IMPORTANT

BIDDING INSTRUCTIONS

THE FOLLOWING FORMS MUST BE SENT WITH YOUR BID/QUOTE

1. **THREE (3) ORIGINALS OF BID DOCUMENTS (I.E., STANDARD FORM 1442, STANDARD FORM 18).**

2. **REPRESENTATION AND CERTIFICATION, BID SECTION 00600.**

3. **BID BOND FORM – POWER OF ATTORNEY MUST ACCOMPANY BID BOND**

INFORMATION REGARDING USE OF FACSIMILES

USE OF FACSIMILIE COPIES FOR SUBMISSION OF BIDS/QUOTES, MODIFICATIONS, ACKNOWLEDGEMENT OF AMENDMENT, OR WITHDRAWALS, WILL NOT BE CONSIDERED.

SOLICITATION, OFFER, AND AWARD *(Construction, Alteration, or Repair)*	1. SOLICITATION NO. N62470-04-B-1154	2. TYPE OF SOLICITATION [X] SEALED BID (IFB) [ ] NEGOTIATED *(RFP)*	3. DATE ISSUED 14-Jan-2004	PAGE OF PAGES 1 OF 72

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4. CONTRACT NO.	5. REQUISITION/PURCHASE REQUEST NO. PR041154	6. PROJECT NO.

7. ISSUED BY CODE N62470	8. ADDRESS OFFER TO *(If Other Than Item 7)* CODE
RESIDENT OFFICER IN CHARGE OF CONSTRUCTI FACILTIES OIC BLDG 163 CURTIS ROAD PSC BOX 8006 CHERRY POINT NC 28533-0006 TEL: FAX:	**See Item 7** TEL: FAX:

9. FOR INFORMATION CALL:	A. NAME CONNIE TURNER	B. TELEPHONE NO. *(Include area code)* *(NO COLLECT CALLS)* (252) 466-5930

SOLICITATION

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

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS *(Title, identifying no., date):*

NAVFAC SPECIFICATION NO. N62470-04-B-1154, REPAIR ELECTRICAL DISTRIBUTION SYSTEM, MARINE CORPS AIR STATION, CHERRY POINT, NORTH CAROLINA

IN ACCORDANCE WITH FAR 52.232-27 PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS (MAY 1997) THIS IS A 14 DAY PROGRESS PAY

ESTIMATED COST RANGE: BETWEEN $1,000,000 AND $5,000,000

NAICS CODE: 238210 SIZE STANDARD: $12,000,000

11. The Contractor shall begin performance within 10 calendar days and complete it within 360 calendar days after receiving [X] award, [ ] notice to proceed. This performance period is [X] mandatory, [ ] negotiable. *(See _____ .)*

12 A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? *(If "YES," indicate within how many calendar days after award in Item 12B.)* [X] YES [ ] NO	12B. CALENDAR DAYS 10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and 2 copies to perform the work required are due at the place specified in Item 8 by 02:00 PM *(hour)* local time 19 Feb 2004 *(date).* If this is a sealed bid solicitation, offers must be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee [X] is, [ ] is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 90 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

SOLICITATION, OFFER, AND AWARD (Continued)

(Construction, Alteration, or Repair)

OFFER ***(Must be fully completed by offeror)***

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*	15. TELEPHONE NO. *(Include area code)*
	16. REMITTANCE ADDRESS *(Include only if different than Item 14)* **See Item 14**
CODE / FACILITY CODE	

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

AMOUNTS	SEE SCHEDULE OF PRICES

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

19. ACKNOWLEDGMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation -- give number and date of each)

AMENDMENT NO.										
DATE										

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*	20B. SIGNATURE	20C. OFFER DATE

AWARD ***(To be completed by Government)***

21. ITEMS ACCEPTED:

22. AMOUNT	23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 copies unless otherwise specified)*	**ITEM**	25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO ☐ 10 U.S.C. 2304(c) ☐ 41 U.S.C. 253(c)

26. ADMINISTERED BY CODE	27. PAYMENT WILL BE MADE BY: CODE

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return _____ copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all work, requisitions identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications or incorporated by reference in or attached to this contract.

☐ 29. AWARD *(Contractor is not required to sign this document.)* Your offer on this solicitation, is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*		31A. NAME OF CONTRACTING OFFICER *(Type or print)* TEL: EMAIL:	
30B. SIGNATURE	30C. DATE	31B. UNITED STATES OF AMERICA BY	31C. AWARD DATE

Section 00010 - Solicitation Contract Form

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001		1	Lump Sum		
	Repair Electrical Distribution System FFP FOB: Destination PURCHASE REQUEST NUMBER: PR041154				
				NET AMT	

CLAUSES INCORPORATED BY FULL TEXT

52.204-6 DATA UNIVERSAL NUMBERING SYSTEM (DUNS) NUMBER (OCT 2003)

nnotation “DUNS” or “DUNS+4” followed by the DUNS number or “DUNS+4” that identifies the offeror's name and address exactly as stated in the offer. The DUNS number is a nine-digit number assigned by Dun and Bradstreet, Inc. The DUNS+4 is the DUNS number plus a 4-character suffix that may be assigned at the discretion of the offeror to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see Subpart 32.11) for the same parent concern.

(b) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one.

(1) An offeror may obtain a DUNS number--

(i) If located within the United States, by calling Dun and Bradstreet at 1-866-705-5711 or via the Internet at http://www.dnb.com; or

(ii) If located outside the United States, by contacting the local Dun and Bradstreet office.

(2) The offeror should be prepared to provide the following information:

(i) Company legal business name.

(ii) Tradestyle, doing business, or other name by which your entity is commonly recognized.

(iii) Company physical street address, city, state and Zip Code.

(iv) Company mailing address, city, state and Zip Code (if separate from physical).

(v) Company telephone number.

(vi) Date the company was started.

(vii) Number of employees at your location.

(viii) Chief executive officer/key manager.

(ix) Line of business (industry).

(x) Company Headquarters name and address (reporting relationship within your entity).

(End of provision)

CLAUSES INCORPORATED BY FULL TEXT

52.211-2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE DOD INDEX OF SPECIFICATIONS AND STANDARDS (DODISS) AND DESCRIPTIONS LISTED IN THE ACQUISITION MANAGEMENT SYSTEMS AND

DATA REQUIREMENTS CONTROL LIST, DOD 5010.12-L (DEC 1999)

Copies of specifications, standards, and data item descriptions cited in this solicitation may be obtained--

(a) From the ASSIST database via the Internet at http://assist.daps.mil; or

(b) By submitting a request to the--Department of Defense Single Stock Point (DoDSSP), Building 4, Section D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Telephone (215) 697-2667/2179, Facsimile (215) 697-1462.

(End of provision)

52.211-6 BRAND NAME OR EQUAL (AUG 1999)

(a) If an item in this solicitation is identified as “brand name or equal,” the purchase description reflects the characteristics and level of quality that will satisfy the Government's needs. The salient physical, functional, or performance characteristics that “equal” products must meet are specified in the solicitation.

(b) To be considered for award, offers of “equal” products, including “equal” products of the brand name manufacturer, must--

(1) Meet the salient physical, functional, or performance characteristic specified in this solicitation;

(2) Clearly identify the item by--

(i) Brand name, if any; and

(ii) Make or model number;
(3) Include descriptive literature such as illustrations, drawings, or a clear reference to previously furnished descriptive data or information available to the Contracting Officer; and

(4) Clearly describe any modifications the offeror plans to make in a product to make it conform to the solicitation requirements. Mark any descriptive material to clearly show the modifications.

(c) The Contracting Officer will evaluate “equal” products on the basis of information furnished by the offeror or identified in the offer and reasonably available to the Contracting Officer. The Contracting Officer is not responsible for locating or obtaining any information not identified in the offer.

(d) Unless the offeror clearly indicates in its offer that the product being offered is an “equal” product, the offeror shall provide the brand name product referenced in the solicitation.

(End of provision)

52.214-3 AMENDMENTS TO INVITATIONS FOR BIDS (DEC 1989)

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b) Bidders shall acknowledge receipt of any amendment to this solicitation (1) by signing and returning the amendment, (2) by identifying the amendment number and date in the space provided for this purpose on the form for submitting a bid, (3) by letter or telegram, or (4) by facsimile, if facsimile bids are authorized in the solicitation. The Government must receive the acknowledgment by the time and at the place specified for receipt of bids.

(End of provision)

52.214-4 FALSE STATEMENTS IN BIDS (APR 1984)

Bidders must provide full, accurate, and complete information as required by this solicitation and its attachments. The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

(End of provision)

52.214-5 SUBMISSION OF BIDS (MAR 1997)

(a) Bids and bid modifications shall be submitted in sealed envelopes or packages (unless submitted by electronic means) (1) addressed to the office specified in the solicitation, and (2) showing the time and date specified for receipt, the solicitation number, and the name and address of the bidder.

(b) Bidders using commercial carrier services shall ensure that the bid is addressed and marked on the outermost envelope or wrapper as prescribed in subparagraphs (a)(1) and (2) of this provision when delivered to the office specified in the solicitation.

(c) Telegraphic bids will not be considered unless authorized by the solicitation; however, bids may be modified or withdrawn by written or telegraphic notice.

(d) Facsimile bids, modifications, or withdrawals, will not be considered unless authorized by the solicitation.

(e) Bids submitted by electronic commerce shall be considered only if the electronic commerce method was specifically stipulated or permitted by the solicitation.

(End of provision)

52.214-6 EXPLANATION TO PROSPECTIVE BIDDERS (APR 1984)

Any prospective bidder desiring an explanation or interpretation of the solicitation, drawings, specifications, etc., must request it in writing soon enough to allow a reply to reach all prospective bidders before the submission of their bids. Oral explanations or instructions given before the award of a contract will not be binding. Any information given a prospective bidder concerning a solicitation will be furnished promptly to all other prospective bidders as an amendment to the solicitation, if that information is necessary in submitting bids or if the lack of it would be prejudicial to other prospective bidders.

(End of provision)

52.214-7 LATE SUBMISSIONS, MODIFICATIONS, AND WITHDRAWALS OF BIDS (NOV 1999)

(a) Bidders are responsible for submitting bids, and any modifications or withdrawals, so as to reach the Government office designated in the invitation for bids (IFB) by the time specified in the IFB. If no time is specified in the IFB, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that bids are due.

(b)(1) Any bid, modification, or withdrawal received at the Government office designated in the IFB after the exact time specified for receipt of bids is “late” and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late bid would not unduly delay the acquisition; and--

(i) If it was transmitted through an electronic commerce method authorized by the IFB, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of bids; or

(ii) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of bids and was under the Government's control prior to the time set for receipt of bids.

(2) However, a late modification of an otherwise successful bid that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(c) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the bid wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(d) If an emergency or unanticipated event interrupts normal Government processes so that bids cannot be received at the Government office designated for receipt of bids by the exact time specified in the IFB and urgent Government requirements preclude amendment of the IFB, the time specified for receipt of bids will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(e) Bids may be withdrawn by written notice received at any time before the exact time set for receipt of bids. If the IFB authorizes facsimile bids, bids may be withdrawn via facsimile received at any time before the exact time set for receipt of bids, subject to the conditions specified in the provision at 52.214-31, Facsimile Bids. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for receipt of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

(End of provision)

52.214-12 PREPARATION OF BIDS (APR 1984)

(a) Bidders are expected to examine the drawings, specifications, Schedule, and all instructions. Failure to do so will be at the bidder's risk.

(b) Each bidder shall furnish the information required by the solicitation. The bidder shall sign the bid and print or type its name on the Schedule and each continuation sheet on which it makes an entry. Erasures or other changes must be initialed by the person signing the bid. Bids signed by an agent shall be accompanied by evidence of that agent's authority, unless that evidence has been previously furnished to the issuing office.

(c) For each item offered, bidders shall (1) show the unit price, including, unless otherwise specified, packaging, packing, and preservation and (2) enter the extended price for the quantity of each item offered in the "Amount" column of the Schedule. In case of discrepancy between a unit price and an extended price, the unit price will be presumed to be correct, subject, however, to correction to the same extent and in the same manner as any other

mistake.

(d) Bids for supplies or services other than those specified will not be considered unless authorized by the solicitation.

(e) Bidders must state a definite time for delivery of supplies or for performance of services, unless otherwise specified in the solicitation.

(f) Time, if stated as a number of days, will include Saturdays, Sundays, and holidays.

(End of provision)

52.214-18 PREPARATION OF BIDS--CONSTRUCTION (APR 1984)

(a) Bids must be (1) submitted on the forms furnished by the Government or on copies of those forms, and (2) manually signed. The person signing a bid must initial each erasure or change appearing on any bid form.

(b) The bid form may require bidders to submit bid prices for one or more items on various bases, including--

(1) Lump sum bidding;

(2) Alternate prices;

(3) Units of construction; or

(4) Any combination of subparagraphs (1) through (3) above.

(c) If the solicitation requires bidding on all items, failure to do so will disqualify the bid. If bidding on all items is not required, bidders should insert the words "no bid" in the space provided for any item on which no price is submitted.

(d) Alternate bids will not be considered unless this solicitation authorizes their submission.

(End of provision)

52.214-19 CONTRACT AWARD--SEALED BIDDING--CONSTRUCTION (AUG 1996)

(a) The Government will evaluate bids in response to this solicitation without discussions and will award a contract to the responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the Government, considering only price and the price-related factors specified elsewhere in the solicitation.

(b) The Government may reject any or all bids, and waive informalities or minor irregularities in bids received.

(c) The Government may accept any item or combination of items, unless doing so is precluded by a restrictive limitation in the solicitation or the bid.

(d) The Government may reject a bid as nonresponsive if the prices bid are materially unbalanced between line items or subline items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that

the bid will result in the lowest overall cost to the Government even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

(End of provison)

52.214-21 DESCRIPTIVE LITERATURE (APR 2002)

(a) Descriptive literature, as used in this provision, means information furnished by a bidder, such as cuts, illustrations, drawings, and brochures, that shows a product's characteristics or construction or explains its operation. The term includes only that information required to evaluate the acceptability of the product and excludes other information for operating or maintaining the product.

(b) Descriptive literature is required to establish, for the purpose of evaluation and award, details of the product offered that are specified elsewhere in the solicitation and pertain to significant elements such as--

(1) Design;

(2) Materials;

(3) Components;

(4) Performance characteristics; and

(5) Methods of manufacture, assembly, construction, or operation.

(c) Descriptive literature, required elsewhere in this solicitation, shall be--

(1) Identified to show the item(s) of the offer to which it applies; and

(2) Received by the time specified in this solicitation.

(d) If the bidder fails to submit descriptive literature on time, the Government will reject the bid, except that late descriptive literature sent by mail may be considered under the Late Submissions, Modifications, and Withdrawals of Bids provision of this solicitation.

(e) If the descriptive literature fails to show that the product offered conforms to the requirements of the solicitation, the Government will reject the bid.

(End of provision)

52.214-34 SUBMISSION OF OFFERS IN THE ENGLISH LANGUAGE (APR 1991)

Offers submitted in response to this solicitation shall be in the English language. Offers received in other than English shall be rejected.

(End of provision)

52.214-35 SUBMISSION OF OFFERS IN U.S. CURRENCY (APR 1991)

Offers submitted in response to this solicitation shall be in terms of U.S. dollars. Offers received in other than U.S. dollars shall be rejected.

(End of provision)

52.216-1 TYPE OF CONTRACT (APR 1984)

The Government contemplates award of a Firm Fixed-Price contract resulting from this solicitation.

(End of clause)

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

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

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

Goals for minority participation for each trade	Goals for female participation for each trade
31.7	6.9

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

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in

excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

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

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

(3) Estimated dollar amount of the subcontract;

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

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

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is Rocky Mount, Wilson, and Greenville, North Carolina and the counties of Beauforts, Carteret, Craven, Dare, Edgecombe, Greene, Halifax, Hyde, Jones, Lenoir, Martin, Nash, Northampton, Pamlico, Pitt, Tyrell, Washington, Wayne and Wilson, North Carolina.

(End of provision)

52.225-10 NOTICE OF BUY AMERICAN ACT REQUIREMENT--CONSTRUCTION MATERIALS (MAY 2002)

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

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

(c) Evaluation of offers. (1) The Government will evaluate an offer requesting exception to the requirements of the Buy American Act, based on claimed unreasonable cost of domestic construction material, by adding to the offered price the appropriate percentage of the cost of such foreign construction material, as specified in paragraph (b)(3)(i) of the clause at FAR 52.225-9.

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

(d) Alternate offers.

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

(2) If an alternate offer is submitted, the offeror shall submit a separate Standard Form 1442 for the alternate offer, and a separate price comparison table prepared in accordance with paragraphs (c) and (d) of the clause at FAR 52.225-9

for the offer that is based on the use of any foreign construction material for which the Government has not yet determined an exception applies.

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

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

(ii) May be accepted if revised during negotiations.

(End of provision)

52.232-38 SUBMISSION OF ELECTRONIC FUNDS TRANSFER INFORMATION WITH OFFER (MAY 1999)

The offeror shall provide, with its offer, the following information that is required to make payment by electronic funds transfer (EFT) under any contract that results from this solicitation. This submission satisfies the requirement to provide EFT information under paragraphs (b)(1) and (j) of the clause at 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration.

(1) The solicitation number (or other procurement identification number).

(2) The offeror's name and remittance address, as stated in the offer.

(3) The signature (manual or electronic, as appropriate), title, and telephone number of the offeror's official authorized to provide this information.

(4) The name, address, and 9-digit Routing Transit Number of the offeror's financial agent.

(5) The offeror's account number and the type of account (checking, savings, or lockbox).

(6) If applicable, the Fedwire Transfer System telegraphic abbreviation of the offeror's financial agent.

