Visual and Mechanical Inspection:

1. Inspect physical and mechanical condition.
2. Check for proper anchorage, alignment, and grounding.
3. Perform mechanical operator tests in accordance with manufacturer's instructions.
4. Verify that insulating SF6 gas pressure level is correct.
5. Inspect all indicating devices for proper operation.
6. Test interlock systems for proper operation and sequencing.

D. Electrical Tests:

1. Perform contact-resistance tests.
2. Trip fault interrupters by operation of overcurrent control.
3. Perform insulation-resistance tests.
4. Perform an over-potential test on each switched way pole with the switched way in the open position in accordance with the manufacturer's instructions.

E. Grounding System:

1. Inspect ground system for proper connections.
2. Perform ground-impedance measurements utilizing the fall-of-potential method.

F. Equipment Outage:

1. Coordinate each switch outage with City of Key West and Navy 48 hours in advance.
2. Navy personnel will perform the required primary system switching to remove each switch from service and return each switch to service.

2.08 PROTECTIVE RELAYS

A. Basler BE1-951 no equal match existing:

1. Overcurrent Protection: Phase Faults (50/51P-67P, 50/51Q-67Q)
2. The Voltage Protection:
   a. Volts per Hertz Overexcitation (24).
   b. Phase Under/Overvoltage (27P/59P).
   c. Auxiliary Under/Overvoltage (27X/59X).
   d. Negative Sequence Overvoltage (47).
   e. Fuse Loss Detection (60).
   f. Under/Overfrequency (81O/U).
3. The directional power protection: Directional Power (32).
4. Sensing and Control:
   a. Automatic Reclosing Control.
   b. Settings Groups: The relay shall have 4 user-programmable settings groups.
   c. Input/Output: The relay shall have 4 optically isolated inputs, 5 general purpose output contacts, and one fail-safe normally closed alarm output contact. Each output shall be isolated and rated for tripping duty (30A for 0.2 seconds, 7A continuous).
   d. Virtual Control Switches (43/101): The relay shall include 4 virtual selector switches (x43) and one virtual breaker control switch (101), controllable from both the HMI and communication ports.
   e. Relay Logic: The relay shall include programmable logic for each output, for all inputs, and at least ten additional virtual outputs for user programming.
   f. Logic Timers and Logic Latches (62 and 86): The relay shall include 2 logic timers (62) and 2 nonvolatile logic latches (86) to aid in the development of custom logic.
   g. Selectable Wye or Delta Voltage Inputs: The relay shall be field selectable after purchase to operate with either wye-connected (four wire) or open-delta-connected (three wire) potential transformers.

h. Terminal Blocks and Wiring: Other than RS-232, or optional Ethernet wiring, all connections, including RS-485 wiring and IRIG-B wiring, shall be to barrier terminal strips capable of accepting ring lug connection. RS-232 wiring shall be to DB9S female connectors on the front and rear. RS-232 wiring shall be configured to allow 1-to-1 wiring to the DTE port on a PC, without need for null-modem adaptors or proprietary cabling or connectors Ethernet connection shall be made through a case mounted RJ-45 connector. Standard Ethernet cabling practices shall apply.

i. HMI/Display: A backlit 2 line x 16-character LCD display shall be provided integral to the relay, along with a 4-key cursor/navigation keypad. Separate target/alarm reset and settings edit pushbuttons shall be included. Keypad/pushbuttons shall include a continuous, flexible, water-resistant membrane overlay over all keys.

5. Reporting and Alarm:
   a. Oscillography and Sequential Events Recorder.
   b. Nonvolatile Status and Trip Target LEDs.
   c. Real Time Metering The relay shall include real time metering that provides Watt, Watt-hour, VAR, VAR-hour, voltage, amp, and unbalance loading telemetry for the protected circuit.
   d. Demand Metering.
   e. Circuit Breaker Monitor.
   f. Distance to Fault.
6. Communications:
   a. Relay Interface: The relay shall include three independent general-purpose communication ports, including a front and rear RS-232 port and a rear RS-485 port. All communications ports, (with the exception of the optional Ethernet port) shall support ASCll protocol, and the RS-485 port and optional Ethernet port shall support Modbus™ or DNP3.0 options. Ethernet port replaces the rear RS-232 port.
      1) Modbus RTU Slave Communications: The relay shall incorporate Modbus RTU slave protocol internally. External converters or adapters are not acceptable.
   b. IRIG-B: The relay shall include an interface port for a demodulated IRIG-B time synchronization input signal. IRIG-B connection shall be to a barrier terminal strip capable of accepting ring lug terminated wiring.
   c. PC Interface**:** The relay shall be capable of being set by Windows®-based graphical user interface and ASCII terminal interfaces.

7. Settings and Analysis Software:
   a. PC Software PC software compatible with Windows 98, NT, 2000, XP Home, XP Professional, and Me shall be included at no charge. The software shall be freely reproducible within the end user's organization without additional charge. The software must include serial communications for settings upload and download, graphical programming and display of logic equations (including pictorial display of AND and OR gates), and the ability to display and print COMTRADE oscillography and event files.
8. CASE OPTIONS (packaging):
   a. S1 Single or Double Ended (S1 or S1D)

2.09 CURRENT TRANSFORMERS

A. Replace existing current transformers with equal 400:5 corrosion resistant and suitable for marine applications current transformers matching the existing bolt pattern provide new stainless steel mounting hardware.

B. Eaton T Line.

2.10 SUBMITTALS

A. Action Submittals:

1. Product Data:
   a. Wire and cable.
   b. Wire and cable accessories.
   c. Cable fault detection system.

2.11 CONDUCTORS 600 VOLT AND BELOW REPLACEMENT:

A. The following is a list of standards which may be referenced in this section:

1. Association of Edison Illuminating Companies (AEIC): CS 8, Specification for Extruded Dielectric Shielded Power Cables Rated 5 kV through 46 kV.
2. ASTM International (ASTM):
   a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
   b. B3, Standard Specification for Soft or Annealed Copper Wire.
   c. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
   d. B496, Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors.

3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   a. 48, Standard Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV Through 500 kV.
   b. 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V.
   c. 404, Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V to 500000 V.
4. Insulated Cable Engineer's Association, Inc. (ICEA):
   a. S-58-679, Standard for Control Cable Conductor Identification.
   b. S-73-532, Standard for Control Thermocouple Extensions and Instrumentation Cables.
   c. T-29-520, Conducting Vertical Cable Tray Flame Tests with Theoretical Heat Input of 210,000 Btu/hour.
5. National Electrical Manufacturers' Association (NEMA):
   a. CC 1, Electric Power Connectors for Substations.
   b. WC 57, Standard for Control, Thermocouple Extension, and Instrumentation Cables.
   c. WC 70, Standard for Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
   d. WC 71, Standard for Nonshielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electric Energy.
   e. WC 74, 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.
6. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
   b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
7. Telecommunications Industry Association (TIA): TIA-568-C, Commercial Building Telecommunications Cabling Standard.
8. Underwriters Laboratories Inc. (UL):
   a. 13, Standard for Safety for Power-Limited Circuit Cables.
   b. 44, Standard for Safety for Thermoset-Insulated Wires and Cables.
   c. 62, Standard for Safety for Flexible Cord and Cables.
   d. 486A-486B, Standard for Safety for Wire Connectors.
   e. 486C, Standard for Safety for Splicing Wire Connectors.
   f. 510, Standard for Safety for Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.
   g. 854, Standard for Safety for Service-Entrance Cables.
   h. 1072, Standard for Safety for Medium-Voltage Power Cables.
   i. 1277, Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
   j. 1569, Standard for Safety for Metal-Clad Cables.

k. 1581, Standard for Safety for Reference Standard for Electrical Wires, Cables, and Flexible Cords.

l. Conductors shall be UL-listed Type or THWN- gasoline and oil resistant II, suitable for operations at 600 volts as specified in the National Electrical Code. Sizes 14through 1 AWG shall be rated VW-1, larger sizes shall be listed for CT use. Sizes 2 AWG and larger listed and marked sunlight-resistant in black only. Conductors shall be annealed copper, insulated with high-heat and moisture resistant PVC, jacketed with abrasion, moisture, gasoline, and oil resistant nylon or listed equivalent, as manufactured by Southwire Company or approved equal.

2.12 CONDUCTORS 600 VOLTS AND BELOW

A. Conform to applicable requirements of NEMA WC 70.

B. Conductor Type: Stranded copper.

C. Insulation: THHN/THWN-2 (rated for wet locations).

2.13 CONDUCTORS FOR CONTROL CABLE REPLACEMENT:

A. Type 1, Multiconductor Control Cable:

1. Conductors:
   a. 12 AWG, seven-strand copper.
   b. Insulation: 15-mil PVC with 4-mil nylon.
   c. UL 1581 listed as Type THHN/THWN rated VW-1.
   d. Conductor group bound with spiral wrap of barrier tape.
   e. Color Code: In accordance with ICEA S-58-679, Method 1, Table 2.
2. Cable: Passes the ICEA T-29-520, 210,000 Btu per hour Vertical Tray Flame Test.
3. Cable Sizes: 12 conductor/# 12 600 volt jacket thickness 60 mil outside dimension 1.0.
4. Manufacturers:
   a. Southwire.
   b. Okonite.
   c. Okonite Co.

2.14 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW

A. Tape:

1. General Purpose, Flame Retardant: 7-mil, vinyl plastic, Scotch Brand 33+, rated for 90 degrees C minimum, meeting requirements of UL 510.

2. Flame Retardant, Cold and Weather Resistant: 8.5-mil, vinyl plastic, Scotch Brand 88.
3. Arc and Fireproofing:
   a. 30-mil, elastomer.
   b. Manufacturers and Products:
      1) 3M; Scotch Brand 77, with Scotch Brand 69 glass cloth tapebinder.
      2) Plymouth; 53 Plyarc, with 77 Plyglas glass cloth tapebinder.