(7) If applicable, the offeror shall also provide the name, address, telegraphic abbreviation, and 9-digit Routing Transit Number of the correspondent financial institution receiving the wire transfer payment if the offeror's financial agent is not directly on-line to the Fedwire and, therefore, not the receiver of the wire transfer payment.

(End of provision)

52.232-38 SUBMISSION OF ELECTRONIC FUNDS TRANSFER INFORMATION WITH OFFER (MAY 1999)

The offeror shall provide, with its offer, the following information that is required to make payment by electronic funds transfer (EFT) under any contract that results from this solicitation. This submission satisfies the requirement to provide EFT information under paragraphs (b)(1) and (j) of the clause at 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration.

(1) The solicitation number (or other procurement identification number).

(2) The offeror's name and remittance address, as stated in the offer.

(3) The signature (manual or electronic, as appropriate), title, and telephone number of the offeror's official authorized to provide this information.

(4) The name, address, and 9-digit Routing Transit Number of the offeror's financial agent.

(5) The offeror's account number and the type of account (checking, savings, or lockbox).

(6) If applicable, the Fedwire Transfer System telegraphic abbreviation of the offeror's financial agent.

(7) If applicable, the offeror shall also provide the name, address, telegraphic abbreviation, and 9-digit Routing Transit Number of the correspondent financial institution receiving the wire transfer payment if the offeror's financial agent is not directly on-line to the Fedwire and, therefore, not the receiver of the wire transfer payment.

(End of provision)

52.233-2 SERVICE OF PROTEST (AUG 1996)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accounting Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from OIC, NAVFAC Contracts, Facilities MCAS, PSC Box 8006, Cherry Point, North Carolina 28533-0006.

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

(End of provision)

52.236-27 SITE VISIT (CONSTRUCTION) (FEB 1995)

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

(b) Site visits may be arranged during normal duty hours by contacting:
Name: Ronnie Davenport
Telephone: 252-466-4756

(End of provision)

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

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

(End of provision

252.211-7001 AVAILABILITY OF SPECIFICATIONS AND STANDARDS NOT LISTED IN DODISS, DATA ITEM DESCRIPTIONS NOT LISTED IN DOD 5010.12-L, AND PLANS, DRAWINGS, AND OTHER PERTINENT DOCUMENTS. (DEC 1991)

Offerors may obtain the specifications, standards, plans, drawings, data item descriptions, and other pertinent documents cited in this solicitation by submitting a request to:

OIC, NAVFAC Contracts
Facilities MCAS
PSC Box 8006
Cherry Point, North Carolina 28533-0006

Include the number of the solicitation and the title and number of the specification, standard, plan, drawing, or other pertinent document.

(End of Clause)

252.211-7002 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS, STANDARDS, PLANS, DRAWINGS, DATA ITEM DESCRIPTIONS, AND OTHER PERTINENT DOCUMENTS (DEC. 1991)

The specifications, standards, plans, drawings, data item descriptions, and other pertinent documents cited in this solicitation are not available for distribution but may be examined at the following location:

OIC, NAVFAC Contracts
Facilities MCAS
PSC Box 8006
Cherry Point, North Carolina 28533-0006

(End of Clause)

5252.214-9301 NOTICE TO BIDDERS (JUN 1994)

(a) Under the bidding items furnished on Standard Form 1442 (Solicitation, Offer, and Award) the bidder shall state prices for each basis for bid given hereinafter: (check if applicable)

(i) Base Bid Item 0001 shall be the entire work complete in accordance with the drawings and specifications, but not including work indicated or specified to be provided under any of the other bid items.

BIDS MUST BE SUBMITTED ON ALL ITEMS. FAILURE TO PROPOSE ON ALL ITEMS MAY RESULT IN THE BID BEING REJECTED AS NON-RESPONSIVE.

(b) All hand delivered bids must be deposited in the bid box at the office of OIC, NAVFAC Contracts, Facilities MCAS, PSC Box 8006, Building 163 Curtis Road, Cherry Point, North Carolina 28533-0006 prior to the time and date set for bid opening. Any bids submitted by hand after the time set for receipt will be stamped with the date and hour of receipt and held unopened until after award. The file shall be documented in accordance with FAR 14.304-4.

5252.228-9300 INDIVIDUAL SURETY/SURETIES (JUN 1994)

As prescribed in FAR 28.203(a), individual sureties will be permitted. In order for the Contracting Officer to make a determination as to the acceptability of individuals proposed as sureties, as prescribed in FAR 28.203(b), all proposers who submit bonds which are executed by individual sureties are requested to furnish additional information in support of SF-28, Affidavit of Individual Surety, with the bonds. Pursuant to Instruction 3(b) of Standard Form 24, the Bond, Standard Form 25A, the Payment Bond, the Contracting Officer requests the following information:

(a) Equity Securities (Stock):

(1) State the place(s) of incorporation and address of the principal place of business for each issuing corporation listed.
(2) State whether the security issued was issued by public or private offering and give the place of registration of the security.
(3) State whether the security is presently, actively traded.

(b) Debt Securities (Bonds) and Certificates of Deposit:

(1) List the type of bonds held and their maturity dates.
(2) State the name, address and telephone number of the issuing agency, firm or individual.
(3) State the complete address(es) where the bonds are held.
(4) State whether the bonds have been pledged as security or otherwise been encumbered.

(c) Real Property Interests:

(1) Provide complete recording data for the conveyance of each parcel or interest listed to the individual proposed surety.
(2) State whether the values listed are based upon personal evaluation or evaluation of an experienced real estate appraiser. If available, provide copies of written appraisals.
(3) State the method(s) of valuation upon which appraisal is based.
(4) Provide the assessed value of each property interest listed utilized by the appropriate tax assessor for purposes of property taxation.
(5) Provide the telephone number, including area code, for the tax assessor who performed the most recent tax assessment.
(6) State whether each real property interest listed is currently under lien or in any way encumbered and the dollar amount of each such lien or encumbrance.

(d) Persons Proposed as Individual Sureties:

(1) A current list of all other bonds (bid, performance and payment) on which the individual is a surety and bonds for which the individual is requesting to be a surety.

(2) A statement as to the percent of completion of projects for which the individual is bound on a performance bond.

This information is necessary to enable the Contracting Officer to evaluate the sufficiency of the surety's net worth in a timely manner.

5252.228-9302 BID GUARANTEE (JAN 1996)

To assure the execution of the contract and the performance and payment bonds, each bidder/offeror shall submit with its bid/offer a guarantee bond (Standard Form 24) executed by a surety company holding a certificate of authority from the Secretary of the Treasury as an acceptable surety, or other security as provided in FAR Clause 52.228-1, "Bid Guarantee". Security shall be in a penal sum equal to at least 20 percent of the largest amount for which award can be made under the bid submitted, but in no case to exceed $3,000,000. The bid guarantee bond shall be accompanied by a copy of the agent's authority to sign bonds for the surety company.

Section 00600 - Representations & Certifications

CLAUSES INCORPORATED BY FULL TEXT

52.203-2 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (APR 1985)

(a) The offeror certifies that --

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to –

(i) Those prices,

(ii) The intention to submit an offer, or

(iii) The methods of factors used to calculate the prices offered:

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory --

(1) Is the person in the offeror's organization responsible for determining the prices offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) of this provison _____ (insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization);

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) of this provision.

(c) If the offeror deletes or modifies subparagraph (a)(2) of this provision, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

(End of clause)

CLAUSES INCORPORATED BY FULL TEXT

52.203-8 CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY (JAN 1997)

(a) If the Government receives information that a contractor or a person has engaged in conduct constituting a violation of subsection (a), (b), (c), or (d) of Section 27 of the Office of Federal Procurement Policy Act (41 U.S.C. 423) (the Act), as amended by section 4304 of the 1996 National Defense Authorization Act for Fiscal Year 1996 (Pub. L. 104-106), the Government may--

(1) Cancel the solicitation, if the contract has not yet been awarded or issued; or

(2) Rescind the contract with respect to which--

(i) The Contractor or someone acting for the Contractor has been convicted for an offense where the conduct constitutes a violation of subsection 27(a) or (b) of the Act for the purpose of either--

(A) Exchanging the information covered by such subsections for anything of value; or

(B) Obtaining or giving anyone a competitive advantage in the award of a Federal agency procurement contract; or

(ii) The head of the contracting activity has determined, based upon a preponderance of the evidence, that the Contractor or someone acting for the Contractor has engaged in conduct constituting an offense punishable under subsections 27(e)(1) of the Act.

(b) If the Government rescinds the contract under paragraph (a) of this clause, the Government is entitled to recover, in addition to any penalty prescribed by law, the amount expended under the contract.

(c) The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law, regulation, or under this contract.

(End of clause)

52.203-11 CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (APR 1991)

(a) The definitions and prohibitions contained in the clause, at FAR 52.203-12, Limitation on Payments to Influence Certain Federal Transactions, included in this solicitation, are hereby incorporated by reference in paragraph (b) of this Certification.

(b) The offeror, by signing its offer, hereby certifies to the best of his or her knowledge and belief that on or after December 23, 1989,--

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of

Congress on his or her behalf in connection with this solicitation, the offeror shall complete and submit, with its offer, OMB standard form LLL, Disclosure of Lobbying Activities, to the Contracting Officer; and

(3) He or she will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

(End of provision)

52.204-3 TAXPAYER IDENTIFICATION (OCT 1998)

(a) Definitions.

"Common parent," as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"Taxpayer Identification Number (TIN)," as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) Taxpayer Identification Number (TIN).

___ TIN:._____

___ TIN has been applied for.

___ TIN is not required because:

___ Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

___ Offeror is an agency or instrumentality of a foreign government;

___ Offeror is an agency or instrumentality of the Federal Government.

(e) Type of organization.

___ Sole proprietorship;

___ Partnership;

___ Corporate entity (not tax-exempt);

___ Corporate entity (tax-exempt);

___ Government entity (Federal, State, or local);

___ Foreign government;

___ International organization per 26 CFR 1.6049-4;

___ Other _____

(f) Common parent.

___ Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

___ Name and TIN of common parent:

Name _____

TIN _____

(End of provision)

52.204-5 WOMEN-OWNED BUSINESS (OTHER THAN SMALL BUSINESS) (MAY 1999)

(a) Definition. Women-owned business concern, as used in this provision, means a concern that is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

(b) Representation. [Complete only if the offeror is a women-owned business concern and has not represented itself as a small business concern in paragraph (b)(1) of FAR 52.219-1, Small Business Program Representations, of this solicitation.] The offeror represents that it ( ) is a women-owned business concern.

(End of provision)

52.209-5 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (DEC 2001)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that-

(i) The Offeror and/or any of its Principals -

(A) Are ( ) are not ( ) presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have ( ) have not ( ), within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are ( ) are not ( ) presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (a)(1)(i)(B) of this provision.

(ii) The Offeror has ( ) has not ( ), within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

This Certification Concerns a Matter Within the Jurisdiction of an Agency of the United States and the Making of a False, Fictitious, or Fraudulent Certification May Render the Maker Subject to Prosecution Under Section 1001, Title 18, United States Code.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

(End of provision)

52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (APR 2002) - ALTERNATE I (APR 2002)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 238210.

(2) The small business size standard is $12,000,000.00.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations. (1) The offeror represents as part of its offer that it ( ) is, ( ) is not a small business concern.

(2) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents, for general statistical purposes, that it ( ) is, ( ) is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a women-owned small business concern.

(4) (Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a veteran-owned small business concern.

(5) (Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.) The offeror represents as part of its offer that it ( ) is, ( ) is not a service-disabled veteran-owned small business concern.

(6) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents, as part of its offer, that--

(i) It ( ) is, ( ) is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR part 126; and

(ii) It ( ) is, ( ) is not a joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. (The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture:_____.) Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(7) (Complete if offeror represented itself as disadvantaged in paragraph (b)(2) of this provision.) The offeror shall check the category in which its ownership falls:

____ Black American.

____ Hispanic American.

____ Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

____ Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, U.S. Trust Territory of the Pacific Islands (Republic of Palau), Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

____ Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

____ Individual/concern, other than one of the preceding.

(c) Definitions. As used in this provision--

Service-disabled veteran-owned small business concern--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern," means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

Veteran-owned small business concern means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern," means a small business concern --

(1) That is at least 51 percent owned by one or more women or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; or

(2) Whose management and daily business operations are controlled by one or more women.

(d) Notice.

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

52.219-2 EQUAL LOW BIDS. (OCT 1995)

(a) This provision applies to small business concerns only.

(b) The bidder's status as a labor surplus area (LSA) concern may affect entitlement to award in case of tie bids. If the bidder wishes to be considered for this priority, the bidder must identify, in the following space, the LSA in which the costs to be incurred on account of manufacturing or production (by the bidder or the first-tier subcontractors) amount to more than 50 percent of the contract price.

_____

_____

(c) Failure to identify the labor surplus area as specified in paragraph (b) of this provision will preclude the bidder from receiving priority consideration. If the bidder is awarded a contract as a result of receiving priority consideration under this provision and would not have otherwise received award, the bidder shall perform the contract or cause the contract to be performed in accordance with the obligations of an LSA concern.

52.219-19 SMALL BUSINESS CONCERN REPRESENTATION FOR THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (OCT 2000)

(a) Definition.

"Emerging small business" as used in this solicitation, means a small business concern whose size is no greater than 50 percent of the numerical size standard applicable to the North American Industry Classification System (NAICS) code assigned to a contracting opportunity.

(b) [Complete only if the Offeror has represented itself under the provision at 52.219-1 as a small business concern under the size standards of this solicitation.] The Offeror [ ] is, [ ] is not an emerging small business.

(c) (Complete only if the Offeror is a small business or an emerging small business, indicating its size range.)

Offeror's number of employees for the past 12 months (check this column if size standard stated in solicitation is expressed in terms of number of employees) or Offeror's average annual gross revenue for the last 3 fiscal years (check this column if size standard stated in solicitation is expressed in terms of annual receipts). (Check one of the following.)

No. of Employees Avg. Annual Gross Revenues

____ 50 or fewer ____ $1 million or less

____ 51 - 100 ____ $1,000,001 - $2 million

____ 101 - 250 ____ $2,000,001 - $3.5 million

____ 251 - 500 ____ $3,500,001 - $5 million

____ 501 - 750 ____ $5,000,001 - $10 million

____ 751 - 1,000 ____ $10,000,001 - $17 million

____ Over 1,000 ____ Over $17 million

(End of provision)

52.219-21 SMALL BUSINESS SIZE REPRESENTATION FOR TARGETED INDUSTRY CATEGORIES UNDER THE SMALL BUSINESS COMPETITIVENESS DEMONSTRATION PROGRAM (MAY 1999)

(Complete only if the Offeror has represented itself under the provision at 52.219-1 as a small business concern under the size standards of this solicitation.)

Offeror's number of employees for the past 12 months (check this column if size standard stated in solicitation is expressed in terms of number of employees) or Offeror's average annual gross revenue for the last 3 fiscal years (check this column if size standard stated in solicitation is expressed in terms of annual receipts). (Check one of the following.)

No. of Employees Avg. Annual Gross Revenues

____ 50 or fewer ____ $1 million or less

____ 51 - 100 ____ $1,000,001 - $2 million

____ 101 - 250 ____ $2,000,001 - $3.5 million

____ 251 - 500 ____ $3,500,001 - $5 million

____ 501 - 750 ____ $5,000,001 - $10 million

____ 751 - 1,000 ____ $10,000,001 - $17 million

____ Over 1,000 ____ Over $17 million

(End of provision)

52.219-22 SMALL DISADVANTAGED BUSINESS STATUS (OCT 1999)

(a) General. This provision is used to assess an offeror's small disadvantaged business status for the purpose of obtaining a benefit on this solicitation. Status as a small business and status as a small disadvantaged business for general statistical purposes is covered by the provision at FAR 52.219-1, Small Business Program Representation.

(b) Representations.

(1) General. The offeror represents, as part of its offer, that it is a small business under the size standard applicable to this acquisition; and either--

___ (i) It has received certification by the Small Business Administration as a small disadvantaged business concern consistent with 13 CFR 124, Subpart B; and

(A) No material change in disadvantaged ownership and control has occurred since its certification;

(B) Where the concern is owned by one or more disadvantaged individuals, the net worth of each individual upon whom the certification is based does not exceed $750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(C) It is identified, on the date of this representation, as a certified small disadvantaged business concern in the database maintained by the Small Business Administration(PRO0Net); or

___ (ii) It has submitted a completed application to the Small Business Administration or a Private Certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR 124, Subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted.

(2)___ For Joint Ventures. The offeror represents, as part of its offer, that it is a joint venture that complies with the requirements at 13 CFR 124.1002(f) and that the representation in paragraph (b)(1) of this provision is accurate for the small disadvantaged business concern that is participating in the joint venture. [The offeror shall enter the name of the small disadvantaged business concern that is participating in the joint venture: _____.]

(c) Penalties and Remedies. Anyone who misrepresents any aspects of the disadvantaged status of a concern for the purposes of securing a contract or subcontract shall:

(1) Be punished by imposition of a fine, imprisonment, or both;

(2) Be subject to administrative remedies, including suspension and debarment; and

(3) Be ineligible for participation in programs conducted under the authority of the Small Business Act.

(End of provision)

52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999)

The offeror represents that --

(a) ( ) It has, ( ) has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation;

(b) ( ) It has, ( ) has not, filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

(End of provision)

52.222-38 COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS (DEC 2001)

By submission of its offer, the offeror represents that, if it is subject to the reporting requirements of 38 U.S.C. 4212(d) (i.e., if it has any contract containing Federal Acquisition Regulation clause 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans), it has submitted the most recent VETS-100 Report required by that clause.

(End of provision)

52.223-4 RECOVERED MATERIAL CERTIFICATION (OCT 1997)

As required by the Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6962(c)(3)(A)(i)), the offeror certifies, by signing this offer, that the percentage of recovered materials to be used in the performance of the contract will be at least the amount required by the applicable contract specifications.

(End of provision)

52.223-13 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (AUG 2003)

(a) Executive Order 13148, of April 21, 2000, Greening the Government through Leadership in Environmental Management, requires submission of this certification as a prerequisite for contract award.

(b) By signing this offer, the offeror certifies that--

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: (Check each block that is applicable.)

( ) (i) The facility does not manufacture, process, or otherwise use any toxic chemicals listed in 40 CFR 372.65;

( ) (ii) The facility does not have 10 or more full-time employees as specified in section 313.(b)(1)(A) of EPCRA 42 U.S.C. 11023(b)(1)(A);

( ) (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

( ) (iv) The facility does not fall within the following Standard Industrial Classification (SIC) codes or their corresponding North American Industry Classification System sectors:

(A) Major group code 10 (except 1011, 1081, and 1094.

(B) Major group code 12 (except 1241).

(C) Major group codes 20 through 39.

(D) Industry code 4911, 4931, or 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce).

(E) Industry code 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, Subtitle C (42 U.S.C. 6921, et seq.), 5169, 5171, or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); or

( ) (v) The facility is not located within the United States or its outlying areas.

(End of clause)

52.226-2 HISTORICALLY BLACK COLLEGE OR UNIVERSITY AND MINORITY INSTITUTION REPRESENTATION (MAY 2001)

(a) Definitions. As used in this provision--

Historically black college or university means an institution determined by the Secretary of Education to meet the requirements of 34 CFR 608.2. For the Department of Defense, the National Aeronautics and Space Administration, and the Coast Guard, the term also includes any nonprofit research institution that was an integral part of such a college or university before November 14, 1986.

Minority institution means an institution of higher education meeting the requirements of Section 1046(3) of the Higher Education Act of 1965 (20 U.S.C. 1067k, including a Hispanic-serving institution of higher education, as defined in Section 316(b)(1) of the Act (20 U.S.C. 1101a)).

(b) Representation. The offeror represents that it--

( ) is ( ) is not a historically black college or university;

( ) is ( ) is not a minority institution.

(End of provision)

252.209-7001 DISCLOSURE OF OWNERSHIP OR CONTROL BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) "Definitions."

As used in this provision --

(a) "Government of a terrorist country" includes the state and the government of a terrorist country, as well as any

political subdivision, agency, or instrumentality thereof.

(2) "Terrorist country" means a country determined by the Secretary of State, under section 6(j)(1)(A) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(j)(i)(A)), to be a country the government of which has repeatedly provided support for such acts of international terrorism. As of the date of this provision, terrorist countries include: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria.

(3) "Significant interest" means --

(i) Ownership of or beneficial interest in 5 percent or more of the firm's or subsidiary's securities. Beneficial interest includes holding 5 percent or more of any class of the firm's securities in "nominee shares," "street names," or some other method of holding securities that does not disclose the beneficial owner;

(ii) Holding a management position in the firm, such as a director or officer;

(iii) Ability to control or influence the election, appointment, or tenure of directors or officers in the firm;

(iv) Ownership of 10 percent or more of the assets of a firm such as equipment, buildings, real estate, or other tangible assets of the firm; or

(v) Holding 50 percent or more of the indebtness of a firm.

(b) "Prohibition on award."

In accordance with 10 U.S.C. 2327, no contract may be awarded to a firm or a subsidiary of a firm if the government of a terrorist country has a significant interest in the firm or subsidiary or, in the case of a subsidiary, the firm that owns the subsidiary, unless a waiver is granted by the Secretary of Defense.

(c) "Disclosure."

If the government of a terrorist country has a significant interest in the Offeror or a subsidiary of the Offeror, the Offeror shall disclosure such interest in an attachment to its offer. If the Offeror is a subsidiary, it shall also disclose any significant interest the government of a terrorist country has in any firm that owns or controls the subsidiary. The disclosure shall include --

(1) Identification of each government holding a significant interest; and

(2) A description of the significant interest held by each government.

(End of provision)

252.209-7001 DISCLOSURE OF OWNERSHIP OR CONTROL BY THE GOVERNMENT OF A TERRORIST COUNTRY (MAR 1998)

(a) "Definitions."

As used in this provision --

(a) "Government of a terrorist country" includes the state and the government of a terrorist country, as well as any political subdivision, agency, or instrumentality thereof.

(2) "Terrorist country" means a country determined by the Secretary of State, under section 6(j)(1)(A) of the Export Administration Act of 1979 (50 U.S.C. App. 2405(j)(i)(A)), to be a country the government of which has repeatedly provided support for such acts of international terrorism. As of the date of this provision, terrorist countries include: Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria.

(3) "Significant interest" means --

(i) Ownership of or beneficial interest in 5 percent or more of the firm's or subsidiary's securities. Beneficial interest includes holding 5 percent or more of any class of the firm's securities in "nominee shares," "street names," or some other method of holding securities that does not disclose the beneficial owner;

(ii) Holding a management position in the firm, such as a director or officer;

(iii) Ability to control or influence the election, appointment, or tenure of directors or officers in the firm;

(iv) Ownership of 10 percent or more of the assets of a firm such as equipment, buildings, real estate, or other tangible assets of the firm; or

(v) Holding 50 percent or more of the indebtness of a firm.

(b) "Prohibition on award."

In accordance with 10 U.S.C. 2327, no contract may be awarded to a firm or a subsidiary of a firm if the government of a terrorist country has a significant interest in the firm or subsidiary or, in the case of a subsidiary, the firm that owns the subsidiary, unless a waiver is granted by the Secretary of Defense.

(c) "Disclosure."

If the government of a terrorist country has a significant interest in the Offeror or a subsidiary of the Offeror, the Offeror shall disclosure such interest in an attachment to its offer. If the Offeror is a subsidiary, it shall also disclose any significant interest the government of a terrorist country has in any firm that owns or controls the subsidiary. The disclosure shall include --

(1) Identification of each government holding a significant interest; and

(2) A description of the significant interest held by each government.

(End of provision)

252.225-7031 SECONDARY ARAB BOYCOTT OF ISRAEL (APR 2003)

(a) Definitions. As used in this provision--

(1) Foreign person means any person (including any individual, partnership, corporation, or other form of association) other than a United States person.

(2) United States person is defined in 50 U.S.C. App. 2415(2) and means--

(i) Any United States resident or national (other than an individual resident outside the United States who is employed by other than a United States person);

(ii) Any domestic concern (including any permanent domestic establishment of any foreign concern); and

(iii) Any foreign subsidiary or affiliate (including any permanent foreign establishment) of any domestic concern that is controlled in fact by such domestic concern.

(b) Certification. If the offeror is a foreign person, the offeror certifies, by submission of an offer, that it--

(1) Does not comply with the Secondary Arab Boycott of Israel; and

(2) Is not taking or knowingly agreeing to take any action, with respect to the Secondary Boycott of Israel by Arab countries, which 50 U.S.C. App. 2407(a) prohibits a United States person from taking.

(End of provision)

252.247-7022 REPRESENTATION OF EXTENT OF TRANSPORTATION BY SEA (AUG 1992)

(a) The Offeror shall indicate by checking the appropriate blank in paragraph (b) of this provision whether transportation of supplies by sea is anticipated under the resultant contract. The term supplies is defined in the Transportation of Supplies by Sea clause of this solicitation.

(b) Representation. The Offeror represents that it:

____ (1) Does anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

____ (2) Does not anticipate that supplies will be transported by sea in the performance of any contract or subcontract resulting from this solicitation.

(c) Any contract resulting from this solicitation will include the Transportation of Supplies by Sea clause. If the Offeror represents that it will not use ocean transportation, the resulting contract will also include the Defense FAR Supplement clause at 252.247-7024, Notification of Transportation of Supplies by Sea.

(End of provision)

Section 00700 - Contract Clauses

CLAUSES INCORPORATED BY REFERENCE

52.202-1 Alt I	Definitions (Dec 2001) --Alternate I	MAY 2001
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	APR 1984
52.203-7	Anti-Kickback Procedures	JUL 1995
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	JAN 1997
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	JAN 1997
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	JUN 2003
52.204-4	Printed or Copied Double-Sided on Recycled Paper	AUG 2000
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	JUL 1995
52.211-18	Variation in Estimated Quantity	APR 1984
52.214-26	Audit and Records--Sealed Bidding	OCT 1997
52.214-27	Price Reduction for Defective Cost or Pricing Data - Modifications - Sealed Bidding	OCT 1997
52.214-28	Subcontracting Cost Or Pricing Data--Modifications--Sealed Bidding	OCT 1997
52.219-8	Utilization of Small Business Concerns	OCT 2000
52.219-9 Alt I	Small Business Subcontracting Plan (Jan 2002) Alternate I	OCT 2001
52.219-14	Limitations On Subcontracting	DEC 1996
52.219-16	Liquidated Damages-Subcontracting Plan	JAN 1999
52.222-3	Convict Labor	JUN 2003
52.222-4	Contract Work Hours and Safety Standards Act - Overtime Compensation	SEP 2000
52.222-6	Davis Bacon Act	FEB 1995
52.222-7	Withholding of Funds	FEB 1988
52.222-8	Payrolls and Basic Records	FEB 1988
52.222-9	Apprentices and Trainees	FEB 1988
52.222-10	Compliance with Copeland Act Requirements	FEB 1988
52.222-11	Subcontracts (Labor Standards)	FEB 1988
52.222-12	Contract Termination-Debarment	FEB 1988
52.222-13	Compliance with Davis-Bacon and Related Act Regulations.	FEB 1988
52.222-14	Disputes Concerning Labor Standards	FEB 1988
52.222-15	Certification of Eligibility	FEB 1988
52.222-21	Prohibition Of Segregated Facilities	FEB 1999
52.222-26	Equal Opportunity	APR 2002
52.222-27	Affirmative Action Compliance Requirements for Construction	FEB 1999
52.222-35	Equal Opportunity For Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans	DEC 2001
52.222-36	Affirmative Action For Workers With Disabilities	JUN 1998
52.222-37	Employment Reports On Special Disabled Veterans, Veterans Of The Vietnam Era, and Other Eligible Veterans	DEC 2001
52.223-14	Toxic Chemical Release Reporting	AUG 2003
52.226-1	Utilization Of Indian Organizations And Indian-Owned Economic Enterprises	JUN 2000
52.227-1	Authorization and Consent	JUL 1995

52.227-2	Notice And Assistance Regarding Patent And Copyright Infringement	AUG 1996
52.228-11	Pledges Of Assets	FEB 1992
52.228-14	Irrevocable Letter of Credit	DEC 1999
52.229-3	Federal, State And Local Taxes	APR 2003
52.232-23 Alt I	Assignment of Claims (Jan 1986) - Alternate I	APR 1984
52.232-25	Prompt Payment	OCT 2003
52.232-27	Prompt Payment for Construction Contracts	OCT 2003
52.233-1	Disputes	JUL 2002
52.233-3	Protest After Award	AUG 1996
52.236-5	Material and Workmanship	APR 1984
52.236-7	Permits and Responsibilities	NOV 1991
52.236-15	Schedules for Construction Contracts	APR 1984
52.236-17	Layout of Work	APR 1984
52.236-26	Preconstruction Conference	FEB 1995
52.242-13	Bankruptcy	JUL 1995
52.242-14	Suspension of Work	APR 1984
52.243-5	Changes and Changed Conditions	APR 1984
52.244-6	Subcontracts for Commercial Items	APR 2003
52.246-1	Contractor Inspection Requirements	APR 1984
52.246-12	Inspection of Construction	AUG 1996
52.247-34	F.O.B. Destination	NOV 1991
52.249-2	Termination For Convenience Of The Government (Fixed-Price)	SEP 1996
52.249-2 Alt I	Termination for Convenience of the Government (Fixed-Price) (Sep 1996) - Alternate I	SEP 1996
52.253-1	Computer Generated Forms	JAN 1991
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	MAR 1999
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.205-7000	Provision Of Information To Cooperative Agreement Holders	DEC 1991
252.209-7000	Acquisition From Subcontractors Subject To On-Site Inspection Under The Intermediate Range Nuclear Forces (INF) Treaty	NOV 1995
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	MAR 1998
252.219-7003	Small, Small Disadvantaged and Women-Owned Small Business Subcontracting Plan (DOD Contracts)	APR 1996
252.219-7011	Notification to Delay Performance	JUN 1998
252.225-7012	Preference For Certain Domestic Commodities	FEB 2003
252.225-7016	Restriction On Acquisition Of Ball and Roller Bearings	APR 2003
252.232-7003	Electronic Submission of Payment Requests	MAR 2003
252.236-7006	Cost Limitation	JAN 1997
252.243-7002	Requests for Equitable Adjustment	MAR 1998
252.244-7000	Subcontracts for Commercial Items and Commercial Components (DoD Contracts)	MAR 2000
252.246-7000	Material Inspection And Receiving Report	MAR 2003
252.247-7024	Notification Of Transportation Of Supplies By Sea	MAR 2000
5252.236-9301	SPECIAL WORKING CONDITIONS AND ENTRY TO WORK AREA	JUN 1994

CLAUSES INCORPORATED BY FULL TEXT

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

The Contractor shall be required to (a) commence work under this contract within 10 calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than 360 calendar days after award. The time stated for completion shall include final cleanup of the premises.

(End of clause)

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

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount of $900.00 for each calendar day of delay until the work is completed or accepted.

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

(End of clause)

52.214-29 ORDER OF PRECEDENCE--SEALED BIDDING (JAN 1986)

Any inconsistency in this solicitation or contract shall be resolved by giving precedence in the following order: (a) the Schedule (excluding the specifications); (b) representations and other instructions; (c) contract clauses; (d) other documents, exhibits, and attachments; and (e) the specifications.

(End of clause)

52.225-9 BUY AMERICAN ACT—CONSTRUCTION MATERIALS (JUN 2003)

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

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

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

Cost of components means--

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

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

Domestic construction material means--

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

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

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

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

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

(2) This requirement does not apply to the construction material or components listed by the Government as follows: [Contracting Officer to list applicable excepted materials or indicate “none”]

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

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

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

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

(c) Request for determination of inapplicability of the Buy American Act. (1)(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(3) of this clause shall include adequate information for Government evaluation of the request, including--

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

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

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

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

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

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

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

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

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

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

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars) \1\
Item 1			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....
Item 2			
Foreign construction material....	.....	.....	.....
Domestic construction material...	.....	.....	.....

Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).
List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary.
Include other applicable supporting information.

(End of clause)

52.227-4 PATENT INDEMNITY--CONSTRUCTION CONTRACTS (APR 1984)

Except as otherwise provided, the Contractor agrees to indemnify the Government and its officers, agents, and employees against liability, including costs and expenses, for infringement upon any United States patent (except a patent issued upon an application that is now or may hereafter be withheld from issue pursuant to a Secrecy Order under 35 U.S.C. 181) arising out of performing this contract or out of the use or disposal by or for the account of the Government of supplies furnished or work performed under this contract.

(End of clause)

52.228-1 BID GUARANTEE (SEP 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, e.g., bid bond supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds, (1) to unsuccessful bidders as soon as practicable after the opening of bids, and (2) to the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.-

(c) The amount of the bid guarantee shall be _____ percent of the bid price or $_____, whichever is less.-

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.-

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

(End of clause)

52.228-5 INSURANCE--WORK ON A GOVERNMENT INSTALLATION (JAN 1997)

(a) The Contractor shall, at its own expense, provide and maintain during the entire performance of this contract, at least the kinds and minimum amounts of insurance required in the Schedule or elsewhere in the contract.

(b) Before commencing work under this contract, the Contractor shall notify the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective (1) for such period as the laws of the State in which this contract is to be performed prescribe, or (2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

(c) The Contractor shall insert the substance of this clause, including this paragraph (c), in subcontracts under this contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

(End of clause)

52.229-2 NORTH CAROLINA STATE AND LOCAL SALES AND USE TAX (APR 1984)

(a) "Materials," as used in this clause, means building materials, supplies, fixtures, and equipment that become a part of or are annexed to any building or structure erected, altered, or repaired under this contract.

(b) If this is a fixed-price contract, the contract price includes North Carolina State and local sales and use taxes to be paid on materials, notwithstanding any other provision of this contract. If this is a cost-reimbursement contract, any North Carolina State and local sales and use taxes paid by the Contractor on materials shall constitute an allowable cost under this contract.

(c) At the time specified in paragraph (d) below, the Contractor shall furnish the Contracting Officer certified statements setting forth the cost of the materials purchased from each vendor and the amount of North Carolina State and local sales and use taxes paid. In the event the Contractor makes several purchases from the same vendor, the certified statement shall indicate the invoice numbers, the inclusive dates of the invoices, the total amount of the invoices, and the North Carolina State and local sales and use taxes paid. The statement shall also include the cost of any tangible personal property withdrawn from the Contractor's warehouse stock and the amount of North Carolina State and local sales or use tax paid on this property by the Contractor. Any local sales or use taxes included in the Contractor's statements must be shown separately from the State sales or use taxes. The Contractor shall furnish any additional information the Commissioner of Revenue of the State of North Carolina may require to substantiate a refund claim for sales or use taxes. The Contractor shall also obtain and furnish to the Contracting Officer similar certified statements by its subcontractors.

(d) If this contract is completed before the next October 1, the certified statements to be furnished pursuant to paragraph (c) above shall be submitted within 60 days after completion. If this contract is not completed before the next October 1, the certified statements shall be submitted on or before November 30 of each year and shall cover taxes paid during the 12-month period that ended the preceding September 30.