B. Identification Devices:

1. Sleeve:
   a. Permanent, PVC, yellow or white, with legible machine-printed black markings.
   b. Manufacturers and Products:
      1) Raychem; Type D-SCE or ZH-SCE.
      2) Brady, Type 3PS.
2. Heat Bond Marker:
   a. Transparent thermoplastic heat bonding film with acrylic pressure sensitive adhesive.
   b. Self-laminating protective shield over text.
   c. Machine printed black text.
   d. Manufacturer and Product: 3M Co.; Type SCS-HB.
3. Marker Plate: Nylon, with legible designations permanently hot stamped on plate.
4. Tie-On Cable Marker Tags:
   a. Chemical-resistant white tag.
   b. Size: 1/2 inch by 2 inches.
   c. Manufacturer and Product: Raychem; Type CM-SCE.
5. Grounding Conductor: Permanent green heat-shrink sleeve, 2-inch minimum.

C. Connectors and Terminations:

1. Nylon, Self-Insulated Crimp Connectors:
   a. Manufacturers and Products:
      1) Thomas & Betts; Sta-Kon.
      2) Burndy; Insulug.
      3) ILSCO.
2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:
   a. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
   b. Seamless.
   c. Manufacturers and Products:
      1) Thomas & Betts; Sta-Kon.
      2) Burndy; Insulink.

3) ILSCO; ILSCONS.

3. Self-Insulated, Freespring Wire Connector (Wire Nuts):
   a. UL 486C.
   b. Plated steel, square wire springs.
   c. Manufacturers and Products:
      1) Thomas & Betts.
      2) Ideal; Twister.
4. Self-Insulated, Set Screw Wire Connector:
   a. Two piece compression type with set screw in brass barrel.
   b. Insulated by insulator cap screwed over brass barrel.
   c. Manufacturers:
      1) 3M Co.
      2) Thomas & Betts.
      3) Marrette.

D. Cable Lugs:

1. In accordance with NEMA CC 1.
2. Rated 600 volts of same material as conductor metal.
3. Uninsulated Crimp Connectors and Terminators:
   a. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
   b. Manufacturers and Products:
      1) Thomas & Betts; Color-Keyed.
      2) Burndy; Hydent.
      3) ILSCO.
4. Uninsulated, Bolted, Two-Way Connectors and Terminators:
   a. Manufacturers and Products:
      1) Thomas & Betts; Locktite.
      2) Burndy; Quiklug.
      3) ILSCO.

E. Cable Ties:

1. Nylon, adjustable, self-locking, and reusable.
2. Manufacturer and Product: Thomas & Betts; TY-RAP.

F. Heat Shrinkable Insulation:

1. Thermally stabilized cross-linked polyolefin.
2. Single wall for insulation and strain relief.
3. Dual Wall, adhesive sealant lined, for sealing and corrosion resistance.
4. Manufacturers and Products:
   a. Thomas & Betts; SHRINK-KON.
   b. Raychem; RNF-100 and ES-2000.

2.15 PULLING COMPOUND

A. Nontoxic, noncorrosive, noncombustible, nonflammable, water-based lubricant; UL listed.

B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.

C. Approved for intended use by cable manufacturer.

D. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.

E. Manufacturers:

1. Ideal Co.
2. Polywater, Inc.
3. Cable Grip Co.

2.16 GROUNDING

A. The existing grounding system shall be tested under the commission section of these specifications. Contractor shall include grounding materials to assure all raceways, pull boxes and junction boxes are properly grounded to the grid system. All Manhole metal parts shall be bonded to the grid system. Grounding test wells will be installed in two locations for Pier 8 480 volt system to be utilized during testing and commission phase of contract. Field locate test wells with on site representative.

2.17 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Institute of Electrical and Electronics Engineers (IEEE): C2, National Electrical Safety Code (NESC).
2. National Fire Protection Association (NFPA): 70, National Electrical Code. (NEC).

2.18 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Product data for the following:
   a. Exothermic weld connectors.
   b. Mechanical connectors.
   c. Compression connectors.

2.19 GROUND ROD

A. Material: Copper.

B. Diameter: Minimum5/8.

C. Length: 10 feet sectional.

2.20 GROUND CONDUCTORS

A. All direct buried or duct system grounds shall be 4/0 bare CU minimum size and meet the conductor referenced standards and specification contained in this section .

2.21 CONNECTORS

A. Exothermic Weld Type:

1. Outdoor Weld: Suitable for exposure to elements or direct burial.
2. Indoor Weld: Utilize low-smoke, low-emission process.
3. Manufacturers:
   a. Erico Products, Inc.**;** Cadweld.
   b. Thermoweld.

B. Compression Type:

1. Compress-deforming type; wrought copper extrusion material.
2. Single indentation for conductors 6 AWG and smaller.
3. Double indentation with extended barrel for conductors 4 AWG and larger.
4. Barrels prefilled with oxide-inhibiting and antiseizing compound and sealed.
5. Manufacturers:
   a. Burndy Corp.
   b. Thomas and Betts Co.
   c. ILSCO.

C. Mechanical Type: Split-bolt, saddle, or cone screw type; copper alloy material.

1. Manufacturers:
   a. Burndy Corp.
   b. Thomas and Betts Co.

2.22 GROUNDING WELLS

A. Ground rod box complete with cast iron riser ring and traffic cover marked GROUND ROD.

B. Manufacturers and Products:

1. Christy Co.; No. G5. or
2. Lightning and Grounding Systems, Inc.; I-R S.

PART 3 EXECUTION

3.01 GENERAL

A. Install materials and equipment in accordance with manufacturer's instructions and recommendations.

B. Work shall comply with all applicable provisions of NECA 1.

C. Electrical Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.

D. Operations: Existing primary electrical distribution system shall be coordinated through Naval Facilities Engineering Command.

3.02 DEMOLITION

A. General Demolition: Remove existing 480-volt feeder conductors and control cables from pier igloos back to supplying substations. Clean out manholes and remove any existing cable racking system and ant debris. All salvaged conductor shall be turned over to the Owner.

3.03 PROTECTION FOLLOWING INSTALLATION

A. Protect materials and equipment from corrosion, physical damage, and effects of moisture on insulation.

B. Stainless Steel Box Extension: Contractor shall field measure existing power stations 1,2,3,4. Install box extension with stainless hardware.

3.04 PROTECTIVE RELAYS

A. Replace relays as directed in the field. Calibrate all new and existing relays and adjust settings in accordance with the switchgear manufacturer's recommendations.

3.05 PRECAST HANDHOLES

A. Identify and tag all existing Manholes MH 1-2-3-4-etc (Pier 8 only). Use new marine grade aluminum markers as specified. Install directional arrows indicating the routing of the existing duct bank.

3.06 CONDUCTOR GENERAL

A. Conductor installation shall be in accordance with manufacturer's recommendations.

B. No feeder or sub-feeder splices will be permitted contractor shall pull continuous through manholes and provide conductor and adequately rack all conductors in all manholes on the new racking system.

C. Conductor and cable sizing shown is based on copper conductors, unless noted otherwise.

D. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii.

E. Terminate conductors and cables, unless otherwise indicated. Tighten screws and terminal bolts in accordance with UL 486A-486B for copper conductors.

F. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals.

G. Bundling: Where single conductors and cables in manholes, hand holes, vaults, cable trays, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 12 inches on center.

H. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables. Clean interior of all existing manholes prior to re-pulling cable

I. Existing Duct Bank System: Prior to installation of conductors, pull through each raceway a mandrel approximately 1/4 inch smaller than raceway inside diameter.

J. All conductors shall be protected during storage and installation. Use pulley and rack system to guide conductors. No conductors shall be placed on the ground. All conductors shall be pulled from onsite wire reel staging system utilizing all necessary devices to protect conductors and cables during installation. All conductors will be installed with an electrical powered puller with accurate torque measuring abilities. Record torques during installation. Contractor shall not exceed manufacturers recommended maximum cable torque ratings or pulling tensions. Any conductors installed where it is observed that these values were exceeded will be removed and replaced at the contractors expenses.

3.07 POWER CONDUCTOR COLOR CODING

A. Conductors 600 Volts and Below:

1. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, and at accessible locations wrapped at least six full overlapping turns, covering area 1-1/2 inches to 2 inches wide.
2. 8 AWG and Smaller: Provide colored conductors.
3. Colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts, Single-Phase, Three-Wire	Grounded Neutral One Hot Leg Other Hot Leg	White Black Red
208Y/120 Volts, Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Black Red Blue
240/120 Volts, Three-Phase, Four-Wire, Delta, Center Tap, Ground on Single-Phase	Grounded Neutral Phase A High (wild) Leg Phase C	White Black Orange Blue
480Y/277 Volts, Three-Phase, Four-Wire	Grounded Neutral Phase A Phase B Phase C	White Brown Orange Yellow
Note: Phase A, B, C implies direction of positive phase rotation.		

3.08 CIRCUIT IDENTIFICATION

A. Identify power, instrumentation, and control conductor circuits at each termination, and in accessible locations such as manholes, hand holes, panels, switchboards, motor control centers, pull boxes, and terminal boxes.

B. Circuits Appearing in Circuit Schedules: Identify using circuit schedule designations.

C. Circuits Not Appearing in Circuit Schedules:

1. Assign circuit name based on device or equipment at load end of circuit.
2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.

D. Method:

1. Conductors 3 AWG and Smaller: Identify with sleeves or heat bond markers.
2. Cables and Conductors 2 AWG and Larger:
   a. Identify with marker plates or tie-on cable marker tags.
   b. Attach with nylon tie cord.
3. Taped-on markers or tags relying on adhesives not permitted.