(e) The certified statements to be furnished pursuant to paragraph (c) above shall be in the following form: I hereby certify that during the period . . . . to . . . .[insert dates], ... [insert name of Contractor or subcontractor] paid North Carolina State and local sales and use taxes aggregating $ . . . . (State) and $ . . . . (local), with respect to building materials, supplies, fixtures, and equipment that have become a part of or annexed to a building or structure erected, altered, or repaired by . . . . [insert name of Contractor or subcontractor] for the United States of America, and that the vendors from whom the property was purchased, the dates and numbers of the invoices covering the purchases, the total amount of the invoices of each vendor, the North Carolina State and local sales and use taxes paid on the property (shown separately), and the cost of property withdrawn from warehouse stock and North Carolina State and local sales or use taxes paid on this property are as set forth in the attachments.

(End of clause)

52.232-5 PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS (SEP 2002)

(a) Payment of price. The Government shall pay the Contractor the contract price as provided in this contract.

(b) Progress payments. The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer.

(1) The Contractor's request for progress payments shall include the following substantiation:

(i) An itemization of the amounts requested, related to the various elements of work required by the contract covered by the payment requested.

(ii) A listing of the amount included for work performed by each subcontractor under the contract.

(iii) A listing of the total amount of each subcontract under the contract.

(iv) A listing of the amounts previously paid to each such subcontractor under the contract.

(v) Additional supporting data in a form and detail required by the Contracting Officer.

(2) In the preparation of estimates, the Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site also may be taken into consideration if--

(i) Consideration is specifically authorized by this contract; and

(ii) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract.

(c) Contractor certification. Along with each request for progress payments, the Contractor shall furnish the following certification, or payment shall not be made: (However, if the Contractor elects to delete paragraph (c)(4) from the certification, the certification is still acceptable.)

I hereby certify, to the best of my knowledge and belief, that--

(1) The amounts requested are only for performance in accordance with the specifications, terms , and conditions of the contract;

(2) All payments due to subcontractors and suppliers from previous payments received under the contract have been made, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements and the requirements of chapter 39 of Title 31, United States Code;

(3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract; and

(4) This certification is not to be construed as final acceptance of a subcontractor's performance.

_____

(Name)

_____

(Title)

_____

(Date)

(d) Refund of unearned amounts. If the Contractor, after making a certified request for progress payments, discovers

that a portion or all of such request constitutes a payment for performance by the Contractor that fails to conform to the specifications, terms, and conditions of this contract (hereinafter referred to as the "unearned amount"), the Contractor shall--

(1) Notify the Contracting Officer of such performance deficiency; and

(2) Be obligated to pay the Government an amount (computed by the Contracting Officer in the manner provided in paragraph (j) of this clause) equal to interest on the unearned amount from the 8th day after the date of receipt of the unearned amount until--

(i) The date the Contractor notifies the Contracting Officer that the performance deficiency has been corrected; or

(ii) The date the Contractor reduces the amount of any subsequent certified request for progress payments by an amount equal to the unearned amount.

(e) Retainage. If the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of 10 percent of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the contract, for which the price is stated separately in the contract, payment shall be made for the completed work without retention of a percentage.

(f) Title, liability, and reservation of rights. All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be construed as--

(1) Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or

(2) Waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(g) Reimbursement for bond premiums. In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full payment to the surety. The retainage provisions in paragraph (e) of this clause shall not apply to that portion of progress payments attributable to bond premiums.

(h) Final payment. The Government shall pay the amount due the Contractor under this contract after--

(1) Completion and acceptance of all work;

(2) Presentation of a properly executed voucher; and

(3) Presentation of release of all claims against
the Government arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned under the Assignment of Claims Act of 1940 (31 U.S.C. 3727 and 41 U.S.C. 15).

(i) Limitation because of undefinitized work. Notwithstanding any provision of this contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action

resulting in a contract, as defined in FAR Subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes.

(j) Interest computation on unearned amounts. In accordance with 31 U.S.C. 3903(c)(1), the amount payable under subparagraph (d)(2) of this clause shall be--

(1) Computed at the rate of average bond equivalent rates of 91-day Treasury bills auctioned at the most recent auction of such bills prior to the date the Contractor receives the unearned amount; and

(2) Deducted from the next available payment to the Contractor.

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

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

(End of clause)

52.236-6 SUPERINTENDENCE BY THE CONTRACTOR (APR 1984)

At all times during performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on the worksite a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

(End of clause)

52.242-4 CERTIFICATION OF FINAL INDIRECT COSTS (JAN 1997)

(a) The Contractor shall--

(1) Certify any proposal to establish or modify final indirect cost rates;

(2) Use the format in paragraph (c) of this clause to certify; and

(3) Have the certificate signed by an individual of the Contractor's organization at a level no lower than a vice president or chief financial officer of the business segment of the Contractor that submits the proposal.

(b)) Failure by the Contractor to submit a signed certificate, as described in this clause, may result in final indirect costs at rates unilaterally established by the Contracting Officer.

(c) The certificate of final indirect costs shall read as follows:

CERTIFICATE OF FINAL INDIRECT COSTS

This is to certify that I have reviewed this proposal to establish final indirect cost rates and to the best of my knowledge and belief: 1. All costs included in this proposal (identify proposal and date) to establish final indirect cost rates for (identify period covered by rate) are allowable in accordance with the cost principles of the Federal Acquisition Regulation (FAR) and its supplements applicable to the contracts to which the final indirect cost rates will apply; and 2. This proposal does not include any costs which are expressly unallowable under applicable cost principles of the FAR or its supplements.

Firm:----------

Signature:----------

Name of Certifying Official:----------

Title:----------

Date of Execution:----------

(End of clause)

52.246-21 WARRANTY OF CONSTRUCTION (MAR 1994)

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.
(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice;

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud.

(End of clause)

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.
(End of clause)

252.204-7004 REQUIRED CENTRAL CONTRACTOR REGISTRATION ALTERNATE A (NOV 2003)

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

“Central Contractor Registration (CCR) database” means the primary Government repository for contractor information required for the conduct of business with the Government.

“Commercial and Government Entity (CAGE) code” means--

(1) A code assigned by the Defense Logistics Information Service (DLIS) to identify a commercial or Government entity; or

(2) A code assigned by a member of the North Atlantic Treaty Organization that DLIS records and maintains in the CAGE master file. This type of code is known as an “NCAGE code.”

“Data Universal Numbering System (DUNS) number” means the 9-digit number assigned by Dun and Bradstreet, Inc. (D&B) to identify unique business entities.

“Data Universal Numbering System +4 (DUNS+4) number” means the DUNS number assigned by D&B plus a 4-character suffix that may be assigned by a business concern. (D&B has no affiliation with this 4-character suffix.) This 4-character suffix may be assigned at the discretion of the business concern to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see Subpart 32.11 of the Federal Acquisition Regulation) for the same parent concern.

“Registered in the CCR database” means that--

(1) The Contractor has entered all mandatory information, including the DUNS number or the DUNS+4 number, into the CCR database;

(2) The Contractor's CAGE code is in the CCR database; and

(3) The Government has validated all mandatory data fields and has marked the records “Active.”

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any contract, basic agreement, basic ordering agreement, or blanket purchasing agreement resulting from this solicitation.

(2) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation “DUNS” or “DUNS +4” followed by the DUNS or DUNS +4 number that identifies the offeror's name and address exactly as stated in the offer. The DUNS number will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(c) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one.

(1) An offeror may obtain a DUNS number--

(i) If located within the United States, by calling Dun and Bradstreet at 1-866-705-5711 or via the Internet at http://www.dnb.com; or

(ii) If located outside the United States, by contacting the local Dun and Bradstreet office.

(2) The offeror should be prepared to provide the following information:

(i) Company legal business.

(ii) Tradestyle, doing business, or other name by which your entity is commonly recognized.

(iii) Company Physical Street Address, City, State, and Zip Code.

(iv) Company Mailing Address, City, State and Zip Code (if separate from physical).

(v) Company Telephone Number.

(vi) Date the company was started.

(vii) Number of employees at your location.

(viii) Chief executive officer/key manager.

(ix) Line of business (industry).

(x) Company Headquarters name and address (reporting relationship within your entity).

(d) If the Offeror does not become registered in the CCR database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror.

(e) Processing time, which normally takes 48 hours, should be taken into consideration when registering. Offerors who are not registered should consider applying for registration immediately upon receipt of this solicitation.

(f) The Contractor is responsible for the accuracy and completeness of the data within the CCR database, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(g)(1)(i) If a Contractor has legally changed its business name, “doing business as” name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in Subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the CCR database; (B) comply with the requirements of Subpart 42.12 of the FAR; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (g)(1)(i) of this clause, or fails to perform the agreement at paragraph (g)(1)(i)(C) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the CCR information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the “Suspension of Payment” paragraph of the electronic funds transfer (EFT) clause of this contract.

(2) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the CCR record to reflect an assignee for the purpose of assignment of claims (see FAR Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the CCR database. Information provided to the Contractor's CCR record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the “Suspension of payment” paragraph of the EFT clause of this contract.

(h) Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at http://www.ccr.gov or by calling 1-888-227-2423, or 269-961-5757.

(End of clause)

252.223-7001 HAZARD WARNING LABELS (DEC 1991)

(a) "Hazardous material," as used in this clause, is defined in the Hazardous Material Identification and Material Safety Data clause of this contract.

(b) The Contractor shall label the item package (unit container) of any hazardous material to be delivered under this contract in accordance with the Hazard Communication Standard (29 CFR 1910.1200 et seq). The Standard requires

that the hazard warning label conform to the requirements of the standard unless the material is otherwise subject to the labeling requirements of one of the following statutes:

(1) Federal Insecticide, Fungicide and Rodenticide Act;

(2) Federal Food, Drug and Cosmetics Act;

(3) Consumer Product Safety Act;

(4) Federal Hazardous Substances Act; or

(5) Federal Alcohol Administration Act.

(c) The Offeror shall list which hazardous material listed in the Hazardous Material Identification and Material Safety Data clause of this contract will be labeled in accordance with one of the Acts in paragraphs (b)(1) through (5) of this clause instead of the Hazard Communication Standard. Any hazardous material not listed will be interpreted to mean that a label is required in accordance with the Hazard Communication Standard.

MATERIAL (If None, Insert "None.")	ACT
_____	_____
_____	_____

(d) The apparently successful Offeror agrees to submit, before award, a copy of the hazard warning label for all hazardous materials not listed in paragraph (c) of this clause. The Offeror shall submit the label with the Material Safety Data Sheet being furnished under the Hazardous Material Identification and Material Safety Data clause of this contract.

(e) The Contractor shall also comply with MIL-STD-129, Marking for Shipment and Storage (including revisions adopted during the term of this contract).

(End of clause)

252.223-7004 DRUG-FREE WORK FORCE (SEP 1988)

(a) Definitions.

(1) "Employee in a sensitive position," as used in this clause, means an employee who has been granted access to classified information; or employees in other positions that the Contractor determines involve national security; health or safety, or functions other than the foregoing requiring a high degree of trust and confidence.

(2) "Illegal drugs," as used in this clause, means controlled substances included in Schedules I and II, as defined by section 802(6) of title 21 of the United States Code, the possession of which is unlawful under chapter 13 of that Title. The term "illegal drugs" does not mean the use of a controlled substance pursuant to a valid prescription or other uses authorized by law.

(b) The Contractor agrees to institute and maintain a program for achieving the objective of a drug-free work force. While this clause defines criteria for such a program, contractors are encouraged to implement alternative approaches comparable to the criteria in paragraph (c) that are designed to achieve the objectives of this clause.

(c) Contractor programs shall include the following, or appropriate alternatives:

(1) Employee assistance programs emphasizing high level direction, education, counseling, rehabilitation, and coordination with available community resources;

(2) Supervisory training to assist in identifying and addressing illegal drug use by Contractor employees;

(3) Provision for self-referrals as well as supervisory referrals to treatment with maximum respect for individual confidentiality consistent with safety and security issues;

(4) Provision for identifying illegal drug users, including testing on a controlled and carefully monitored basis. Employee drug testing programs shall be established taking account of the following:

(i) The Contractor shall establish a program that provides for testing for the use of illegal drugs by employees in sensitive positions. The extent of and criteria for such testing shall be determined by the Contractor based on considerations that include the nature of the work being performed under the contract, the employee's duties, and efficient use of Contractor resources, and the risks to health, safety, or national security that could result from the failure of an employee adequately to discharge his or her position.

(ii) In addition, the Contractor may establish a program for employee drug testing--

(A) When there is a reasonable suspicion that an employee uses illegal drugs; or

(B) When an employees has been involved in an accident or unsafe practice;

(C) As part of or as a follow-up to counseling or rehabilitation for illegal drug use;

(D) As part of a voluntary employee drug testing program.

(iii) The Contractor may establish a program to test applicants for employment for illegal drug use.

(iv) For the purpose of administering this clause, testing for illegal drugs may be limited to those substances for which testing is prescribed by section 2..1 of subpart B of the "Mandatory Guidelines for Federal Workplace Drug Testing Programs" (53 FR 11980 (April 11, 1988), issued by the Department of Health and Human Services.

(d) Contractors shall adopt appropriate personnel procedures to deal with employees who are found to be using drugs illegally. Contractors shall not allow any employee to remain on duty or perform in a sensitive position who is found to use illegal drugs until such times as the Contractor, in accordance with procedures established by the Contractor, determines that the employee may perform in such a position.

(e) The provisions of this clause pertaining to drug testing program shall not apply to the extent that are inconsistent with state or local law, or with an existing collective bargaining agreement; provided that with respect to the latter, the Contractor agrees those issues that are in conflict will be a subject of negotiation at the next collective bargaining session.

(End of clause)

252.236-7001 CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (AUG 2000)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings as identified in Specfication Section 00200.

(End of clause)

252.243-7001 PRICING OF CONTRACT MODIFICATIONS (DEC 1991)

When costs are a factor in any price adjustment under this contract, the contract cost principles and procedures in FAR part 31 and DFARS part 231, in effect on the date of this contract, apply.

252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAY 2002)

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

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense" (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or

owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) "Supplies" includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if--

(i) This contract is a construction contract; or

(ii) The supplies being transported are--

(A) Noncommercial items; or

(B) Commercial items that--

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it contracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that --

(1) U.S.-flag vessels are not available for timely shipment;

(2) The freight charges are inordinately excessive or unreasonable; or

(3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum --

(1) Type, weight, and cube of cargo;

(2) Required shipping date;

(3) Special handling and discharge requirements;

(4) Loading and discharge points;

(5) Name of shipper and consignee;

(6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Maritime Administration, Office of Cargo Preference, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information:

(1) Prime contract number;

(2) Name of vessel;

(3) Vessel flag of registry;

(4) Date of loading;

(5) Port of loading;

(6) Port of final discharge;

(7) Description of commodity;

(8) Gross weight in pounds and cubic feet if available;

(9) Total ocean freight in U.S. dollars; and

(10) Name of the steamship company.

(f) The Contractor shall provide with its final invoice under this contract a representation that to the best of its knowledge and belief--

(1) No ocean transportation was used in the performance of this contract;

(2) Ocean transportation was used and only U.S.-flag vessels were used for all ocean shipments under the contract;

(3) Ocean transportation was used, and the Contractor had the written consent of the Contracting Officer for all non-U.S.-flag ocean transportation; or

(4) Ocean transportation was used and some or all of the shipments were made on non-U.S.-flag vessels without the written consent of the Contracting Officer. The Contractor shall describe these shipments in the following format:

ITEM DESCRIPTION	CONTRACT LINE ITEMS	QUANTITY

_____
_____
TOTAL_____

(g) If the final invoice does not include the required representation, the Government will reject and return it to the Contractor as an improper invoice for the purposes of the Prompt Payment clause of this contract. In the event there has been unauthorized use of non-U.S.-flag vessels in the performance of this contract, the Contracting Officer is entitled to equitably adjust the contract, based on the unauthorized use.

(h) In the award of subcontracts for the types of supplies described in paragraph (b)(2) of this clause, the Contractor shall flow down the requirements of this clause as follows:

(1) The Contractor shall insert the substance of this clause, including this paragraph (h), in subcontracts that exceed the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(2) The Contractor shall insert the substance of paragraphs (a) through (e) of this clause, and this paragraph (h), in subcontracts that are at or below the simplified acquisition threshold in part 2 of the Federal Acquisition Regulation.

(End of clause)

252.247-7023 TRANSPORTATION OF SUPPLIES BY SEA (MAY 2002) ALTERNATE III (MAY 2002)

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

(1) "Components" means articles, materials, and supplies incorporated directly into end products at any level of manufacture, fabrication, or assembly by the Contractor or any subcontractor.

(2) "Department of Defense" (DoD) means the Army, Navy, Air Force, Marine Corps, and defense agencies.

(3) "Foreign flag vessel" means any vessel that is not a U.S.-flag vessel.

(4) "Ocean transportation" means any transportation aboard a ship, vessel, boat, barge, or ferry through international waters.

(5) "Subcontractor" means a supplier, materialman, distributor, or vendor at any level below the prime contractor whose contractual obligation to perform results from, or is conditioned upon, award of the prime contract and who is performing any part of the work or other requirement of the prime contract.

(6) "Supplies" means all property, except land and interests in land, that is clearly identifiable for eventual use by or owned by the DoD at the time of transportation by sea.

(i) An item is clearly identifiable for eventual use by the DoD if, for example, the contract documentation contains a reference to a DoD contract number or a military destination.

(ii) "Supplies" includes (but is not limited to) public works; buildings and facilities; ships; floating equipment and vessels of every character, type, and description, with parts, subassemblies, accessories, and equipment; machine tools; material; equipment; stores of all kinds; end items; construction materials; and components of the foregoing.

(7) "U.S.-flag vessel" means a vessel of the United States or belonging to the United States, including any vessel registered or having national status under the laws of the United States.

(b)(1) The Contractor shall use U.S.-flag vessels when transporting any supplies by sea under this contract.

(2) A subcontractor transporting supplies by sea under this contract shall use U.S.-flag vessels if--

(i) This contract is a construction contract; or

(ii) The supplies being transported are--

(A) Noncommercial items; or

(B) Commercial items that--

(1) The Contractor is reselling or distributing to the Government without adding value (generally, the Contractor does not add value to items that it contracts for f.o.b. destination shipment);

(2) Are shipped in direct support of U.S. military contingency operations, exercises, or forces deployed in humanitarian or peacekeeping operations; or

(3) Are commissary or exchange cargoes transported outside of the Defense Transportation System in accordance with 10 U.S.C. 2643.

(c) The Contractor and its subcontractors may request that the Contracting Officer authorize shipment in foreign-flag vessels, or designate available U.S.-flag vessels, if the Contractor or a subcontractor believes that --

(1) U.S.-flag vessels are not available for timely shipment;

(2) The freight charges are inordinately excessive or unreasonable; or

(3) Freight charges are higher than charges to private persons for transportation of like goods.

(d) The Contractor must submit any request for use of other than U.S.-flag vessels in writing to the Contracting Officer at least 45 days prior to the sailing date necessary to meet its delivery schedules. The Contracting Officer will process requests submitted after such date(s) as expeditiously as possible, but the Contracting Officer's failure to grant approvals to meet the shipper's sailing date will not of itself constitute a compensable delay under this or any other clause of this contract. Requests shall contain at a minimum --

(1) Type, weight, and cube of cargo;

(2) Required shipping date;

(3) Special handling and discharge requirements;

(4) Loading and discharge points;

(5) Name of shipper and consignee;

(6) Prime contract number; and

(7) A documented description of efforts made to secure U.S.-flag vessels, including points of contact (with names and telephone numbers) with at least two U.S.-flag carriers contacted. Copies of telephone notes, telegraphic and facsimile message or letters will be sufficient for this purpose.

(e) The Contractor shall, within 30 days after each shipment covered by this clause, provide the Contracting Officer and the Maritime Administration, Office of Cargo Preference, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590, one copy of the rated on board vessel operating carrier's ocean bill of lading, which shall contain the following information:

(1) Prime contract number;

(2) Name of vessel;

(3) Vessel flag of registry;

(4) Date of loading;

(5) Port of loading;

(6) Port of final discharge;

(7) Description of commodity;

(8) Gross weight in pounds and cubic feet if available;

(9) Total ocean freight in U.S. dollars; and

(10) Name of the steamship company.

(f) The Contractor shall insert the substance of this clause, including this paragraph (f), in subcontracts that are for a type of supplies described in paragraph (b)(2) of this clause.

(End of clause)

5252.201-9300 CONTRACTING OFFICER AUTHORITY (JUN 1994)

In no event shall any understanding or agreement between the Contractor and any Government employee other than the Contracting Officer on any contract, modification, change order, letter or verbal direction to the Contractor be effective or binding upon the Government. All such actions must be formalized by a proper contractual document executed by an appointed Contracting Officer. The Contractor is hereby put on notice that in the event a Government employee other than the Contracting Officer directs a change in the work to be performed, it is the Contractor’s responsibility to make inquiry of the Contracting Officer before making the deviation. Payments will not be made without being authorized by an appointed Contracting Officer with the legal authority to bind the Government.

5252.209-9300 ORGANIZATIONAL CONFLICTS OF INTEREST (JUN 1994)

5253The restrictions described herein shall apply to the Contractor and its affiliates, consultants and subcontracts under this contract. If the Contractor under this contract prepares or assists in preparing a statement of work, specifications and plans, the Contractor and its affiliates shall be ineligible to bid or participate, in any capacity, in any contractual effort which is based on such statement of work or specifications and plans as a prime contractor, subcontractor, consultant or in any similar capacity. The Contractor shall not incorporate its

products or services in such statement of work or specification unless so directed in writing by the Contracting Officer, in which case the restriction shall not apply. This contract shall include this clause in its subcontractor's or consultants' agreements concerning the performance of this contract.

5252.228-9305 NOTICE OF BONDING REQUIREMENTS (DEC 2000)

Within 10 days of receipt of award, the bidder/offeror to whom the award is made shall furnish the following bond(s) each with satisfactory security:

A Performance Bond (Standard Form 25). The performance bond shall be in a penal sum equal to 100% percent of the contract price.

A Payment Bond (Standard Form 25A). The payment bond shall be in a penal sum equal to 100% of the contract price.

Any surety company holding a certificate of authority from the Secretary of Treasury as an acceptable Surety on Federal bonds will be accepted. Individual sureties will be permitted as prescribed in FAR 28.203 and FAC 5252.228-9300. Alternative types of security in lieu of furnishing sureties on performance and/or payment bonds will be permitted as prescribed in FAR 28.204, and will be held for at least one year after the completion of the contract. Additional bond security may be required as prescribed in FAR 52.228-2. Bonds shall be accompanied by a document authenticating the agent’s authority to sign bonds for the surety company.

The contract time for purposes of fixing the completion date, default and liquidated damages shall begin to run 15 days from the date of award, regardless of when performance and payment bonds or deposits in lieu of surety are executed.

5252.228-9306 PERFORMANCE GUARANTEE (JUN 1994)

Submittal Time. The bidder whose bid is accepted shall furnish a performance guarantee within ten (10) days after the contract forms are presented to him for signature. If he fails to give such guarantee within ten (10) days, his contract may be terminated for default. In such event he shall be liable for any cost of procuring the work which exceeds the amount of his bid and the bid guarantee shall be available toward offsetting such difference.

Form of Performance Guarantee. The bidder whose bid is accepted shall furnish a performance guarantee in the form of a cashier's check to the order of the (Office Designated for Contract Administration) in the amount of eight percent (8%) of the contract price, which will be cashed and deposited in the account of the U. S. Government. The performance guarantee shall take effect upon the date of signature of the contract and remain valid and irrevocable until one (1) year after the work has been finally inspected and accepted by the Government. However, upon acceptance of all work by the Government, the Contractor may, with the approval of the Contracting Officer, replace this guarantee with a reduced guarantee in the amount of four percent (4%) of the then existing contract price, with modifications, if any. Such replacement guarantee will then remain in effect for one year after the final acceptance of the work by the Government.

Optional Performance Bond. In lieu of a performance guarantee in the above stated form of a cashier's check, the Contractor may submit a performance bond in which the Contractor and the surety obligate themselves in the amount of ten percent (10%) of the contract price, that the Contractor shall undertake the performance of the contract and that said performance bond ensures the fulfillment of all agreements contained in the contract.

a. The bond shall be from a registered bank, bonding firm, or registered insurance firm approved by the Contracting Officer.

5254The bond shall be of the U. S. standard type or of another approved type and shall include the following concepts: (1) name of Surety and name of agent signing in behalf of Surety; (2) name of Principal; (3) a statement that the Principal and Surety are firmly bound on the United States of America in the penal sum of the bond; (4) Contract number; (5) Penal sum of bond and the statement "This bond will be in force until the Contracting Officer of the above-cited Contract authorized cancellation of the bond"; and (6) date of issuance of bond and signature of Surety's agent.

5252.232-9301 PAYMENT FOR DESIGN UNDER FIXED-PRICE DESIGN-BUILD CONTRACTS (JUL 1998)

(a) The contracting officer may approve progress payments for work performed during the project design phase up to the maximum amount of four (4) percent of the contract price.

(b) Contractor invoices for payment must be accompanied by satisfactory documentation supporting the amounts for which payments are requested. Progress payments approved by the contracting officer during the project design phase in no way constitute an acceptance of functional and aesthetic design elements nor acceptance of a final settlement amount in the event of a buy-out nor a waiver of any contractual requirements.

5252.232-9302 LIMITATION ON EXTENT OF GOVERNMENT LIABILITY IN THE EVENT OF A BUY-OUT PRIOR TO COMMENCEMENT OF CONSTRUCTION (JUL 1998)

(a) For the purposes of this clause, functional elements are defined as room layout and space allocations as determined by partitions, doors, or other architectural features. Aesthetic elements are defined as the facility’s visual appearance and appeal.

(b) If the government and the contractor are unable to mutually agree on the functional and aesthetic elements of the project design, the government may initiate a buy-out of the contract prior to the commencement of construction for a maximum settlement amount not to exceed four (4) percent of the contract amount. This amount shall be negotiated based on a reasonable cost incurred and may include a reasonable profit.

(c) Actions taken by the government pursuant to this clause shall in no way be considered a termination for default. Upon payment of all negotiated amounts, all responsibilities and obligations of the parties are discharged.

5252.236-9303 ACCIDENT PREVENTION (NOV 1998)

(a) The Contractor will maintain an accurate record of, and will report to the Contracting Officer in the manner and on the forms prescribed by the Contracting Officer, all accidents resulting in death, traumatic injury, occupational disease, and damage to property, materials, supplies and equipment incident to work performed under this contract.

(b) Compliance with the provisions of this article by subcontractors will be the responsibility of the Contractor.

(c) Prior to commencement of the work, the Contractor may be required to:

(1) submit in writing his proposals for effectuating provision for accident prevention;

5255 meet in conference with representatives of the Contracting Officer to discuss and develop mutual understandings relative to administration of the overall safety program.

5252.236-9304 UTILITIES FOR CONSTRUCTION AND TESTING (JUN 1994)

The Contractor shall be responsible for obtaining, either from available Government sources or local utility companies, all utilities required for construction and testing. The Contractor shall provide these utilities at his expense, paid for at the current utility rate delivered to the job site. The Contractor shall provide and maintain all temporary utility connections and distribution lines, and all meters required to measure the amount of each utility used.

5252.236-9305 AVAILABILITY OF UTILITIES (JUN 1994)

When available, the government will furnish reasonable amounts of the following utilities for the work to be performed under this contract at no cost to the Contractor. Information concerning the location of existing outlets may be secured from the OIC. The Contractor shall provide and maintain, at his expense, the necessary service lines from existing Government outlets to the site of work.

Electric - Water - Compressed Air

Contractor Furnished Utilities: In the event that the Government is unable to provide the required types of utilities, the Contractor shall, at his expense, arrange for the required utilities.

Contractor Energy Conservation: The Contractor shall be directly responsible for instructing employees in utilities conservation practices. The Contractor shall be responsible for operating under conditions which preclude the waste of utilities, which shall include:

a. Lights shall be used only in areas where and at the time when work is actually performed.

b. Mechanical equipment controls for heating, ventilation and air conditioning systems will not be adjusted by the workers.

c. Water faucets or valves shall be turned off after the required usage has been accomplished.

Telephone Lines. Telephone lines for the sole use of the Contractor will not be available. Government telephones shall not be used for personal reasons.

Contractor Availability. The Contractor shall maintain a telephone at which he or his representative may be reached 24 hours daily. The telephone shall be listed in the contractor's name. If the Contractor does not have a local telephone, he shall maintain a toll free emergency telephone (or accept collect calls from authorized Government personnel) at which he or his representative may be reached at night, weekends and holidays. It is mandatory that the Contractor or his representative be available to a toll-free telephone 24 hours per day, seven days per week, including holidays. He shall notify the OIC in writing of the mailing address and telephone number within three days after award of this contract and immediately thereafter in the event of change.

5252.236-9310 RECORD DRAWINGS (JUN 1994)

The Contractor shall maintain at the job site two sets of full-size prints of the contract drawings, accurately marked in red with adequate dimensions, to show all variations between the construction actually provided and that indicated or specified in the contract documents, including buried or concealed construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the contract drawings. Existing utility lines and features revealed during the course of construction, shall also be accurately located and dimensioned. Variations in the interior utility systems shall be clearly defined and dimensioned; and coordinated with exterior utility connections shall be clearly defined and dimensioned; and coordinated with exterior utility connections at the building five-foot line, where applicable. Existing topographic features which differ from those shown on the contract drawings shall also be accurately located and recorded. Where a choice of materials or methods is permitted herein, or where variations in scope or character of methods is permitted herein, or where variations in scope or character of work from that of the original contract are authorized, the drawings shall be marked to define the construction actually provided. The representations of such changes shall conform to standard drafting practice and shall include such supplementary notes, legends and details as necessary to clearly portray the as-built construction. These drawings shall be available for review by the Contracting Officer at all times. Upon completion of the work, both sets of the marked up prints shall be certified as correct, signed by the Contractor, and delivered to the Contracting Officer for his approval before acceptance. Requests for partial payments will not be approved if the marked prints are not kept current, and request for final payment will not be approved until the market prints are delivered to the Contracting Officer.

5252.237-9301, SUBSTITUTIONS OF KEY PERSONNEL (JUN 1994)

The Contractor shall provide complete resumes for proposed substitutes, and any additional information requested by the Contracting Officer. Proposed substitutes should have comparable qualifications to those of the persons being replaced. The Contracting Officer will notify the Contractor within 15 calendar days after receipt of all required information of the consent on substitutions. No change in fixed unit prices may occur as a result of key personnel substitutions.

5252.242-9300 GOVERNMENT REPRESENTATIVES (OCT 1996)

a. The contract will be administered by an authorized representative of the Contracting Officer. In no event, however, will any understanding or agreement, modification, change order, or other matter deviating from the terms of the contract between the contractor and any person other than the Contracting Officer be effective or binding upon the Government, unless formalized by proper contractual documents executed by the Contracting Officer prior to completion of this contract. The authorized representative as indicated hereinafter:

_1. The Contracting Officer’s Representative (COR) will be designated by the Contracting Officer as the authorized representative of the Contracting Officer. The COR is responsible for monitoring performance and the technical management of the effort required hereunder, and should be contacted regarding questions or problems of a technical nature.

_2. The designated Contract Specialist will be the Administrative Contracting Officer's representative on all other contract administrative matters. The Contract Specialist should be contacted regarding all matters pertaining to the contract or delivery orders.

_3. The designated Property Administrator is the Administrative contracting Officer's representative on property matters. The Property Administrator should be contacted regarding all matters pertaining to property administration.

5252.245-9302, LIMITED ASSUMPTION OF RISK BY GOVERNMENT (JUN 1994)

a. Title of all work in place shall be in the Government, and title to all property intended for incorporation in the work shall vest in the Government upon delivery thereof to the site of the work. The term "Government-owned property" as used in this clause refers to such work in place and to such other property as to which title has vested in the Government and includes any property furnished or rented to the Contractor by the Government. Upon completion of the work, any such Government-owned property not a part of the work (except property rented to, or furnished without charge to the contractor by the Government) shall become the property of the Contractor. The vesting of title in the Government, as provided in this paragraph, shall in no way relieve the Contractor of any obligations otherwise provided in this contract in respect to such Government-owned property except as expressly stated in paragraph (b) of this clause.

b. The Contractor represents that the contract price does not include the cost of insurance, nor any provision for a reserve, covering the risk assumed by the Government under this paragraph.

The Government assumes the risk of loss or damage to such Government-owned property (including expenses incidental to such loss or damage) which results directly or indirectly from the explosion of Government-owned or controlled munitions (including, without limitations, ammunition, bombs, powder, dynamite and other explosives), whether or not caused by negligence, except that the Government does not assume at any time the risk of, and the Contractor shall be responsible for, such loss or damage (1) which is in fact covered by insurance or for which contractor is otherwise reimbursed, or (2) which results from disregard of proper instructions of the Contracting Officer, on the part of any of the Contractor's directors, officers or any other representatives having supervision or direction of all or substantially all the Contractor's operations under this contract.

c. In the event of loss or damage to Government-owned property resulting from the risk assumed by the Government hereunder, the Contracting Officer shall determine whether, and to what extent, such property shall be rebuilt, repaired or replaced by the Contractor or otherwise. Should this determination cause an increase or decrease in the cost of doing the work under this contract or time required for its performance, an equitable adjustment shall be made as provided in the changes clause of the contract.

d. The provisions contained in the statement of work under "PERMITS AND RESPONSIBILITIES," are to be deemed modified by this clause only to the extent required to give effect to the limited assumption of risk provided in this clause.

BOND FORMS

Bond Forms Attached

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

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

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION *("X" one)*
	☐ INDIVIDUAL ☐ PARTNERSHIP
	☐ JOINT VENTURE ☐ CORPORATION
	STATE OF INCORPORATION

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

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

OBLIGATION:

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

CONDITIONS:

The Principal has submitted the bid identified above.

THEREFORE:

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

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

WITNESS:

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

PRINCIPAL

SIGNATURE(S)	1. *(Seal)*	2. *(Seal)*	3. *(Seal)*	*Corporate Seal*
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1. *(Seal)*	2. *(Seal)*
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	*Corporate Seal*
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

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

INSTRUCTIONS

1. This form is authorized for use when a bid guaranty is required. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. The bond may express penal sum as a percentage of the bid price. In these cases, the bond may state a maximum dollar limitation (e.g., (e.g., 20% of the bid price but the amount not to exceed_____ dollars).

4. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designed "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual surety (Standard Form 28), for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning its financial capability.

5. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal"; and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

6. Type the name and title of each person signing this bond in the space provided.

7. In its application to negotiated contracts, the terms "bid" and "bidder" shall include "proposal" and "offeror."

PAYMENT BOND *(See instructions on reverse)*	DATE BOND EXECUTED *(Must be same or later than date of contract)*	OMB No.: **9000-0045**

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

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION *("X" one)* ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION
SURETY(IES) *(Name(s) and business address(es)*	PENAL SUM OF BOND MILLION(S) / THOUSAND(S) / HUNDRED(S) / CENTS CONTRACT DATE / CONTRACT NO.

OBLIGATION:

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

CONDITIONS:

The above obligation is void if the Principal promptly makes payment to all persons having a direct relationship with the Principal or a subcontractor of the Principal for furnishing labor, material or both in the prosecution of the work provided for in the contract identified above, and any authorized modifications of the contract that subsequently are made. Notice of those modifications to the Surety(ies) are waived.