3.09 TERMINAL BLOCKS

A. Install for termination of control circuits entering or leaving equipment and local control panels. Leave 25% spare terminals

3.10 SUPPORT AND FRAMING CHANNELS

A. Install where required for mounting and supporting electrical equipment and raceway systems, stainless steel box extensions

1. All Locations: Type 316 stainless steel.

B. Conductors and Cable Racking System: Install conductors and cable racking system on all sides of existing manholes utilizing stainless steel hardware. All support racks will be installed in a manner which allows looping and securing of conductors as they enter and exit the manholes. Utilize manufacturer’s recommendations for adequate sizing or all racks and mounting systems. Conductors and cables shall not be suspended from the racking system and shall be installed in a uniform manor on the surface of the racking system support arms.

C. Nameplates: Provide identifying nameplate on all equipment, manholes, and control stations. Install as directed in the field utilizing stainless steel hardware.

3.11 GROUNDING GENERAL

A. Grounding shall be in compliance with NFPA 70 and IEEE C2.

B. Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.

C. Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

D. Bond together system neutrals, service equipment enclosures, exposed noncurrent-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.

E. Shielded Power Cables: Ground shields at each splice or termination in accordance with recommendations of splice or termination manufacturer.

F. Shielded Instrumentation Cables:

1. Ground shield to ground bus at power supply for analog signal.
2. Expose shield minimum 1 inch at termination to field instrument and apply heat shrink tube.
3. Do not ground instrumentation cable shield at more than one point.

3.12 WIRE CONNECTIONS

A. Ground Conductors: Install in conduit containing power conductors and control circuits above 50 volts.

B. Nonmetallic Raceways and Flexible Tubing: Install equipment grounding conductor connected at both ends to noncurrent-carrying grounding bus.

C. Connect ground conductors to raceway grounding bushings.

D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.

E. Connect enclosure of equipment containing ground bus to that bus.

F. Bolt connections to equipment ground bus.

G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.

H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.

3.13 GROUND RODS

A. Install full length with conductor connection at upper end.

B. Install with connection point below finished grade, unless otherwise shown.

C. Space multiple ground rods by one rod length.

3.14 GROUNDING WELLS

A. Install inside buildings, asphalt, and paved areas.

B. Install riser ring and cover flush with surface.

C. Place 12 inches of crushed rock in bottom of each well.

3.15 CONNECTIONS

A. General:

1. Abovegrade Connections: Install exothermic weld, mechanical, or compression-type connectors; or brazing.
2. Belowgrade Connections: Install exothermic weld or compression type connectors.
3. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.
4. Notify Engineer and Owner prior to backfilling ground connections.

B. Exothermic Weld Type:

1. Wire brush or file contact point to bare metal surface.
2. Use welding cartridges and molds in accordance with manufacturer's recommendations.
3. Avoid using badly worn molds.
4. Mold to be completely filled with metal when making welds.
5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.

C. Compression Type:

1. Install in accordance with connector manufacturer's recommendations.
2. Install connectors of proper size for grounding conductors and ground rods specified.
3. Install using connector manufacturer's compression tool having proper sized dies.

D. Mechanical Type:

1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
2. Install in accordance with connector manufacturer's recommendations.
3. Do not conceal mechanical connections.

3.16 METAL STRUCTURE GROUNDING

A. Ground metal sheathing and exposed metal vertical structural elements to grounding system.

B. Bond electrical equipment supported by metal platforms to the platforms.

C. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

3.17 MANHOLE AND HANDHOLE GROUNDING

A. Install one ground rod inside each.

B. Ground Rod Floor Protrusion: 4 to 6 inches above floor.

C. Make connections of grounding conductors fully visible and accessible.

D. Connect all noncurrent-carrying metal parts, and any metallic raceway grounding bushings to ground rod with No. 6 AWG copper conductor.

E. Equipment Grounding Conductors: Provide in all conduits containing power conductors and control circuits above 50 volts.

3.18 CURRENT TRANSFORMERS

A. Disconnect and remove all existing current transformers and install with new current transformers with new stainless steel hardware. C/T shall be installed in a manor to prevent over torque and cracking of the C/T housing. Installation of the new C/T shall be supervised by the switchgear manufacturer to assure compliance with the installation instructions. Modify C/T cables as necessary to complete the installation. Install and test under the direction of the equipment manufacturer.

3.19 FIELD QUALITY CONTROL

A. Tests shall be performed in accordance with the requirements of Section 26 08 00, Commissioning and Start Up.

B. General:

1. Test equipment shall have an operating accuracy equal to, or greater than, requirements established by NETA ATS.
2. Test instrument calibration shall be in accordance with NETA ATS.
3. Perform inspection and electrical tests after equipment has been installed.
4. Perform tests with apparatus de-energized whenever feasible.

5. Inspection and electrical tests on energized equipment are to be:
   a. Prior to operation of any primary switch approval must be obtained from the Owner.
   b. Tests and inspection shall be completed in accordance with Section 26 08 00, Commissioning and Start Up.

C. Controls:

1. Test control and signal wiring for proper termination and function.
2. Test local control panels and other control devices for proper terminations, configuration and settings, and functions.
3. Demonstrate control, monitoring, and indication functions in presence of Owner and Engineer.

D. Voltage Testing:

1. When installation is complete and facility is in operation, check voltage at point of termination of electric utility supply system to Project.
2. Record supply voltage for 72 continuous hours.
3. If corrections are not made, obtain written statement from a responsible electric utility official that voltage variations and/or unbalance are within their normal standards.

E. Equipment Line Current:

1. Check line current in each phase for each piece of equipment.
2. If electric utility makes adjustments to supply voltage magnitude or balance, make line current check after adjustments are made.

END OF SECTION

SECTION 26 08 00
COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
   a. D877, Standard Test Method for Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.
   b. D923, Standard Practice for Sampling Electrical Insulating Liquids.
   c. D924, Standard Test Method for Dissipation Factor (or Power Factor) and Relative Permittivity (Dielectric Constant) of Electrical Insulating Liquids.
   d. D971, Standard Test Method for Interfacial Tension of Oil against Water by the Ring Method.
   e. D974, Standard Test Method for Acid and Base Number by Color-Indicator Titration.
   f. D1298, Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method.
   g. D1500, Standard Test Method for ASTM Color of Petroleum Products (ASTM Color Scale).
   h. D1524, Standard Test Method for Visual Examination of Used Electrical Insulating Oils of Petroleum Origin in the Field.
   i. D1533, Standard Test Method for Water in Insulating Liquids by Coulometric Karl Fischer Titration.
   j. D1816, Standard Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes.
2. Institute of Electrical and Electronics Engineers (IEEE):
   a. 43, Recommended Practice for Testing Insulating Resistance of Rotating Machinery.
   b. 48, Standard Test Procedures and Requirements for Alternating-Current Cable Terminators Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5kV through 500kV.
   c. 81, Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
   d. 95, Recommended Practice for Insulation Testing of AC Electric Machinery (2300V and Above) with High Direct Voltage.
   e. 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems above 600V.

f. 400, Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems.
g. 450, Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications.
h. C2, National Electrical Safety Code.
i. C37.20.1, Standard for Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear.
j. C37.20.2, Standard for Metal-Clad Switchgear.
k. C37.20.3, Standard for Metal-Enclosed Interrupter Switchgear.
l. C37.23, Standard for Metal-Enclosed Bus.
m. C62.33, Standard Test Specifications for Varistor Surge-Protective Devices.

3. Insulated Cable Engineers Association (ICEA):
   a. S-93-639, 5-46 kV Shielded Power Cables for Use in the Transmission and Distribution of Electric Energy.
   b. S-94-649, Concentric Neutral Cables Rated 5 through 46 kV.
   c. S-97-682, Standard for Utility Shielded Power Cables Rated 5 through 46 kV.
4. National Electrical Manufacturers Association (NEMA):
   a. AB 4, Guidelines for Inspection and Preventive Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications.
   b. PB 2, Deadfront Distribution Switchboards.
   c. WC 74, 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.
5. InterNational Electrical Testing Association (NETA): ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
6. National Fire Protection Association (NFPA):
   a. 70, National Electrical Code (NEC).
   b. 70B, Recommended Practice for Electrical Equipment Maintenance.
   c. 70E, Standard for Electrical Safety in the Workplace.
   d. 101, Life Safety Code.
7. National Institute for Certification in Engineering Technologies (NICET).
8. Occupational Safety and Health Administration (OSHA): CFR 29, Part 1910, Occupational Safety and Health Standards.

1.02 SUBMITTALS

A. Informational Submittals:

1. Submit 30 days prior to performing inspections or tests:
   a. Schedule for performing inspection and tests.
   b. List of references to be used for each test.
   c. Sample copy of equipment and materials inspection form(s).
   d. Sample copy of individual device test form.
   e. Sample copy of individual system test form.
2. Submit test or inspection reports and certificates for each electrical item tested within 5 days after completion of test:
3. Operation and Maintenance Data:
   a. In accordance with Section 01 78 23, Operation and Maintenance Data.
   b. After test or inspection reports and certificates have been reviewed by Engineer and returned, insert a copy of each in Operation and Maintenance Manual.

1.03 QUALITY ASSURANCE

A. Testing Firm Qualifications:

1. Corporately and financially independent organization functioning as an unbiased testing authority.
2. Professionally independent of manufacturers, suppliers, and installers of electrical equipment and systems being tested.
3. Employer of engineers and technicians regularly engaged in testing and inspecting of electrical equipment, installations, and systems.
4. Supervising engineer accredited as Certified Electrical Test Technologist by NICET or NETA and having a minimum of 5 years' testing experience on similar projects.
5. Technicians certified by NICET or NETA.
6. Assistants and apprentices assigned to Project at ratio not to exceed two certified to one noncertified assistant or apprentice.
7. Registered Professional Engineer or State Certified Master electrical contractor with 10 years testing experience to provide comprehensive Project report outlining services performed, results of such services, recommendations, actions taken, and opinions.
8. In compliance with OSHA CFR 29, Part 1910.7 criteria for accreditation of testing laboratories and a full member company of NETA.