WITNESS:

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

PRINCIPAL

SIGNATURE(S)	1. (Seal)	2. (Seal)	3. (Seal)	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1. (Seal)	2. (Seal)
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

CORPORATE SURETY(IES) *(Continued)*

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

INSTRUCTIONS

1. This form, for the protection of persons supplying labor and material, is used when a payment bond is required under the Act of August 24, 1935, 49 Stat. 793 (40 U.S.C. 270a-270e). Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual Surety (Standard Form 28) for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning their financial capability.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal", and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

5. Type the name and title of each person signing this bond in the space provided.

PERFORMANCE BOND *(See instructions on reverse)*	DATE BOND EXECUTED *(Must be same or later than date of contract)*	OMB No.: **9000-0045**

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

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION *("X" one)* ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION
SURETY(IES) *(Name(s) and business address(es)*	PENAL SUM OF BOND MILLION(S) / THOUSAND(S) / HUNDRED(S) / CENTS CONTRACT DATE / CONTRACT NO.

OBLIGATION:

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

CONDITIONS:

The Principal has entered into the contract identified above.

THEREFORE:

The above obligation is void if the Principal -

(a)(1) Performs and fulfills all the undertakings, covenants, terms, conditions, and agreements of the contract during the original term of the contract and any extensions thereof that are granted by the Government, with or without notice to the Surety(ies), and during the life of any guaranty required under the contract, and (2) performs and fulfills all the undertakings, covenants, terms conditions, and agreements of any and all duly authorized modifications of the contract that hereafter are made. Notice of those modifications to the Surety(ies) are waived.

(b) Pays to the Government the full amount of the taxes imposed by the Government, if the said contract is subject to the Miller Act, (40 U.S.C. 270a-270e), which are collected, deducted, or withheld from wages paid by the Principal in carrying out the construction contract with respect to which this bond is furnished.

WITNESS:

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

PRINCIPAL

SIGNATURE(S)	1. (Seal)	2. (Seal)	3. (Seal)	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1. (Seal)	2. (Seal)
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

CORPORATE SURETY(IES) *(Continued)*

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

BOND PREMIUM	RATE PER THOUSAND ($)	TOTAL ($)

INSTRUCTIONS

1. This form is authorized for use in connection with Government contracts. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. (a) Corporations executing the bond as sureties must appear on the Department of the Treasury's list of approved sureties and must act within the limitation listed therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual Surety (Standard Form 28) for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning their financial capability.

4. Corporations executing the bond shall affix their corporate seals. Individuals shall execute the bond opposite the word "Corporate Seal", and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

5. Type the name and title of each person signing this bond in the space provided.

DAVIS BACON WAGE DETERMINATION ATTACHED

General Decision Number NC030055

General Decision Number NC030055
Superseded General Decision No. NC020055
State: **North Carolina**
Construction Type:
BUILDING
County(ies):
CRAVEN

Modification Number	Publication Date
0	06/13/2003

COUNTY(ies):
CRAVEN

BOIL0453C 11/01/2002

	Rates	Fringes
BOILERMAKERS	25.30	11.05

SUNC1034A 03/21/2000

	Rates	Fringes
CARPENTERS (incl. Drywall Hangers)	9.82	
CEMENT MASONS/CONCRETE FINISHERS	9.75	
ELECTRICIANS	10.18	
LABORERS,Unskilled	7.17	
PAINTERS,BRUSH	10.00	
PLUMBERS (Excl. HVAC Pipe)	11.75	.66
PIPEFITTERS (Incl. HVAC Pipe)	13.50	.93
POWER EQUIPMENT OPERATORS:		
Backhoe Operators	10.54	
SHEET METAL WORKERS (Incl. HVAC Duct)	11.56	.97
TRUCK DRIVERS	7.88	

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

==========

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

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

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

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

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

END OF GENERAL DECISION

LOBBY ACTIVITIES

Lobbying Activities Form Attached

DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB
0348-0046

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action:
- ☐ a. CONTRACT
- b. GRANT
- c. COOPERATIVE AGREEMENT
- d. LOAN
- e. LOAN GUARANTEE
- f. LOAN INSURANCE

2. Status of Federal Action:
- ☐ a. BID/OFFER/APPLICATION
- b. INITIAL AWARD
- c. POST-AWARD

3. Report Type
- ☐ a. INITIAL FILING
- b. MATERIAL CHANGE

FOR MATERIAL CHANGE ONLY:

YEAR _____ QUARTER _____

DATE OF LAST REPORT _____

4. Name and Address of Reporting Entity:

☐ PRIME ☐ SUBAWARDEE

TIER _____ , *IF KNOWN:*

Congressional District, *if known:*

5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of

Congressional District, *if known:*

6. Federal Department/Agency

7. Federal Program Name/Description:

CFDA Number, *if applicable:* _____

8. Federal Action Number *if known:*

9. Award Amount *if known:*

$

10a. Name and Address of Lobbying Entity
(If individual, last name, first name, MI)

b. Individual Performing Services *(including address if different from No. 10A) (last name, first name, MI)*

(attach Continuation sheet(s) SF LLL-A, if necessary)

11. Amount of Payment *(check all that apply):*

$ _____ ☐ actual ☐ planned

12. Form of Payment *(check all that apply):*
- ☐ a. cash
- ☐ b. in-kind; specify: nature _____
  value _____

13. Type of Payment *(check all that apply):*
- ☐ a. RETAINER
- ☐ b. ONE-TIME FEE
- ☐ c. COMMISSION
- ☐ d. CONTINGENT FEE
- ☐ e. DEFERRED
- ☐ f. OTHER; SPECIFY:

14. Brief Description of Services performed or to be Performed and Date(s) of Service, including offier(s), employee(s), or Member(s) contacted, for Payment indicated in Item 11:

(attach Continuation sheet(s) SF LLL-A, if necessary)

15. Continuation Sheet(s) SF-LLL-A attached: ☐ Yes ☐ No

11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Signature: _____

Printed Name: _____

Title: _____

Telephone No.: _____ **Date:** _____

Federal Use Only:

AUTHORIZED FOR LOCAL REPRODUCTION
Standard Form - LLL

INSTRUCTIONS

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in Item 4 checks "Subawardee", then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (Item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in Item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in Item 4 or 5.

10. (a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in Item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10 9a). Enter Last Name, First Name, and Middle Initial (MI).

11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (Item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.

12. Check the appropriate box(es). Check all boxes that apply. if payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.

13. Check the appropriate box(es). Check all boxes that apply. In other, specify nature.

14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.

15. Check whether or not a SF-LLL-A Continuation Sheet(s) is attached.

16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

DEPARTMENT OF THE NAVY

ATLANTIC DIVISION, NAVAL FACILITIES ENGINEERING COMMAND

MARINE CORPS AIR STATION, CHERRY POINT, NORTH CAROLINA

N62470-04-C-1154

NAVFAC SPECIFICATION
No: 05-04-1154

REPAIR ELECTRICAL DISTRIBUTION SYSTEM

AT

MCAS CHERRY POINT, NORTH CAROLINA

CONTRACT N62470-04-C-1154
PROJECT: CP0315M

DESIGNED BY:

FACILITIES ENGINEERING DEPARTMENT
BUILDING 163, PSC BOX 8006, MCAS
CHERRY POINT, NORTH CAROLINA, 28533-0006

SPECIFICATION PREPARED BY:

UTILITY TECHNOLOGY ENGINEERING CONSULTANTS
DBA UTEC, 147-B DUBLIN SQUARE ROAD, PO BOX 2629
ASHEBORO, NC 27203

SPECIFICATION APPROVED BY:

Design Director: _____
C.A. CONKLIN, P.E.

OIC NAVFAC Contracts: _____
M.L. SAYGER, CDR, CEC, USN

Date: 12 JAN 04

DOCUMENT 00102

LIST OF DRAWINGS
10/03

PART 1 GENERAL

1.1 SUMMARY

This document lists the drawings for the project pursuant to contract clause "DFARS 252.236-7001, Contract Drawings, Maps and Specifications."

1.2 DFARS 252.236-7001, CONTRACT DRAWINGS, MAPS AND SPECIFICATIONS (AUG 2000))

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall—

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings. Contract drawings are as follows:

NAVFAC DRAWING NO.	TITLE
4483096	TITLE SHEET
4483097	STATION 1 EXISTING PLAN
4483098	STATION 1 TEMPORARY FEED PLAN
4483099	STATION 1 TEMPORARY FEED PLAN, SECTIONS & DETAILS
4483100	STATION 1 3 - LINE DIAGRAM
4483101	STATION 1 SITE PLAN
4483102	STATION 1 SECTIONS - SHEET 1 OF 2
4483103	STATION 1 SECTIONS - SHEET 2 OF 2
4483104	STATION 1 FOUNDATION PLAN & DETAILS
4483105	STATION 1 GROUNDING PLAN
4483106	STATION 1 GROUNDING DETAILS
4483107	STATION 1 CONDUIT & CABLE PLAN
4483108	STATION 1 CONDUIT SCHEDULE
4483109	STATION 1 CABLE SCHEDULE
4483110	STATION 1 STATION SERVICE AC PANEL
4483111	STATION 1 DC DISTRIBUTION PANEL
4483112	STATION 1 POTENTIAL TRANSFORMER JUNCTION BOX
4483113	STATION 1 CABLE TERMINATION, DUCT AND SPLICING DETAIL
4483114	STATION 1 TO H CABLE ROUTING
4483115	STATION E PLANS & ELEVATIONS
4483116	STATION E CONDUIT PLAN
4483117	STATION E BUS TIE SECTION
4483118	STATION H SWITCHGEAR LAYOUT, DESIGN AND DETAILS
4483119	STATION H MANHOLE 54 MODIFICATIONS
4483120	CHERRY POINT SYSTEM ONE-LINE
4483121	STATION 1 RELAY ONE-LINE
4483122	STATION 2 RELAY ONE-LINE
4483123	STATION A RELAY ONE-LINE
4483124	STATION B RELAY ONE-LINE
4483125	STATION C RELAY ONE-LINE
4483126	STATION D RELAY ONE-LINE
4483127	STATION E RELAY ONE-LINE
4483128	STATION F RELAY ONE-LINE
4483129	STATION G RELAY ONE-LINE
4483130	STATION H RELAY ONE-LINE
4483131	STATIONS A, B, & C PANEL LAYOUTS
4483132	STATIONS D, E, & F PANEL LAYOUTS
4483133	STATIONS G & H PANEL LAYOUTS
4483134	STATIONS 1 & 2 PANEL LAYOUTS
4483135	STATION 1 RELAY AC ELEMENTARY
4483136	STATION 1 MAIN BREAKER DC SCHEMATIC
4483137	STATION 1 FEEDER BREAKER DC SCHEMATIC
4483138	STATION 2 BREAKER CONTROL SCHEMATIC
4483139	TYPICAL SWITCHGEAR STATION BREAKER SCHEMATIC
4483140	TYPICAL SWITCHGEAR MAIN BREAKER SCHEMATIC
4483141	ENERGY MANAGEMENT CONTROL SYSTEM ETHERNET SCHEMATIC
4483142	MASTER STATION AND HMI LOCATIONS
4483143	FIBER OPTIC CONNECTION DIAGRAM - (SHEET 1 OF 2)
4483144	FIBER OPTIC CONNECTION DIAGRAM - (SHEET 2 OF 2)

4483145	FIBER PLAN
4483146	STATIONS A & B FIBER ROUTING PLANS
4483147	STATIONS C & D FIBER ROUTING PLANS
4483148	STATIONS F FIBER ROUTING PLAN
4483149	STATIONS E & G FIBER ROUTING PLANS
4483150	STATIONS H, 1 & 2 FIBER ROUTING PLANS
4483151	BUILDING 93 FIBER ROUTING PLAN

-- End of Document --

SECTION 01110N

SUMMARY OF WORK
10/03

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

This contract specifies modifications to the main electrical substations and sectionalizing switching stations on the 12.47KV electrical distribution system at MCAS, Cherry Point. The oil circuit breakers and timber support structure in Substation 1 will be replaced along with relays, the grounding grid and other accessory equipment and systems. Sectionalizing Station "E" will have old metal clad switchgear sections replaced with new sections. Sectionalizing Station "H" will have new metal clad switchgear sections added. Existing electromechanical and solid state relays throughout the system will be replaced with new microprocessor based relays which contain protective, measurement, control, diagnostic, and communications capability. A Supervisory Control and Data Acquisition (SCADA) system will be installed which provides the ability to monitor and control the electrical distribution network. The new relays settings will be set up by the contractor base on a relay coordination study of the new system configuration. The new settings are inculded in the specification.

1.1.2 Specific

1.1.2.1 Substation 1

The eight oil circuit breakers and timber support structure in Substation 1 will be replaced along with their associated relays, the grounding grid and other accessory equipment and systems as specified in the plans The Government-owned section of this substation starts at the 3000A main breaker. CP&L owns the transformers, the voltage regulator, and capacitor banks ahead of the Government's connection point which are also part of the substation but will not be modified by this project. Special instructions are provided in the plans addressing the installation of a temporary feed in Substation 1 while the substation is being renovated. The amount of time that Substation 1 is out of service shall be minimized to the extent practical.

1.1.2.2 Sectionalizing Station "H"

Two cabinet sections shall be added to Sectionalizing Station "H" to agree with the new configuration shown in the plans This station currently has no relays. Installation of protective relaying for this station including circuit over-current protection for all circuits entering the station as well as a differential relaying system to protect the station during internal faults shall be installed according to the plans. In conjunction with these station changes, circuits 1, 2, MOQ, and MOQ Loop

will be modified to the configuration shown in the plans.

1.1.2.3 Sectionalizing Station "E"

2.3 Sectionalizing Station "E": Station "E" currently consists of fourteen cabinet sections. Six of these sections are relatively new and contain vacuum circuit breakers. The remaining sections are much older and contain obsolete magna-blast breakers. These old sections shall be replaced with new sections containing vacuum circuit breakers according to the plans.

1.1.2.4 New Microprocessor Based Relays

New multifunction microprocessor based relays shall be installed at all main substations and sectionalizing switching stations in accordance with the plans and these specifications. These relays will replace the existing electromechanical relays at these stations. Existing current transformers and station control power are utilized where practical except where new equipment is being installed at Substation 1, and Sectionalizing Stations "E" and "H".

1.1.2.5 SCADA System

An Ethernet based SCADA system shall be installed where each of the ten different station locations are connected to an existing fiber optic Ethernet backbone. The SCADA system is to include all communications hardware and software and computer hardware and software required to implement the system specified in these plans and specifications.

1.1.3 Location

The work shall be located at the Marine Corps Air Station, Cherry Point, approximately as indicated. The exact location will be shown by the Contracting Officer.

1.2 EXISTING WORK

In addition to "FAR 52.236-9, Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements":

a. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work which remain.

b. Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as approved by the Contracting Officer. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.

1.3 LOCATION OF UNDERGROUND FACILITIES

It shall be the responsibility of the contractor to locate all existing underground utilities that are within the limits of work, prior to any excavation activities. These include but are not limited to the following

buried utilities: water lines, sanitary and storm sewers, steam, condensate, fuel lines, gas lines, electrical ducts and direct buried conductors, commercial telephone, Base telephone, commercial cable TV, Base instructional cable TV, EMCS and fire alarm. The contractor shall employ the services of a qualified Utility locating company to locate, identify and mark all underground utilities. The entire construction limits shall be thoroughly scanned and researched to determine existing utility locations. Any existing utilities that are indicated on the project drawings shall be considered for reference use by the locating company and shall be verified. All underground utilities shall be clearly marked with flags, paint or stakes prior to any digging operation except that required to determine exact utility location and depth. CAUTION shall be used when trenching or excavating around or near buried utilities. The contractor shall be responsible for the timely repair and/or replacement of direct and collateral damage on any and all underground utilities that are severed, crushed, broken, displaced or otherwise disturbed by the construction operation. The Government shall not incur any additional cost for such repair or replacement. The contractor shall notify the ROICC a minimum of three working days prior to utility location. Do not continue with excavations or installation of new work without resolving elevation discrepancies and conflicts.

1.3.1 Notification Prior to Excavation

Notify the Contracting Officer at least 48 hours prior to starting excavation work.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

ATTACHMENT 1
DESIGN CRITERIA

REPAIR ELECTRICAL DISTRIBUTION SYSTEM
CONTRACT N62470-02-C-4018

MARINE CORPS AIR STATION CHERRY POINT, NC

UTILITY TECHNOLOGY
ENGINEERS – CONSULTANTS

2 September 2003

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1. INTRODUCTION

Utility Technology Engineers Consultants (UTEC) prepared this Design Criteria for the Marine Corps Air Station Cherry Point, NC, as part of the engineering services for Project CP0315M Repair Electrical Distribution System. This document includes the following sections:

2 PROJECT DESCRIPTION
This section includes a summary of the scope of the project and descriptions of the major components of the project.

3 DESIGN CRITERIA
This section documents the technical basis for design of the project.

4 SCHEDULE
This section lists the major project milestones and the target dates.

5 SPECIFICATION OUTLINE
This section lists the specification sections based on SpecsIntact and the additional detailed equipment specifications required.

2. PROJECT DESCRIPTION

This Project Description is based on the scope of work and drawings included with the original RFP (included in Appendix A), on information supplied at the project kick-off meeting, and information provided in the preliminary submittal review meeting. The project includes the following major objectives:

1. Demolition of the obsolete wood pole structure Substation 1 and rebuilding the station with steel structures and new feeder breakers.
2. Change out obsolete electromechanical relays in Substations 1 and 2; and Sectionalizing Stations A, B, C, D, E, F, G, and H with microprocessor relays.
3. Replacement of the obsolete air break circuit breakers in Sectionalizing Station E with vacuum breakers.
4. Addition of two breakers in Sectionalizing Station H.
5. Design, installation, and programming of a SCADA (Supervisory Control and Data Acquisition) system.
6. Design of a fiber optic communication network for the SCADA system.
7. Completion of a fault current and relay coordination study.
8. Purchase, use, and, delivery to MCAS of fault current analysis software.