B. Test equipment shall have an operating accuracy equal to or greater than requirements established by NETA ATS.

C. Test instrument calibration shall be in accordance with NETA ATS.

1.04 SEQUENCING AND SCHEDULING

A. Perform inspection and electrical tests after equipment listed herein has been installed.

B. Perform tests with apparatus de-energized whenever feasible.

C. Inspection and electrical tests on energized equipment shall be:

1. Scheduled with both the Owner and the Engineer prior to de-energization.
2. Minimized to avoid extended period of interruption to the operating plant equipment.

D. Notify both the Owner and the Engineer at least 72 hours prior to performing tests on energized electrical equipment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Testing firm shall coordinate upstream primary requirements with NAVY and KEYS ENERGY SYSTEMS, Mr. Dale Finigan, to ensure loading requirements and primary overcurrent protection are adequate for the full operation of the electrical distribution system at 80 percent of connected load capability.

B. Perform tests in accordance with requirements of NETA STANDARDS for Equipment Testing and Facility Startup.

C. Test will include conductor meg testing, Hi Potential testing of any failed 13.8 systems (if needed), breaker current injection testing, ground system fall of potential testing. C/T calibration testing for rated accuracy, protective relay calibration and testing. Add contingency for 2 additional testing days into the lump sum bid.

D. Testing company shall work with the manufacturer of the existing switchgear company to establish and set up all protective devices.

E. Remote control devices for the existing breaker remote Close/Opening have defective communication ports on at least eight locations testing firm and switchgear manufacturer shall work to resolve the replacement and relocation of the com-ports for control and C/T trip controls.

F. Tests and inspections shall establish:

1. Electrical equipment is operational within industry and manufacturer's tolerances and standards.
2. Installation operates properly.
3. Equipment is suitable for energization.
4. Installation conforms to requirements of Contract Documents and NFPA 70, NFPA 70E, NFPA 101, and IEEE C2.

G. Perform inspection and testing in accordance with NETA ATS, industry standards, and manufacturer's recommendations.

H. Set, test, and calibrate protective relays, circuit breakers, fuses power monitoring meters, and other applicable devices in accordance with values established by coordination study.

I. Adjust mechanisms and moving parts of equipment for free mechanical movement.

J. Adjust and set electromechanical electronic relays and sensors to correspond to operating conditions, or as recommended by manufacturer.

K. Verify nameplate data for conformance to Contract Documents and approved Submittals.

L. Realign equipment not properly aligned and correct unlevelness.

M. Properly anchor electrical equipment found to be inadequately anchored.

N. Tighten accessible bolted connections, including wiring connections, with calibrated torque wrench/screw driver to manufacturer's recommendations, or as otherwise specified in NETA ATS. This for all new wiring connections and existing switchgear bus system.

O. Clean contaminated surfaces with cleaning solvents as recommended by manufacturer.

P. Provide proper lubrication of applicable moving parts.

Q. Inform both the Owner and Engineer of working clearances not in accordance with NFPA 70.

R. Investigate and repair or replace:

1. Electrical items that fail tests.
2. Active components not operating in accordance with manufacturer's instructions.
3. Damaged electrical equipment.

S. Electrical Enclosures:

1. Remove foreign material and moisture from enclosure interior.
2. Vacuum and wipe clean enclosure interior.
3. Remove corrosion found on metal surfaces.
4. Repair or replace, as determined by both the Engineer and Owner, door and panel sections having dented surfaces.
5. Repair or replace, as determined by both the Engineer and Owner, poor fitting doors and panel sections.
6. Repair or replace improperly operating latching, locking, or interlocking devices.
7. Replace missing or damaged hardware.
8. Finish:
   a. Provide matching paint and touch up scratches and mars.
   b. If required due to extensive damage, as determined by both the Engineer and Owner, refinish entire assembly.

T. Replace transformer insulating oil not in compliance with ASTM D923.

U. Replace transformer gauges not meeting current calibration standards.

3.02 CHECKOUT AND STARTUP

A. Voltage Field Test:

1. Check voltage at point of termination of power company supply system to Project when installation is essentially complete and is in operation.
2. Check voltage amplitude and balance between phases for loaded and unloaded conditions.
3. Record supply voltage (all three phases simultaneously on same graph) for 72 hours during normal working day.
   a. Submit Voltage Field Test Report within 5 days of test.

4. Unbalance Corrections:
    a. Make written request to power company to correct condition if balance (as defined by NEMA) exceeds 1 percent, or if voltage varies throughout the day and from loaded to unloaded condition more than plus or minus 4 percent of nominal.
    b. Obtain written certification from responsible power company official that voltage variations and unbalance are within their normal standards if corrections are not made.

B. Equipment Line Current Tests:

1. Check line current in each phase for each piece of equipment.
2. Make line current check after power company has made final adjustments to supply voltage magnitude or balance.
3. If phase current for a piece of equipment is above rated nameplate current, prepare Equipment Line Phase Current Report that identifies cause of problem and corrective action taken.

3.03 SWITCHGEAR AND SWITCHBOARD ASSEMBLIES (SUBSTATIONS #1 THROUGH #4)

A. Visual and Mechanical Inspection:

1. Insulator damage and contaminated surfaces.
2. Proper barrier and shutter installation and operation.
3. Proper operation of indicating devices.
4. Improper blockage of air-cooling passages.
5. Proper operation of drawout elements.
6. Integrity and contamination of bus insulation system.
7. Check door and device interlocking system by:
    a. Closure attempt of device when door is in OPEN position.
    b. Opening attempt of door when device is in CLOSED position.
8. Check key interlocking systems for:
    a. Key captivity when device is in ON and in the CLOSED position.
    b. Key removal when device is in ON and in the or CLOSED position.
    c. Closure attempt of device when key has been removed.
    d. Correct number of keys in relationship to number of lock cylinders.
    e. Existence of other keys capable of operating lock cylinders: Destroy duplicate sets of keys.
9. Check nameplates for proper identification of:
    a. Equipment title and tag number with latest one-line diagram.
    b. Pushbutton.
    c. Control switch.
    d. Pilot light.

e. Control relay.
f. Circuit breaker.
g. Indicating meter.
h. Source feed originates.

10. Verify fuse and circuit breaker ratings, sizes, and types conform to those specified.
11. Check bus and cable connections for high resistance by low resistance ohmmeter and calibrated torque wrench thermographic survey applied to bolted joints.
    a. Ohmic value to be zero**.**
    b. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturer.
    c. Thermographic survey temperature gradient of 2 degrees C, or less.
12. Check operation and sequencing of electrical and mechanical interlock systems by:
    a. Closure attempt for locked open devices.
    b. Opening attempt for locked closed devices.
    c. Key exchange to operate devices in OFF-NORMAL positions.
13. Verify performance of each control device and feature.
14. Control Wiring:
    a. Compare wiring to local and remote control and protective devices with elementary diagrams.
    b. Proper conductor lacing and bundling.
    c. Proper conductor identification.
    d. Proper conductor lugs and connections.
15. Exercise active components.

B. Electrical Tests:

1. Insulation Resistance Tests:
    a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
    b. Each phase of each bus section.
    c. Phase-to-phase and phase-to-ground for 1 minute.
    d. With switches and breakers open.
    e. With switches and breakers closed.
    f. Control wiring except that connected to solid state components.
    g. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
2. Overpotential Tests:
    a. Applied ac or dc voltage and test procedure in accordance with IEEE C37.20.1, C37.20.2, C37.20.3, and NEMA PB 2. Alternatively use NETA ATS, Table 100.2.
    b. Each phase of each bus section.

c. Phase-to-phase and phase-to-ground for 1 minute.
d. Test results evaluated on a pass/fail basis.

3. Current Injection Tests:
   a. For entire current circuit in each section.
   b. Secondary injection for current flow of 1 ampere.
   c. Test current at each device.
4. Control Wiring:
   a. Apply secondary voltage to control power and potential circuits.
   b. Check voltage levels at each point on terminal boards and each device terminal.
5. Operational Test:
   a. Initiate control devices.
   b. Check proper operation of control system in each section.

3.04 PANELBOARDS

A. Visual and Mechanical Inspection: Include the following inspections and related work:

1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up-to-date drawings and panelboard schedules.
2. Exercise and perform operational tests of mechanical components and other operable devices in accordance with manufacturer's instruction manual.
3. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
4. Perform visual and mechanical inspection for overcurrent protective devices.

B. Electrical Tests: Include the following items performed in accordance with manufacturer's instruction:

1. Insulation Resistance Tests:
   a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
   b. Each phase of each bus section.
   c. Phase-to-phase and phase-to-ground for 1 minute.
   d. With switches and breakers open.
   e. With switches and breakers closed.
   f. Control wiring except that connected to solid state components.
   g. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
2. Ground continuity test ground bus to system ground.

3.05 LIQUID FILLED TRANSFORMERS

A. Visual and Mechanical Inspection:

1. Physical and insulator damage.
2. Proper winding connections.
3. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturer.
4. Defective wiring.
5. Proper operation of fans, indicators, and auxiliary devices.
6. Effective core and equipment grounding.
7. Removal of shipping brackets, fixtures, or bracing.
8. Tank leaks and proper liquid level.
9. Integrity and contamination of bus insulation system.
10. Verify tap-changer is set at correct ratio for rated voltage under normal operating conditions.
11. Verify proper secondary voltage phase-to-phase and phase-to-ground after energization and prior to loading.