The following sections provide detail on various aspects of the project

2.1 Substation One

The existing MCAS Cherry Point Delivery Station 1 is a 12.47 kV station with a wooden structures, one main vacuum circuit breaker, eight feeder oil circuit breakers, three sets of current limiting reactors, underground feeder exits, ground grid system, and substation fence.

The work at this station includes the complete replacement of the wooden structures with new steel structures, removal of the eight oil circuit breakers, current limiting reactors, DC electrical system, and fencing. New items to be installed will include five new vacuum circuit breakers, new underground feeder exits, new ground grid system and substation fencing. The project also includes adding a conductor to each phase of circuits 1 and 2. This will increase the load capacity of the Circuit 1 and Circuit 2 feeders. This increased capacity is needed to allow either circuit to energize the base load if the other circuit is out of operation due to a planned or unplanned outage.

The new substation will result in better access to equipment, reduction in the amount and cost of electrical losses due to the removal of the current limiting reactors, and improve reliability. The new ground grid will reduce shock hazards during faults. Upgrading the fence will improve site security.

The new steel structure will be located in the yard to match the existing facilities. This will be done to allow the existing main circuit breaker, the Progress Energy facilities and the Circuit 1 and 2 feeder exit structures to remain in place, as well as the existing conduits to these feeder exit structures.

The new feeder breakers will be installed with new microprocessor relays mounted in the breaker control cabinets. The existing main breaker overcurrent relays will be replaced with a new

microprocessor relay. The existing bus differential relays will be relocated into a new relay cabinet, which will also house the SCADA data concentrator, an Ethernet switch, a fiber optic transceiver, and termination of a fiber optic cable.

Two temporary structures with underground cables will be built to maintain power to the base facilities during the demolition and reconstruction of this substation. The cable and one cable termination structure will be removed upon completion of the substation construction but the main structure used to tap the Progress Energy bus will be used for the new substation structure with the cable riser facilities removed. The temporary work will be done after the completion of the work at Sectionalizing Stations E and H.

2.2 Substation Two

At Substation 2 the existing main and feeder breaker control panels, which contain the electromechanical relays, will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels. A new voltage regulator control with SCADA capability will be installed.

The work at Substation 2 includes installation of three overcurrent relays, two additional control cables between the breakers, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver, and termination of a fiber optic cable. The existing bus differential relays will be reused.

Work will also include a new control cabinet for the SCADA equipment and fiber equipment.

2.3 Sectionalizing Station A

At Sectionalizing Station A the existing door panels, which contain the electromechanical relays, will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels.

The work at Sectionalizing Station A includes installation of ten overcurrent relays, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver, and termination of a fiber optic cable. The existing bus differential relays will be reused and installed in a new door panel.

2.4 Sectionalizing Station B

At the Sectionalizing Station B the existing door panels, which contain the electromechanical relays, will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels.

The work at Sectionalizing Station B includes installation of ten overcurrent relays, three new 7200/120 volt potential transformers, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver, and termination of a fiber optic cable. The existing bus differential relays will be used.

2.5 Sectionalizing Station C

At the Sectionalizing Station C the existing door panels, which contain the electromechanical relays, will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels.

The work at Sectionalizing Station C includes installation of nine overcurrent relays, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver, and termination of a fiber optic cable. The existing bus differential relays will be used. The existing potential transformers will be reconnected inside the switchgear.

2.6 Sectionalizing Station D

At the Sectionalizing Station D the existing door panels, which contain the electromechanical relays, will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels.

The work at Sectionalizing Station D includes installation of ten overcurrent relays, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver, and termination of a fiber optic cable. The existing bus differential relays will be used.

2.7 Sectionalizing Station E

Sectionalizing Station E was originally constructed with GE Magnablast switchgear. In 1989, a new section with Westinghouse breakers was added. The original section includes GE Magnablast breakers, which are obsolete. The original section is not rated for the calculated fault current level after removal of the current limiting reactors at Substation 1.

The work involved at this station requires the complete removal of the original switchgear sections and installation of new switchgear sections, which will tie into the Westinghouse switchgear. This will require installation of new auxiliary sections, containing a 48 volt DC battery system, AC transfer switch, potential and control transformers, five breaker sections with overcurrent relays and a bus transition section. The bus transition will be modified with the underground cables entering this section removed and new underground cables installed which terminate in the corresponding breaker sections. This relocation work is required to allow each section of the metal-clad switchgear to be isolated from the adjacent section. The new section will also include the installation of a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver and termination of a fiber optic cable. Also the fence when reinstalled must meet current NESC/NEC standards.

The work in the Westinghouse sections includes installation of four overcurrent relays, and the rewiring of the existing bus differential relays.

This switchgear work will be completed prior to the modifications at Sectionalizing Station H and Station 1.

2.8 Sectionalizing Station F

At the Sectionalizing Station F the existing door panels, which contain the electromechanical relays, will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels.

The work at Sectionalizing Station F includes installation of eleven overcurrent relays, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver and termination of a fiber optic cable. The existing bus differential relays will be used. The existing potential transformers will be reconnected inside the switchgear.

2.9 Sectionalizing Station G

At the Sectionalizing Station G the existing door panels, which contain the electromechanical relays, will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels.

The work at Sectionalizing Station G includes installation of eight overcurrent relays, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver and termination of a fiber optic cable. The existing bus differential relays will be used. The existing potential transformers will be reconnected inside the switchgear.

2.10 Sectionalizing Station H

This station will be upgraded to serve as one of the electrical hubs for the base. Two additional circuit breakers are to be installed to allow the Station G, MOQ and MOQ Loop feeders and the Station E, Circuit 1 and Circuit 2 Feeders to serve loads from the upgraded Circuit 1 and 2 main feeders from Substation 1. This station will be configured with a split bus arrangement to allow either side to be deenergized, yet keep Stations E and G fully energized. This station upgrade will allow the base to remain energized under non-peak conditions, when Substation 1 is out of service. This work will be scheduled after the completion of work at Sectionalizing Station E and before work at Substation 1.

The Station H work requires the addition of a new breaker section (two total) on each side of the bus tie breaker cubicle. This will require the relocation of the existing utility section (contains DC battery system, AC panel), modifications of the existing concrete foundation, grounding system and fence. It also requires the relocation of existing cables and installation of new underground cables entering the station from Manhole 54. In addition a third conductor per phase will be installed from Station H to Substation 1.

The two new breakers will be installed with microprocessor based overcurrent relays. In the existing sections, the door panels will be removed and replaced with new relays, test switches, and wiring harnesses preinstalled in new door panels.

The work in the existing sections includes installation of four overcurrent relays, a SCADA data concentrator, an Ethernet switch, a fiber optic transceiver, and termination of a fiber optic cable. New microprocessor bus differential relays will be installed. The existing potential transformers will be replaced and additional breaker CTs will be installed.

2.11 Microprocessor Relays

A significant part of this project is the replacement of the existing electromechanical relays. The new relays shall serve as IEDs (intelligent electronic devices) for the proposed SCADA system. The new relays will include the ability to serve as IEDs, which eliminates the need for transducers and SCADA RTUs.

Schweitzer Engineering Laboratories (SEL) 351S relays will be used as the new circuit breaker relays and at Station H 587Z relays will be used as bus differential relays.

2.12 SCADA System

This project includes an electric distribution SCADA (Supervisory Control and Data Acquisition) system. The SCADA system will allow operators to monitor the system, control breakers, and

collect data at the two delivery substations (Substations 1 and 2) and eight sectionalizing stations (Sectionalizing Stations A, B, C, D, E, F, G, and H). The system will include five operator HMIs (Human – Machine Interface); two at Building 87, one at Building 93, one at Building 167 and a dial-in laptop.

2.13 Communications Network

The SCADA system shall use the Johnson Controls Metasys Ethernet Network as the communications network.

2.14 Fiber Optic Network

The SCADA system shall use the existing fiber optic network for communications channels from the stations to the Johnson Controls Metasys Ethernet Network. The fiber network will provide a communication channel that is immune to all electromagnetic interference.

2.15 Coordination Study

A fault current coordination study will be done based on the microprocessor relays and distribution modifications. This study will analyze the fault currents based on three system configurations. Case 1 is based on the normal configuration. Case 2 is based on Substation 2 being removed from service. Case 3 is based on Substation 1 being removed from service. Relay settings will be prepared for the new relays to allow coordinated operation by the base feeder breakers to isolate a fault without deenergizing unaffected facilities. These studies will be done using SKM Powertool engineering software, which will be turned over to the base after completion of the project to allow base engineering personnel to continue analysis of the base system as changes arise.

3. DESIGN REQUIREMENTS

Design of facilities shall be based on the criteria established in this section of the *Design Criteria*.

3.1 Climatic Conditions

The climatic conditions prevailing in Havelock:

- Air temperature[1] - 104 F maximum
-2 F minimum
63 F annual average
- Maximum rainfall[4] - 10.5 inches per 24h
- Isokeraunic level[1] - 47 thunderstorm-days per year
- Relative humidity[1] - 82 % average 7:00 am
- Wind velocity[2] - 140 mph fastest-mile, 50 year recurrence
- NESC loading district - Medium
- Maximum ice loading[3] - 0.25 inches (50 year recurrence) with 30mph 3 second gust
- Altitude - 30 feet above mean sea level

3.2 Civil

3.2.1 Soil Conditions

Soil borings and a geotechnical report will be made by a qualified firm to provide the necessary soil condition information and recommendations for site work and foundations at Substation 1.

3.2.2 Site Grading, Surfacing, and Erosion Control

The Substation 1 yard area, within the perimeter fence and five feet outside the fence, will be regraded and brought to final grade and the subsurface compacted. The substation yard area will be treated with an environmentally safe weed eradicator and soil fumigant, and crushed rock surfacing applied. The grading of the crushed rock will be as follows: 100 percent passing 1.0 in screen, 85 to 95 percent passing 0.75 in screen, 15 to 25 percent passing 0.5 in screen, 5 to 10 percent passing 0.375 in screen, and 0 to 2 percent passing #4 mesh. The remainder of the graded area will be planted with grass or covered with gravel for parking.

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[1] Weatherbase.com (Havelock, NC)

[2] IEEE Std 998-1996

[3] IEEE Std 605-1998, IEEE Guide for Design of Substation Rigid-Bus Structures, Figure 3.

[4] National Climate Data Center

The yard area will be flat, with a 0.6% slope from the center for effective drainage. Drainage ditches around the yard area will be provided where necessary to prevent water from washing over the yard area during maximum rainfall. Cut and fill slopes will be no more than 2:1.

Erosion control provisions will be included during construction and in the final design to meet all applicable requirements of local and state authorities. This will be done at any base site where the earth is disturbed during construction.

3.2.3 Fencing

The fencing at Substation 1 and Sectionalizing Station E will be replaced. The existing fencing at Sectionalizing Station H will be extended for the additional construction. The substation equipment at these sites will be enclosed by a chain link fence with seven feet of fence fabric and a one-foot extension, leaning out, using three strands of barbed wire. Galvanized steel posts will be used, set in concrete. The fence fabric will be aluminum alloy wire. Substation 1 will have three drive gates. Sectionalizing Stations E and H will have one four-foot personnel gate each.

3.3 Structural

3.3.1 Structure Loads

The following structure loads will be considered for the new switchgear cubicles and the new substation structures at Substation 1.

3.3.1.1 Ice Loading.

The ice loading condition is 0.25 radial inches of ice thickness with a 4 psf horizontal wind pressure at a temperature of 0 F.

3.3.1.2 Extreme Wind.

The extreme wind condition is a 140 mph horizontal wind speed with no ice at a temperature of 60 F.

3.3.1.3 Apparatus Loads.

Apparatus loads include the following:

- Weight of equipment.
- Conductor and bus weight.
- Friction forces, moments, and torque due to mechanical operation of apparatus such as air switches.
- Dynamic forces, moments, and torque due to accelerating loads of high-speed circuit-interrupting devices.

3.3.1.4 Short Circuit Forces.

Short circuit forces will be determined in accordance with the IEEE Std 605-1998, Guide for Design of Substation Rigid-Bus Structures and the criteria listed in Table 3-2, Rigid Bus Design Criteria.

3.3.1.5 Application of Wind Loads and Ice Loads on Structures[4]

The wind pressures from Section 3.3.1 will be applied to the vertical projection of the structural members for the first bent. A bent consists of one or more horizontal members supported by two or more columns effectively all in one plane, including bracing between the members. For successive bents, the wind pressure will be reduced in proportion to the shade factor K as defined by:

$$K = \frac{L}{4 \cdot W} \leq 1$$

Where:

L = Distance from front of the first bent to front of the following bent.

W = The least dimension perpendicular to the wind direction.

If L is greater than $4W$, then shading is ineffective and full wind pressure is applied to the next bent (K = 1).

For lattice towers, lattice box columns and trusses, the exposed area is assumed to be 1½ times the total exposed area of the component members.

Shape factors for calculating wind force will be applied as follows:

- Round shapes 1.0
- Octagonal shapes 1.4
- Flat shapes 1.6

Structures will be designed to withstand the ice loading on apparatus, conductors, and the structure itself as shown in Section 3.3.1.1.

3.3.2 Allowable Stresses and Deflections

Allowable stresses will be calculated according to the methods outlined in the latest edition of the American Institute of Steel Construction *Manual of Steel Construction*. No additional overload capacity factors will be used.

The following deflection limits[4] will apply when the structure is under a set of compatible loads without short circuit forces.

[4] From NEMA SG6.

3.3.2.1 Class "A" Structures.

Intended for the support of high voltage equipment, i.e., air switches, interrupter switches, and circuit interrupting devices.

- Horizontal deflection of vertical members—1/100 of the vertical height.
- Vertical deflection of horizontal members—1/200 of the span.
- Horizontal deflection of horizontal members—1/200 of the span.

3.3.2.2 Class "B" Structures.

Where deflections within the limits do not affect the performance of supported equipment, i.e., takeoff structures without switches, bus supports, and miscellaneous equipment supports.

- Horizontal deflection of vertical members—1/50 of the vertical height.
- Vertical deflection of horizontal members—1/200 of the span.
- Horizontal deflection of horizontal members—1/100 of the span.

3.3.3 Foundations

Load factors for foundation design will be applied as follows:

- Live load 1.7
- Dead load 1.4
- Wind load 1.7

Foundation loads for substation structures will be determined from the Overhead Structures and Equipment Contractor's structure design calculations. Loads for equipment will be determined from equipment manufacturers' shop drawings.

Foundations will be designed for a concrete strength of 3,000 psi at 28 days and for ASTM A615 Grade 60 reinforcing steel.

3.4 Electrical

3.4.1 12.47 kV Voltage Ratings

- Maximum phase-to-phase 15.5 kV
- Maximum phase-to-ground 8.95 kV
- Basic impulse insulation level (BIL) 110 kV

3.4.2 Fault Levels

The calculated faults on the 12.47 kV bus with both points of delivery in normal operation at selected locations:

STATION	Amperes Symmetrical	
	Three Phase	Phase to Ground
Substation 1	13,824 A	14,676 A
Sectionalizing Station H	13,554 A	14,226 A
Sectionalizing Station E	11,783 A	11,483 A
Sectionalizing Station B	11,035 A	10,424 A
Substation 2	9,556 A	10,022 A
Sectionalizing Station C	8,845 A	8,894 A

3.4.3 Substation 1 Rigid Bus Spans

The calculation of forces acting on the rigid bus conductors, and the resulting maximum allowable spans will be performed in accordance with IEEE Std 605-1998, *Guide for Design of Substation Rigid-Bus Structures*. The procedure is summarized as follows:

1. The gravitational forces acting vertically on the bus are calculated, including the weight of the bus, the damping conductor, and ice.
2. The wind forces acting horizontally on the bus are calculated.
3. The short-circuit forces acting horizontally on the bus are calculated.
4. The maximum spans based on fiber stress (bus strength) are calculated using the vector sum of gravitational, wind, and short-circuit forces acting on the bus.
5. The maximum spans based on vertical deflection are calculated, using only the vertical forces associated with bus and damper conductor weight. The weight of ice is not included.

The design conditions for the calculation of bus forces are shown in Table 3-1 and Table 3-2.

Table 3-1, Rigid Bus Design Conditions

Case 1	Simultaneous application of extreme wind, short-circuit, and gravitational forces, excluding ice (at 60 degrees F).
Case 2	Simultaneous application of ice wind, short-circuit, and gravitational forces, including ice (at 15 degrees F).
Case 3	Vertical deflection, excluding radial ice (independent of conductor or ambient temperature).

Table 3-2, Rigid Bus Design Criteria

Extreme wind speed	140 mph
Ice wind speed	30 mph
Short-circuit current	15,000 amperes
Ice thickness	1/4 inch
Vertical deflection limit	One bus diameter (or vertical section of angle or bar bus)
Maximum allowable stress for aluminum bus	25,000 psi

3.4.4 Substation 1 Equipment Ratings

This section summarizes the ratings of the major items of equipment to be installed in Substation 1.