B. Electrical Tests:

1. Insulation Resistance Tests:
   a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.5 for each:
      1) Winding-to-winding.
      2) Winding-to-ground.
   b. Test Duration: 10 minutes with resistances tabulated at 30 seconds, 1 minute, and 10 minutes.
   c. Results temperature corrected in accordance with NETA ATS, Table 100.14.
   d. Temperature corrected insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
   e. Insulation resistance test results to compare within 1 percent of adjacent windings.
2. Perform tests and adjustments for fans, controls, and alarm functions as suggested by manufacturer.
3. Sample insulating oil in accordance with ASTM D923 and have laboratory test for:
   a. Dielectric breakdown voltage in accordance with ASTM D877 or ASTM D1816.
   b. Acid neutralization number in accordance with ASTM D974.
   c. Interfacial tension in accordance with ASTM D971.
   d. Color in accordance with ASTM D1500.
   e. Visual condition in accordance with ASTM D1524.
   f. Specific gravity in accordance with ASTM D1298.

g. Water content, in parts per million, in accordance with ASTM D1533.
h. Dielectric fluid test results in accordance with NETA ATS, Table 100.4.
i. Power factor at 25 degrees C and at 100 degrees, in accordance with ASTM D924.
j. Maximum power factor, corrected to 20 degrees C, in accordance with manufacturer's specifications.

3.06 LOW VOLTAGE CABLES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspection:

1. Inspect each individual exposed power cable No. 4 and larger for:
   a. Physical damage.
   b. Proper connections in accordance with single-line diagram.
   c. Cable bends not in conformance with manufacturer's minimum allowable bending radius where applicable.
   d. Color coding conformance with specification.
   e. Proper circuit identification.
2. Mechanical Connections For:
   a. Proper lug type for conductor material.
   b. Proper lug installation.
   c. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturer.
3. Shielded Instrumentation Cables For:
   a. Proper shield grounding.
   b. Proper terminations.
   c. Proper circuit identification.
4. Control Cables For:
   a. Proper termination.
   b. Proper circuit identification.
5. Cables Terminated Through Window Type CTs: Verify neutrals and grounds are terminated for correct operation of protective devices.

B. Electrical Tests for Conductors No. 4 and Larger:

1. Insulation Resistance Tests:
   a. Utilize 1,000-volt dc megohmmeter for 600-volt insulated conductors.
   b. Test each conductor with respect to ground and to adjacent conductors for 1 minute.
   c. Evaluate ohmic values by comparison with conductors of same length and type.
   d. Investigate values less than 50 megohms.
2. Continuity test by ohmmeter method to ensure proper cable connections.

C. Low-voltage cable tests may be performed by installer in lieu of independent testing firm.

3.07 MEDIUM-VOLTAGE CABLES, 15 KV MAXIMUM

A. At this time the 15KV system will not be testing unless during the test and start up a conductor or device should fail. Test will then be performed to determine the nature of the failure and repairs shall be made for the contingency included in the contract. If cable work is required, the following inspections and test shall be completed.

B. Visual and Mechanical Inspection:

1. Inspect each individual exposed cable for:
   a. Physical damage plus jacket and insulation condition.
   b. Proper connections in accordance with single-line diagram or approved Submittals.
   c. Proper shield grounding.
   d. Proper cable support.
   e. Proper cable termination.
   f. Cable bends not in conformance with manufacturer's minimum allowable bending radius.
   g. Proper arc and fireproofing in common cable areas.
   h. Proper circuit and phase identification.
2. Mechanical Connections:
   a. Proper lug type for conductor material.
   b. Proper lug installation.
   c. Bolt torque level in accordance with NETA ATS, Table 100.12, unless otherwise specified by manufacturers.
3. Conductors Terminated Through Window Type CTs: Verify neutrals and grounds are terminated for correct operation of protective devices.

C. Electrical Tests:

1. Insulation Resistance Tests:
   a. Utilize 5,000-volt megohmmeter for 8 kV and 15 kV conductors.
   b. Test each cable individually with remaining cables and shields grounded.
   c. Test each conductor with respect to ground and to adjacent conductors for 1 minute.
   d. Evaluate ohmic values by comparison with conductors of same length and type.
   e. Investigate values less than 50 megohms.
2. Shield Continuity Tests:
   a. By ohmmeter method on each section of conductor.

b. Investigate values in excess of 10 ohms per 1,000 feet of conductors.

3. Acceptance Tests:
   a. In accordance with IEEE 400, ICEA S-93-639, NEMA WC 74, ICEA S-94-649, and ICEA S-97-682 for insulated conductors.
   b. Each conductor section tested with:
      1) Splices and terminations in place but disconnected from equipment.
      2) Remaining conductors and shields grounded in accordance with IEEE 400.
   c. Apply maximum test voltage per NETA ATS, Table 100.6, based on method (DC, AC, PD or VLF) used.
   d. Measure only leakage current associated with conductor.
   e. Utilize guard ring or field reduction sphere to suppress corona at disconnected terminations.
   f. Maximum test voltage shall not exceed limits for terminators specified in IEEE 48, IEEE 386, or manufacturer's specifications.
   g. Apply test voltage in a minimum of five equal increments until maximum acceptable test voltage is reached.
      1) Increments not to exceed ac voltage rating of conductor.
      2) Record dc leakage current at each step after a constant stabilization time consistent with system charging current.
   h. Raise conductor to specified maximum test voltage and hold for 15 minutes or as specified by conductor manufacturer. Record leakage current at 30 seconds and 1 minute, and at 1-minute intervals, thereafter.
   i. Immediately following test, ground conductor for adequate time period to drain insulation stored charge.
   j. Test results evaluated on a pass/fail basis.
      1) High potential test with test voltage not to exceed 60 percent of applied acceptance dc test voltage.

3.08 METAL ENCLOSED BUSWAYS

A. Visual and Mechanical Inspection:

1. Inspect for:
   a. Proper connections.
   b. Proper bracing, suspension alignment, and enclosure ground.
   c. Check if orientation of ventilated bus provides proper cooling in accordance with manufacturer's instructions and if ventilation openings are not blocked.
   d. Proper phase relationship using continuity test.
   e. Supports at maximum allowable intervals.

2. For busways rated for outdoors, check for:
   a. Check bus orientation for proper location of breathers or weep-hole plugs.
   b. Removal of weep-hole plugs.
   c. Proper installation of joint shields.
   d. Proper operation of space heaters.

B. Electrical Tests:

1. Insulation Resistance Tests:
   a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1
   b. Each phase of each bus section.
   c. Phase-to-phase and phase-to-ground for 1 minute.
   d. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
2. Overpotential Tests:
   a. Applied dc voltage in accordance with IEEE C37.23 and NETA ATS, Table 100.19 on busways rated above 600 volts.
   b. Phase-to-phase and phase-to-ground for 1 minute.
   c. Test results evaluated on pass/fail basis.
3. Contact Resistance Tests:
   a. At each uninsulated bus connection.
   b. On insulated bus, measure resistance of bus section and compare values with adjacent phases.

3.09 SAFETY SWITCHES, 600 VOLTS MAXIMUM

A. Visual and Mechanical Inspection:

1. Proper blade pressure and alignment.
2. Proper operation of switch operating handle.
3. Adequate mechanical support for each fuse.
4. Proper contact-to-contact tightness between fuse clip and fuse.
5. Cable connection bolt torque level in accordance with NETA ATS, Table 100.12.
6. Proper phase barrier material and installation.
7. Verify fuse sizes and types correspond to one-line diagram or approved Submittals.
8. Perform mechanical operational test and verify electrical and mechanical interlocking system operation and sequencing.

B. Electrical Tests:

1. Insulation Resistance Tests:
   a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 100.1.
   b. Phase-to-phase and phase-to-ground for 1 minute on each pole.
   c. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
2. Contact Resistance Tests:
   a. Contact resistance in microhms across each switch blade and fuse holder.
   b. Investigate deviation of 50 percent or more from adjacent poles or similar switches.

3.10 MOLDED AND INSULATED CASE CIRCUIT BREAKERS

A. General: Inspection and testing limited to circuit breakers rated 50 amperes and larger.

B. Visual and Mechanical Inspection:

1. Proper mounting.
2. Proper conductor size.
3. Feeder designation according to nameplate and one-line diagram.
4. Cracked casings.
5. Connection bolt torque level in accordance with NETA ATS, Table 100.12.
6. Operate breaker to verify smooth operation.
7. Compare frame size and trip setting with circuit breaker schedules or one-line diagram.
8. Verify that terminals are suitable for 75 degrees C rated insulated conductors.

C. Electrical Tests:

1. Insulation Resistance Tests:
   a. Utilize 1,000-volt dc megohmmeter for 480-volt and 600-volt circuit breakers and 500-volt dc megohmmeter for 208 and 277volt circuit breakers.
   b. Pole-to-pole and pole-to-ground with breaker contacts opened for 1 minute.
   c. Pole-to-pole and pole-to-ground with breaker contacts closed for 1 minute.
   d. Test values to comply with NETA ATS, Table 100.1.

2. Contact Resistance Tests:
   a. Contact resistance in microhms across each pole.
   b. Investigate deviation of 50 percent or more from adjacent poles and similar breakers.
3. Primary Current Injection Test to Verify:
   a. Long-time minimum pickup and delay.
   b. Short-time pickup and delay.
   c. Ground fault pickup and delay.
   d. Instantaneous pickup by run-up or pulse method.
   e. Trip characteristics of adjustable trip breakers shall be within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
   f. Trip times shall be within limits established by NEMA AB 4, Table 5-3. Alternatively, use NETA ATS, Table 100.7.
   g. Instantaneous pickup value shall be within values established by NEMA AB 4, Table 5-4. Alternatively, use NETA ATS, Table 100.8.

3.11 METERING

A. Substations 1 through 4 main metering is Eaton IQ Analyzer:

1. Verify meter connections.
2. Verify meter multipliers.
3. Calibrate meters.
4. Set up meter parameters.
5. Coordinate meter set up with Navy and Eaton.

3.12 LOW VOLTAGE POWER CIRCUIT BREAKERS

A. Visual and Mechanical Inspection:

1. Proper mounting, cell fit, and element alignment.
2. Proper operation of racking interlocks.
3. Check for damaged arc chutes.
4. Proper contact condition.
5. Bolt torque level in accordance with NETA ATS, Table 100.12.
6. Perform mechanical operational and contact alignment tests in accordance with manufacturer's instructions.
7. Check operation of closing and tripping functions of trip devices by activating ground fault relays, undervoltage shunt relays, and other auxiliary protective devices.
8. Verify primary and secondary contact wipe, gap setting, and other dimensions vital to breaker operation are correct.
9. Check charging motor, motor brushes, associated mechanism, and limit switches for proper operation and condition.

10. Check operation of electrically operated breakers in accordance with manufacturer's instructions.
11. Check for adequate lubrication on contact, moving, and sliding surfaces.

B. Electrical Tests:

1. Insulation Resistance Tests:
   a. Utilize 1,000-volt dc megohmmeter for 480-volt and 600-volt circuit breakers.
   b. Pole-to-pole and pole-to-ground with breaker contacts opened for 1 minute.
   c. Pole-to-pole and pole-to-ground with breaker contacts closed for 1 minute.
   d. Test values to comply with NETA ATS, Table 100.1.
2. Contact Resistance Tests:
   a. Contact resistance in microhms across each pole.
   b. Investigate deviation of 50 percent or more from adjacent poles and similar breakers.
3. Primary Current Injection Test to Verify:
   a. Long-time minimum pickup and delay.
   b. Short-time pickup and delay.
   c. Ground fault pickup and delay.
   d. Instantaneous pickup by run-up or pulse method.
   e. Trip characteristic when adjusted to setting sheet parameters shall be within manufacturer's published time-current tolerance band.

3.13 PROTECTIVE RELAYS

A. Visual and Mechanical Inspection:

1. Visually check each relay for:
   a. Tight cover gasket and proper seal.
   b. Unbroken cover glass.
   c. Condition of spiral spring and contacts.
   d. Disc clearance.
   e. Condition of case shorting contacts if present.
2. Mechanically check each relay for:
   a. Freedom of movement.
   b. Proper travel and alignment.
3. Verify each relay:
   a. Complies with Contract Documents, approved Submittal, and application.
   b. Is set in accordance with recommended settings from information provided by Switchgear Manufacturer and Engineer.

B. Electrical Tests:

1. Insulation resistance test on each circuit to frame, except for solid state devices.
2. Test on nominal recommended setting for:
   a. Pickup parameters on each operating element.
   b. Timing at three points on time-current curve.
   c. Pickup target and seal-in units.
   d. Special tests as required to check operation of restraint, directional, and other elements in accordance with manufacturer's instruction manual.
3. Phase angle and magnitude contribution tests on differential and directional relays after energization to vectorially verify proper polarity and connections.
4. Current Injection Tests:
   a. For entire current circuit in each section.
   b. Secondary injection for current flow of 1 ampere.
   c. Test current at each device.

3.14 INSTRUMENT TRANSFORMERS

A. Visual and Mechanical Inspection:

1. Visually check current, potential, and control transformers for:
   a. Cracked insulation.
   b. Broken leads or defective wiring.
   c. Proper connections.
   d. Adequate clearances between primary and secondary circuit wiring.
2. Verify mechanically:
   a. Grounding and shorting connections have good contact.
   b. Withdrawal mechanism and grounding operation, when applicable, operate properly.
3. Verify proper primary and secondary fuse sizes for potential transformers.

B. Electrical Tests:

1. Current Transformer Tests:
   a. Insulation resistance test of transformer and wiring-to-ground at 1,000 volts dc for 30 seconds.
   b. Polarity test.

2. Potential Transformer Tests:
   a. Insulation resistance test at test voltages in accordance with NETA ATS, Table 100.9, for 1 minute on:
      1) Winding-to-winding.
      2) Winding-to-ground.
   b. Polarity test to verify polarity marks or H1-X1 relationship as applicable.
3. Insulation resistance measurement on instrument transformer shall not be less than that shown in NETA ATS, Table 100.5.

3.15 GROUNDING SYSTEMS

A. Visual and Mechanical Inspection:

1. Equipment and circuit grounds in switchboard and switchgear assemblies for proper connection and tightness.
2. Ground bus connections in panelboard, switchboard, and switchgear assemblies for proper termination and tightness.
3. Effective transformer core and equipment grounding.
4. Accessible connections to grounding electrodes for proper fit and tightness.
5. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

B. Electrical Tests:

1. Fall-of-Potential Test:
   a. In accordance with IEEE 81, Section 8.2.1.5 for measurement of main ground system's resistance.
   b. Main ground electrode system resistance to ground to be no greater than 2 (two) ohm(s).
2. Two-Point Direct Method Test:
   a. In accordance with IEEE 81, Section 8.2.1.1 for measurement of ground resistance between main ground system, equipment frames, and system neutral and derived neutral points.
   b. Equipment ground resistance shall not exceed main ground system resistance by 0.50 ohm.
3. Neutral Bus Isolation:
   a. Test each neutral bus individually with neutral bonding jumper removed at service entrance or separately derived system.
   b. Evaluate ohmic values by measuring resistance between ground bus and neutral bus.
   c. Investigate values less than 50 megohms.

3.16 GROUND FAULT SYSTEMS

A. Inspection and testing limited to:

1. Zero sequence grounding systems.
2. Residual ground fault systems.

B. Visual and Manual Inspection:

1. Neutral main bonding connection to ensure:
   a. Zero sequence sensing system is grounded ahead of neutral disconnect link.
   b. Ground strap sensing system is grounded through sensing device.
   c. Neutral ground conductor is solidly grounded.
2. Verify control power has adequate capacity for system.
3. Manually operate monitor panels for:
   a. Trip test.
   b. No trip test.
   c. Nonautomatic rest.
4. Zero sequence system for symmetrical alignment of core balance transformers about current carrying conductors.
5. Relay check for pickup and time under simulated ground fault conditions.
6. Verify nameplate identification by device operation.

C. Electrical Tests:

1. Test system neutral insulation resistance with neutral ground link removed; minimum 1 megohm.
2. Determine relay pickup by primary current injection at the sensor. Relay pickup current within plus or minus 10 percent of device dial or fixed setting.
3. Test relay timing by injecting 300 percent of pick-up current or as specified by manufacturer. Relay operating time in accordance with manufacturer’s time-current characteristic curves.
4. Test system operation at 55 percent rated control voltage, if applicable.
5. Test zone interlock system by simultaneous sensor current injection and monitoring zone blocking functions.

3.17 LOW VOLTAGE SURGE ARRESTORS

A. Visual and Mechanical Inspection:

1. Adequate clearances between arrestors and enclosures.
2. Ground connections to ground bus or electrode.

B. Electrical Tests:

1. Varistor Type Arrestors:
   a. Clamping voltage test.
   b. Rated RMS voltage test.
   c. Rated dc voltage test.
   d. Varistor arrestor test values in accordance with IEEE C62.33, Section 4.4 and Section 4.9.

3.18 THERMOGRAPHIC SURVEY

A. Provide thermographic survey per NETA ATS Table 100.18 of connections associated with incoming service conductors, bus work, and branch feeder conductors No. 4 and larger at each:

1. Medium and low voltage switchgear.
2. Switchboard.
3. Unit substation.
4. Panelboard.

B. Provide thermographic survey of feeder conductors No. 4 (four) and larger terminating at the switchboard and pier power receptacles.

C. Remove necessary enclosure metal panels and covers prior to performing survey.

D. Perform with equipment energized during periods of maximum possible loading per NFPA 70B, Section 20.17.

E. Do not perform survey on equipment operating at less than 40 percent of rated load. If load is insufficient, perform test with supplemental load bank producing rated load on item being measured.

F. Utilize thermographic equipment capable of:

1. Detecting emitted radiation.
2. Converting detected radiation to visual signal.
3. Detecting 1 degree C temperature difference between subject area and reference point of 30 degrees C.

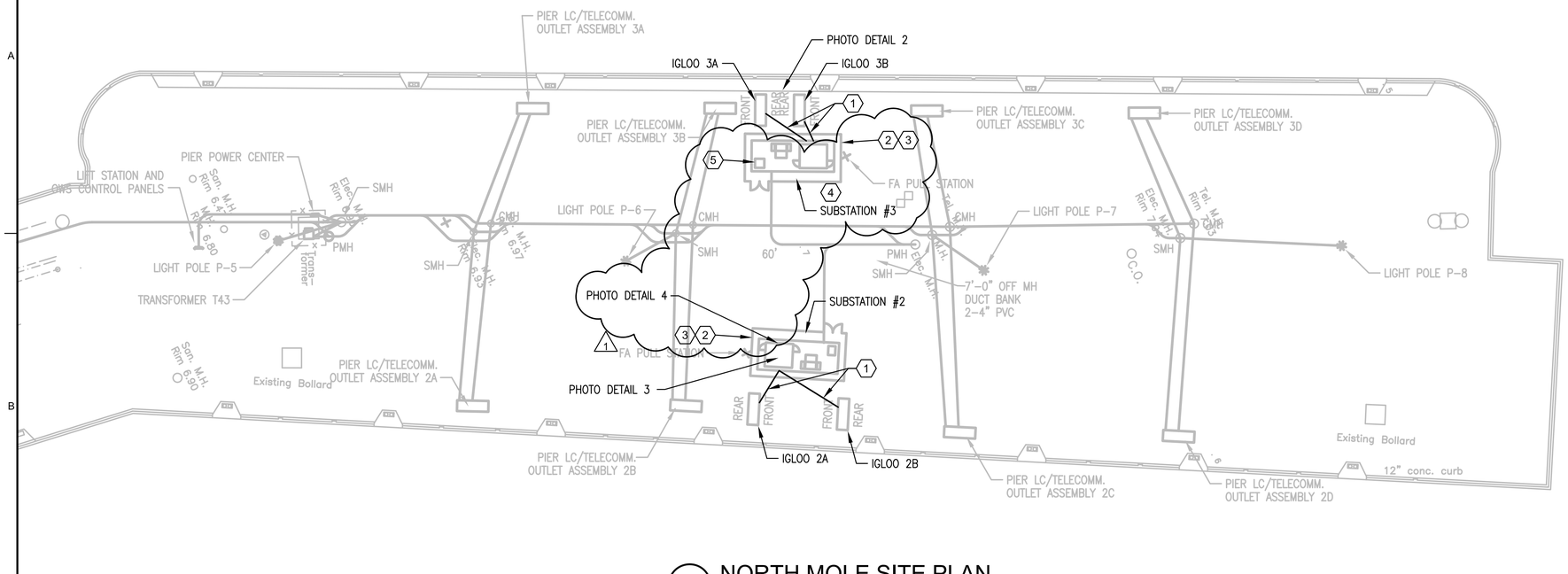
G. Temperature Gradients:

1. 3 degrees C to 7 degrees C indicates possible deficiency that warrants investigation.
2. 7 degrees C to 15 degrees C indicates deficiency that is to be corrected as time permits.
3. 16 degrees C and above indicates deficiency that is to be corrected immediately.

H. Provide written report of:

1. Areas surveyed and the resultant temperature gradients.
2. Locations of areas having temperature gradients of 3 degrees C or greater.
3. Cause of heat rise and actions taken to correct cause of heat rise.
4. Detected phase unbalance.

END OF SECTION



1 NORTH MOLE SITE PLAN
1" = 30'

GENERAL NOTES:

1. CONTRACTOR TO PREP. AND COAT THE METAL TOP OF EACH ELECTRICAL SUBSTATION (FOUR TOTAL) AS DESCRIBED BELOW WITH AMES ® SNOW SEAL:

   A) REMOVE LOOSE DIRT, FLAKING RUST AND DEBRIS FROM ROOF SURFACE. RE-FASTEN OR REPLACE ANY SCREWS THAT HAVE WORKED LOOSE.

   B) PRIME WITH ONE COAT AMES ® SNOW SEAL UNTIL ROOF SURFACE IS SMOOTH AND SEALED. APPLY AMES ® SEAM TAPE OVER ALL SEAMS AND BRUSH A LIBERAL COATING OF AMES ® SNOW SEAL OVER J-STRIPS AND SCREWS.

   C) TOP COAT WITH TWO COATS AMES ® SNOW SEAL.

   D) CONTRACTOR TO FOLLOW MANUFACTURER'S RECOMMENDED APPLICATION REQUIREMENTS.

KEYED NOTES:

(1) REMOVE/REPLACE (24) CT'S, (8) SETS OF 3#750, #2G AND ASSOCIATED REMOTE CONTROL WIRE FROM SWITCHBOARD TO IGLOO. TERMINATE FEEDER AND CONTROL WIRE. CONTRACTOR SHALL FIELD VERIFY FEEDER AND CONTROL SIZE AND COUNT. NOTIFY ENGINEER IMMEDIATELY IF DIFFERENT THAN STATED OR SHOWN ON DRAWINGS.

(2) INSTALL AND SET PROTECTIVE RELAYS AS SPECIFIED IN SECTION 260501-2.07.

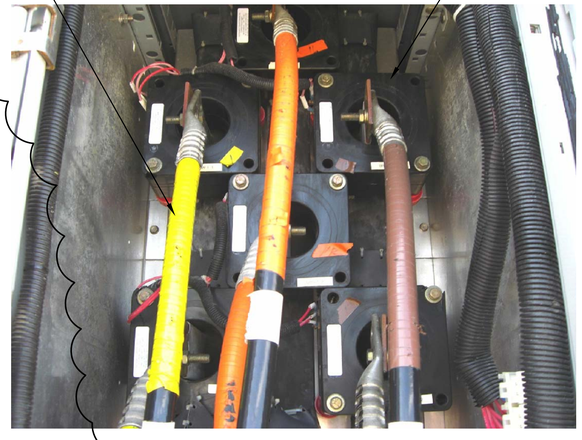
(3) REPLACE CIRCUIT BREAKER CONTROL SWITCH.

(4) CONTRACTOR WILL NOT BE ALLOWED TO WORK ON SUBSTATION #3 DURING THE TIME A CRUISE SHIP IS DOCKED.

(5) PRIMARY SWITCH #3, WAY #3 PROVIDES PRIMARY POWER TO T43 WHICH PROVIDES POWER TO MOLE PIER LIGHTING AND SECURITY (PIER POWER CENTER), SEE ONE LINE E-601. WAY #3 SHALL BE READY FOR RETURN TO SERVICE ONE HOUR PRIOR TO SUNSET EVERY NIGHT.

1

2 PHOTO DETAIL



3 PHOTO DETAIL

4 PHOTO DETAIL

0 30 60 90
1" = 30'

NO.	DATE	DSGN	DR	CHK	APVD
1	5/9/12	J BARTON	R HAMMETT	J BARTON	J BARTON

1 ADDENDUM 1 JB APVD
REVISION BY

Jack S. Barton, P.E.
Fla. P.E. No. 42467

CH2MHILL®
3011 S.W. Willston Road
Gainesville, FL 32608
EB0000072 AAC001992

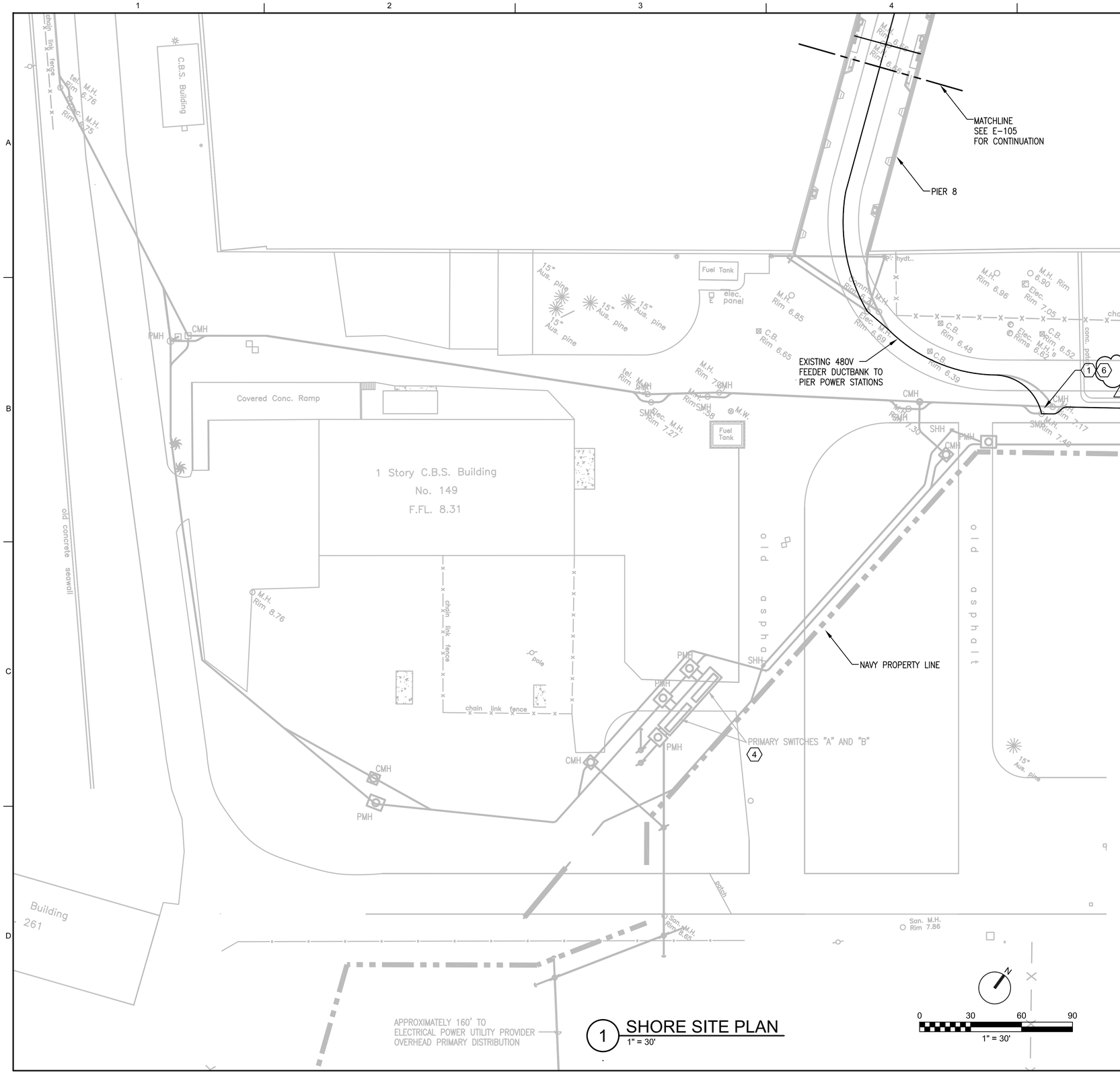
NAVY MOLE ELECTRICAL
KEY WEST, FLORIDA
NAVAL FACILITIES ENGINEERING COMMAND
SOUTH DIVISION - CHARLSTON, SOUTH CAROLINA

ELECTRICAL
NORTH MOLE SITE PLAN

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	APRIL 2012
PROJ	436331
DWG	E-101
SHEET	of

FILENAME: E-101_436331.dwg PLOT DATE: 5/9/2012 PLOT TIME: 10:29 AM



1 SHORE SITE PLAN
1" = 30'

0 30 60 90
1" = 30'

GENERAL NOTES:

1. CONTRACTOR TO PREP. AND COAT THE METAL TOP OF EACH ELECTRICAL SUBSTATION (FOUR TOTAL) AS DESCRIBED BELOW WITH AMES ® SNOW SEAL:

   A) REMOVE LOOSE DIRT, FLAKING RUST AND DEBRIS FROM ROOF SURFACE. RE-FASTEN OR REPLACE ANY SCREWS THAT HAVE WORKED LOOSE.

   B) PRIME WITH ONE COAT AMES ® SNOW SEAL UNTIL ROOF SURFACE IS SMOOTH AND SEALED. APPLY AMES ® SEAM TAPE OVER ALL SEAMS AND BRUSH A LIBERAL COATING OF AMES ® SNOW SEAL OVER J-STRIPS AND SCREWS.

   C) TOP COAT WITH TWO COATS AMES ® SNOW SEAL.

   D) CONTRACTOR TO FOLLOW MANUFACTURER'S RECOMMENDED APPLICATION REQUIREMENTS.

KEYED NOTES:

1. REMOVE/REPLACE EXISTING CABLE RACKS. PROVIDE ADEQUATE SLACK FOR FEEDER CABLES IN MANHOLE FOR FUTURE ADJUSTMENT. FEEDER CABLES SHALL BE A CONTINUOUS RUN FROM SWITCHBOARD TO POWER PLUGS EXCEPT FOR SPLICE AT PLUG PIGTAIL.
2. REMOVE/REPLACE (24) CT'S, (4) [(2) SETS OF 3#750, #2G] AND ASSOCIATED REMOTE CONTROL WIRE FROM SWITCHBOARD TO PIER POWER STATIONS (CUBICLES). LAND AND TERMINATE FEEDER AND CONTROL WIRE. CONTRACTOR SHALL FIELD VERIFY FEEDER AND CONTROL SIZE AND COUNT. NOTIFY ENGINEER IMMEDIATELY IF DIFFERENT THAN STATED OR SHOWN ON DRAWINGS.
3. INSTALL AND SET PROTECTIVE RELAYS AS SPECIFIED IN SECTION 260501-2.07.
4. COORDINATE AND CONFIRM PRIMARY FUSE SIZE AND OVERCURRENT SETTINGS WITH KEYS ENERGY SERVICE MR DALE FINAGIN.
5. REPLACE CIRCUIT BREAKER SWITCHES. SEE PHOTO DETAIL 4, DWG E-101.
6. CONTRACTOR SHALL VERIFY CONDUIT SIZE AT EACH MANHOLE FOR THE 480V FEEDERS FROM SUBSTATION #4 TO THE END OF PIER 8 PRIOR TO START OF CONSTRUCTION.

NO.	DATE	REVISION	DR	CHK	APVD
1	5/9/12	ADDENDUM 1	R HAMMETT	J BARTON	J BARTON

DSGN J BARTON

Jack S. Barton, P.E.
Fla. P.E. No. 42467

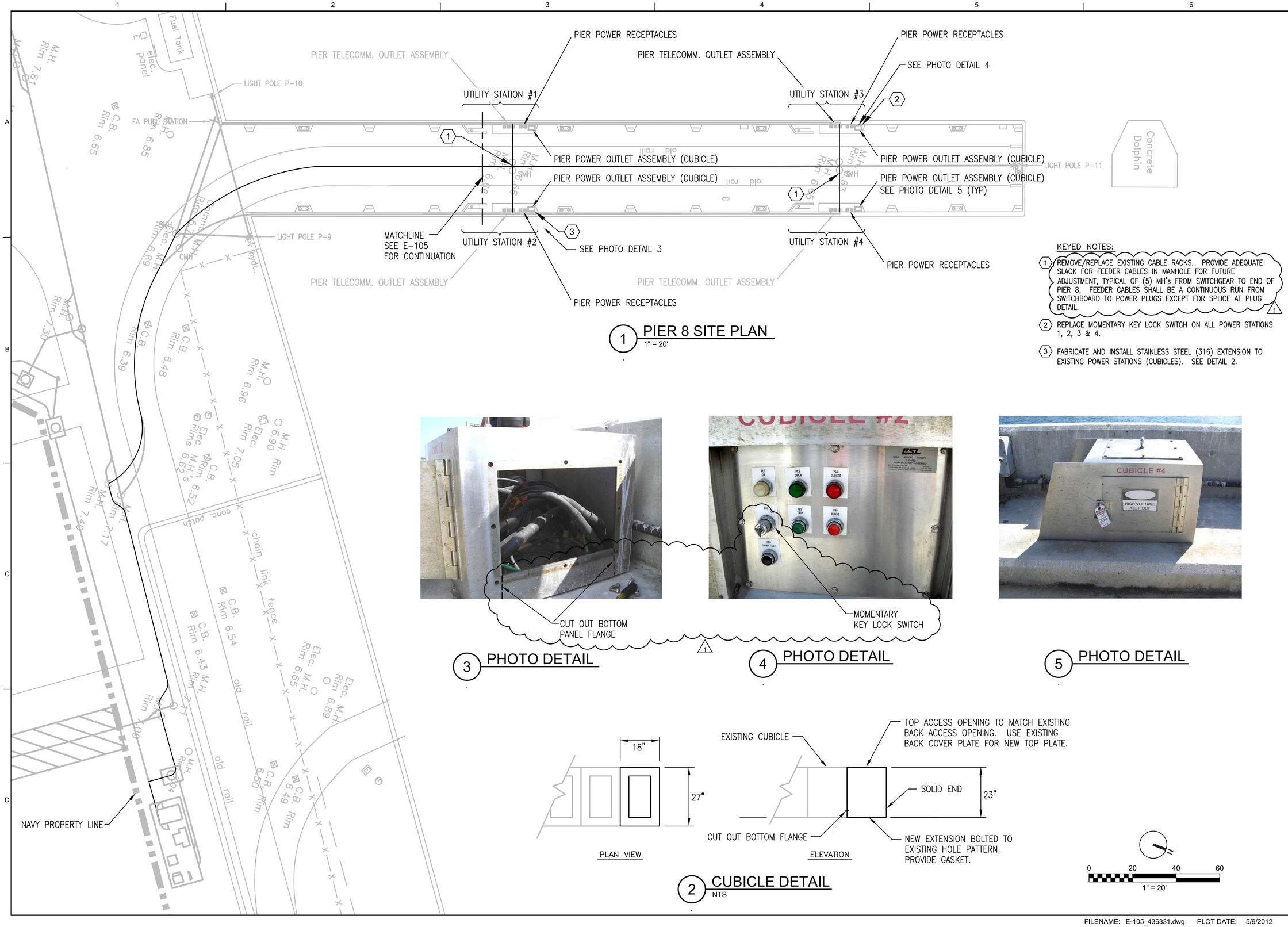
3011 S.W. Williston Road
Gainesville, FL 32608
EB0000072 AAC001992

NAVY MOLE ELECTRICAL
KEY WEST, FLORIDA
NAVAL FACILITIES ENGINEERING COMMAND
SOUTH DIVISION - CHARLSTON, SOUTH CAROLINA

ELECTRICAL
SHORE SITE PLAN

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	APRIL 2012
PROJ	436331
DWG	E-104
SHEET	of



1 PIER 8 SITE PLAN
1" = 20'

KEYED NOTES:

1. REMOVE/REPLACE EXISTING CABLE RACKS. PROVIDE ADEQUATE SLACK FOR FEEDER CABLES IN MANHOLE FOR FUTURE ADJUSTMENT, TYPICAL OF (5) MH's FROM SWITCHGEAR TO END OF PIER 8, FEEDER CABLES SHALL BE A CONTINUOUS RUN FROM SWITCHBOARD TO POWER PLUGS EXCEPT FOR SPLICE AT PLUG DETAIL. 1
2. REPLACE MOMENTARY KEY LOCK SWITCH ON ALL POWER STATIONS 1, 2, 3 & 4.
3. FABRICATE AND INSTALL STAINLESS STEEL (316) EXTENSION TO EXISTING POWER STATIONS (CUBICLES). SEE DETAIL 2.

3 PHOTO DETAIL

4 PHOTO DETAIL

5 PHOTO DETAIL

CUT OUT BOTTOM PANEL FLANGE

MOMENTARY KEY LOCK SWITCH

2 CUBICLE DETAIL
NTS

N
0 20 40 60
1" = 20'

NO.	DATE	DSGN	DR	CHK	APVD
1	5/9/12	J BARTON	R HAMMETT	J BARTON	J BARTON

1 ADDENDUM 1 JB APVD

REVISION BY JB

Jack S. Barton, P.E.
Fla. P.E. No. 42467

3011 S.W. Williston Road
Gainesville, FL 32608
EB0000072 · AAC001992

NAVY MOLE ELECTRICAL
KEY WEST, FLORIDA
NAVAL FACILITIES ENGINEERING COMMAND
SOUTH DIVISION - CHARLSTON, SOUTH CAROLINA

CH2MHILL®

ELECTRICAL
PIER 8 SITE PLAN

VERIFY SCALE	
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"	
DATE	APRIL 2012
PROJ	436331
DWG	E-105
SHEET	of