3.4.4.1 Circuit Breakers

Maximum voltage	15.5 kV
Basic impulse insulation level (BIL)	110 kV
Continuous current	1,200 amperes rms
Interrupting capability	20,000 amperes rms symmetrical
Interrupting medium	vacuum

3.4.4.2 Main Breaker Group-Operated Bypass Switch

Maximum voltage	15.5 kV
Basic impulse insulation level (BIL)	110 kV
Continuous current	3,000 amperes rms
Momentary rating	120,000 amperes rms asymmetrical

3.4.4.3 Transfer Bus Group-Operated Disconnect Switches

Maximum voltage	15.5 kV
Basic impulse insulation level (BIL)	110 kV
Continuous current	1,200 amperes rms
Momentary rating	61,000 amperes rms asymmetrical

3.4.4.4 Station Service Transformer

Type	Single-phase, pole-type, distribution
Capacity	25 kVA
Voltage	7,200/12,470 Grd Y–120/240 volts
Basic impulse insulation level (BIL)	H.V. – 95 kV, L.V. – 30 kV
Taps	±2–2½ %

3.4.4.5 Surge Arresters

Class	Station (for substation structure installation) Heavy Duty Distribution (riser pole and feeder exits)
Duty cycle rating	9 kV
MCOV	7.65 kV
Front-of-wave protective level	25 kV crest 27 kV crest
Maximum 40 kA discharge voltage	28.3 kV crest 32 kV crest

3.4.4.6 Bus Materials

The 12.47 kV bus materials furnished shall be rigid 4-inch and 2-inch ASA schedule 80, 6063-T6 aluminum alloy seamless pipe manufactured in accordance with ASTM Specification B-241 with a rated ampacity of 3,118 and 1,446 amps respectively.

Provisions shall be made for the expansion and contraction of the buses through a temperature change of 100C. Sliding fittings and/or expansion fittings or joints shall be provided where necessary.

Bolted substation bus connectors and terminations manufactured by Sefcor, Dossert, or Anderson Electric shall be used. End enclosure plugs shall be furnished for all bus pipes.

Horizontal tubular bus sections of lengths greater than 15 feet shall be furnished with vibration damping cables to be installed inside the tube. Damping cables for the buses will be as follows:

- 4 inch aluminum tube bus 795 kcmil AAC
- 2 inch aluminum tube bus 336 kcmil AAC

3.4.4.7 Phase Conductor Cables

Phase conductor cables, excluding equipment primary leads, will be 1590 kcmil, 61-strand, bare, all aluminum conductor (AAC), Coreopsis except as noted. Jumpers to cutouts and surge arresters shall be bare 4/0 kcmil AAC.

3.4.4.8 Insulators

All 12.47 kV rigid bus insulators shall be station post type, TR-205, 15 kV, 110 kV BIL, standard strength porcelain with a minimum cantilever strength rating of 2,000 pounds, ANSI 70 gray glaze, a 3 inch bolt circle base, and a 3 inch bolt circle top.

Switch assembly insulators shall be station post type, conforming to the above specifications.

3.4.5 Sectionalizing Station E Equipment Ratings

This section summarizes the ratings of the major items of equipment to be installed for the renovation of Sectionalizing Station E. Existing equipment drawings are available.

3.4.5.1 Circuit Breakers

Maximum voltage	15.5 kV
Basic impulse insulation level (BIL)	110 kV
Continuous current	1,200 amperes rms
Interrupting capability	18,000 amperes rms symmetrical
Interrupting medium	Vacuum

3.4.5.2 Switchgear Bus

Design	Medium voltage metal clad outdoor non-aisle design
Maximum voltage	15.5 kV
Basic impulse insulation level (BIL)	110 kV
Continuous current	1,200 amperes rms
Momentary rating	500 MVA (18 kA)

3.4.6 Sectionalizing Station H Equipment Ratings

This section summarizes the ratings of the major items of equipment to be installed for the renovation of Sectionalizing Station H. Existing equipment drawings are available.

3.4.6.1 Circuit Breakers

Maximum voltage	15.5 kV
Basic impulse insulation level (BIL)	110 kV
Continuous current	1,200 amperes rms
Interrupting capability	18,000 amperes rms symmetrical
Interrupting medium	vacuum

3.4.6.2 Switchgear Bus

Enclosure design	Medium voltage metal clad outdoor non-aisle design matching existing Siemens switchgear cabinets
Bus design	3–phase, 3-wire
Maximum voltage	15.5 kV
Basic impulse insulation level (BIL)	110 kV
Continuous current	2,000 amperes rms
Momentary rating	500 MVA (18 kA)

3.4.7 Cable

All underground power cable shall be 15 kV copper shielded, jacketed, MV-90 EPR (ethylene-propylene rubber) insulated cable with tape type shields. The insulation thickness shall be 220 mils for a 133% insulation rating. This cable will be suitable for installation in cable duct banks, direct burial and exposure to sunlight. Acceptable manufacturers are Okonite, Pirelli or approved equal.

Underground neutral cables shall be 600 V copper, EPR (ethylene-propylene rubber) insulated cable. This cable will be suitable for installation in cable duct banks, direct burial and exposure to sunlight.

Control cables shall be 600 V stranded tinned copper cables with polyethylene and PVC conductor insulation and a PVC jacket.

3.4.8 Grounding

3.4.8.1 Substation 1

A ground grid composed of buried copper wire and driven ground rods will be installed. Sufficient grounding will be provided to ensure a safe substation.

All grounding design will be in accordance with IEEE Std 80-2000, *IEEE Guide for Safety in Substation Grounding* and will be performed using the SES Autoground software package. Autoground comprises three modules, RESAP, MALT, and FCDIST.

Program RESAP interprets measured apparent earth resistivity (or resistance) data to determine an equivalent earth structure model which can be used to analyze grounding systems. From the resistivity measurement data, obtained using arbitrarily spaced 4 electrode configuration methods (including Wenner or Schlumberger methods), RESAP determines an equivalent layered or "exponential" earth. The "exponential" earth is a soil whose resistivity varies exponentially with depth.

Computer program MALT is a grounding analysis tool, which is useful whenever electrical conduction through earth must be studied; typically, MALT is used to analyze and design ground networks for HVAC and HVDC power stations, substations or transmission towers, or to design anode beds for cathodic protection installations. Generally, MALT is suited to analyze all practical problems where DC or ac power frequency currents are injected into the earth by a ground network or multiple electrodes, so long as the longitudinal impedances of the ground conductors can be neglected.

The FCDIST program calculates fault current distribution in multiple terminal transmission and distribution electric line networks. FCDIST makes a computer model of the electric line network incorporating a single faulted phase (which can be used to represent one or any number of phases), and a single ground wire group (which can represent one or more ground or neutral or static wires). Fault current distribution is determined by the grounding of the various sections of the electric line and associated substations, and also the inductive coupling between the phase wire and the ground (or neutral or static) wires groups.

The design will be based on earth resistivity measurements made on the site using the four-probe (Wenner) method. Probe spacing between 2 ½ and 60 feet will be used. The Wenner geometry uses equally-spaced probes along a line. Two current probes, C1 and C2 are placed on the outside with current flowing between them. Two potential probes, P1 and P2, are placed in between the current probes to measure the voltage.

Grounding conductor sizes, allowable step potentials, and allowable touch potentials will be determined according to the primary protection clearing time, including the effect of line reclosing.

The design will consider current division among the ground grid, and one outgoing transmission line, and three outgoing distribution lines. A 50% increase in fault levels will be considered to allow for future expansion.

Grid conductors will be buried at least 18 inches below grade. All substation equipment, steel structures, and fences will be bonded to the ground grid. The ground grid conductors and equipment stingers will be no smaller than No. 2/0 AWG. The ground grid will extend three feet outside the fenced substation area. Below grade connections to the ground grid will be by exothermic welds.

Grounded switch operating platforms will be installed at all group operated switches, with switch operating handles bonded to the platforms. The perimeter fence will be bonded to the ground grid at a maximum spacing of 40 feet. Fence gates will be bonded to gate posts and to the ground grid with flexible braids. Ground rods will be installed at a maximum spacing of 40 feet along the perimeter ground grid conductor and at lightning arresters.

3.4.8.2 Sectionalizing Station E

The existing ground grid will remain in place with the stingers connected to the new switchgear sections and fence.

3.4.8.3 Sectionalizing Station H

The existing ground grid will be extended beyond the edge of the new concrete foundations and fencing as shown in the station drawings. The fence and switchgear will be reconnected to the ground grid with 4/0 CU stingers as shown in the drawings. The existing fence grounding will be modified to ensure that the gates, posts, railing, and barbed wire are connected to the ground system per the current standards.

3.5 Lightning Protection

The location and height of shielding masts and wires in Substation 1 will be determined in accordance with the *IEEE Guide for Direct Stroke Lightning Protection of Substations*. The following criteria will be used in the calculation of striking distance and shielding failure rate:

Equipment BIL	110 kV BIL
Keraunic level	47 thunderstorm days per year
Surge impedance of a vertical conductor remote from earth	300 ohms
Minimum failure rate for which the shield system will be designed	100 years per failure

Station class surge arresters will be provided on the main bus. Heavy duty distribution class riser pole arresters will be provided at the 12.47 kV distribution feeder terminations.

3.6 Clearances

Substation 1 will be designed to maintain the following minimum clearances and spacings.

3.6.1 Electrical

Table 3-3 shows the minimum required electrical clearances.

Table 3-3, Electrical Clearances at 12.47 kV

Metal-to-metal phase spacing (inches) (Designed clearance 36 inches)	12
Vertical break disconnect switch center-to-center phase spacing (inches)	24
Phase-to-ground (inches)	7
Vertical clearance from energized parts or jumpers to grade (feet)	9
Clearance from unguarded live parts to working platform (feet–inches)	
Vertical	9–0
Horizontal	3–6
Low bus height above top of foundation (feet)	11
High bus height above top of foundation (feet)	14

3.6.2 Fences

A safety clearance zone between the fence and energized parts will be maintained as defined in ANSI/IEEE C2-1997, *National Electrical Safety Code*. The safety clearance for 12.5 kV parts will extend to a height of 15.1 feet and to a horizontal distance of 10.1 feet inside the fence.

3.6.3 Equipment Maintenance and Removal

The substation equipment will be arranged such that each circuit breaker is accessible for easy removal and transport. The substation layout will provide a minimum horizontal clearance of 20 feet between the outside fence and any structure to allow sufficient room to drive a standard pickup truck or automobile around the substation structures inside the fence.

3.7 Lighting

New Substation 1 yard lighting will be provided for safe operation during maintenance. Manually controlled lighting will provide a minimum illumination level of two foot-candles on horizontal surfaces.

3.8 Station Power

3.8.1 Substation 1 Station Power

A distribution transformer will serve the substation AC station service system. An AC circuit breaker panelboard will be provided.

A 125 VDC lead selenium stationary type battery and charger will serve the substation DC station service system. Battery and charger capacities will be calculated in accordance with IEEE Std 1115-1992, *Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications*.

The duty cycle loads will consider continuous loads for an eight-hour period. Continuous loads will include all relay and control device power supplies, all indicating lights, and any emergency lights that do not have self-contained power supplies. A DC circuit breaker panelboard will be provided. All cable sizes and circuit breakers for AC and DC station service will be sized in accordance with the *National Electrical Code*.

3.8.2 Sectionalizing Station E Power

A control power transformer will be installed in the new switchgear section to provide substation AC station service. An AC circuit breaker panelboard and transfer switch connected to the control power transformer in the Westinghouse switchgear section will also be installed.

A new 48 VDC lead selenium stationary type battery and charger will serve the substation DC station service system. Battery and charger capacities will be calculated in accordance with IEEE Std 1115-1992, *Recommended Practice for Sizing Nickel-Cadmium Batteries for Stationary Applications*.

The duty cycle loads will consider continuous loads for an eight-hour period. Continuous loads will include all relay and control device power supplies, all indicating lights, and any emergency lights that do not have self-contained power supplies. A DC circuit breaker panelboard will be provided. All cable sizes and circuit breakers for AC and DC station service will be sized in accordance with the *National Electrical Code*.

The contractor shall maintain 48V DC power to the Westinghouse section during construction.

3.9 Raceway

3.9.1 Station 1

A cable trench with open bottoms will be installed complete with covers and a continuous 4/0 AWG copper ground wire attached to the trench. The trench shall be 20 inches wide by 16 inches deep with sections in four foot lengths. The cable trench shall be lightweight fibercrete as produced by Concast or HDPC (Polymer Concrete) as produced by Synertech or an engineer approved equivalent.

The new feeder conduits will be encased in concrete. The equipment control conduits will be direct buried from the cable trench to the equipment.

3.9.2 Sectionalizing Station H

Manhole 54 located behind Station H will be modified by adding 12 additional 6-inch conduit runs into Station H. This conduit will be installed as duct bank within a concrete envelope.

3.10 RELAYS

All existing electromechanical overcurrent relays will be replaced with SEL-351S relays. The existing bus differential relays (PVD) are adequate and will not be replaced.

In Substation 1 and 2 these relays will be installed in the breaker control cabinets. In the existing breakers the relay panels will be removed and new panels installed with these relays, test switches, and wiring harnesses ready for installation.

In the sectionalizing stations the entire door panel will be removed and the SEL-351S relay, test switches, and wiring harnesses will be pre-mounted in new door panels to be installed in the field. This should improve the quality and speed of the field work as a greater part of the work can be done in a shop environment.

3.11 Fiber Optic Network

All passive optical components shall be consistent with the existing system and the G6 bill of materials in Appendix B. The design of the optical network shall conform to the following design criteria:

- Fiber: The optical fiber in both the cable and the jumpers shall be single mode Corning SMF-28 or equivalent.
- Cable: The optical cable shall be all dielectric, loose tube, 12 fibers per buffer tube.
- Connectors: ST Hot-melt, two stage epoxy, field installed.
- Jumpers: Duplex with ST connectors.
- Splices: Fusion splices; maximum splice loss shall be 0.15 dB based on a bi-directional OTDR at 1550 nm.
- Conduit:
    - Below Grade - Concrete encased Schedule 40 PVC (minimum 2 inch).
    - Above Grade - Rigid steel (minimum 2 inch).
    - Building Interior - EMT (minimum 2 inch).

SECTION 01140N

WORK RESTRICTIONS
10/03

PART 1 GENERAL

1.1 SPECIAL SCHEDULING REQUIREMENTS

a. The temporary feed in substation 1 shall be ready for operation as approved by Contracting Officer before work is started on renovation of substation 1 which would interfere with normal operation.

b. Have materials, equipment, and personnel required to perform the work at the site prior to the commencement of the work. Specific items of work to which this requirement applies include:

(1) Renovations to all substations and sectionalizing stations.

c. The electrical distribution system will remain in operation during the entire construction period. The Contractor shall conduct his operations so as to cause the least possible interference with normal operations of the activity. The redundant design of the distribution system will allow continuous uninterrupted electrical service to base customers by switching between alternate circuits during the various construction phases.

1.2 CONTRACTOR ACCESS AND USE OF PREMISES

1.2.1 Station Regulations

Ensure that Contractor personnel employed on the Station become familiar with and obey Station regulations. Keep within the limits of the work and avenues of ingress and egress. Wear hard hats in designated areas. Do not enter any restricted areas unless required to do so and until cleared for such entry. The Contractor's equipment shall be conspicuously marked for identification.

1.2.2 Working Hours

Regular working hours shall consist of an 8 1/2 hour period normally between the hours of 7:00 am to 4:30 PM, Monday through Friday, excluding Government holidays.

1.2.3 Work Outside Regular Hours

Work outside regular working hours requires Contracting Officer approval. Make application 15 calendar days prior to such work to allow arrangements to be made by the Government for inspecting the work in progress. During periods of darkness, the different parts of the work shall be lighted in a manner approved by the Contracting Officer.

1.2.4 Occupied Buildings

The Contractor shall be working in and around existing buildings which are occupied. Do not enter the buildings without prior approval of the Contracting Officer.

The existing buildings and their contents shall be kept secure at all times. Provide temporary closures as required to maintain security as directed by the Contracting Officer.

Provide dust covers or protective enclosures to protect existing work that remains and Government material located in the various buildings during the construction period.

Leave attached equipment in place, and protect it against damage, or temporarily disconnect, relocate, protect, and reinstall it at the completion of the work.

1.2.5 Utility Cutovers and Interruptions

a. Permission to interrupt any Activity utility service shall be requested in writing a minimum of 15 calendar days prior to desired date of interruption.

b. Make utility cutovers and interruptions after normal working hours or on Saturdays, Sundays, and Government holidays. Conform to procedures required in the paragraph "Work Outside Regular Hours."

c. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.

d. Interruption to water, sanitary sewer, storm sewer, telephone service, electric service, air conditioning, heating, fire alarm, and compressed air shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours."

e. Operation of Station Utilities: The Contractor shall not operate nor disturb the setting of control devices in the station utilities system, including water, sewer, electrical, and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer giving reasonable advance notice when such operation is required.

1.3 SECURITY REQUIREMENTS

1.3.1 Station Regulations

No employee or representative of the contractor will be admitted to the work site without an Identification Badge or is specifically authorized admittance to the work site by the OIC, NAVFAC Contracts.

1.3.2 Contractor Access to MCAS Cherry Point

Per Air Station Order 5500.14, within five (5) days of contract award, the contractor shall provide the following information on all personnel that will be providing services aboard the US Marine Corps Air Station, Cherry Point, North Carolina.

a. A list of all employees including name, social security number, date of birth and mailing address.

b. In order to obtain access to MCAS Cherry Point and obtain an identification badge, each contractor employee shall be required to present the following information to the Pass and Identification Office:

1. Documentation of a criminal records check from the state or county covering the previous two years. Criminal record checks may be obtained from, but is not limited to the following sources: County Courthouse, Defense Security Service (www.dss.mil) and/or Infolink Screening Services, Inc. (www.infolinkcreening.com). Infolink Screening Services is listed as another possible source to obtain a criminal background check. The Government does not endorse nor is it affiliated with Infolink Screening Services.

2. Picture Identification Card from a state or federal agency.

3. Proof of immigration status. Acceptable documents include birth certificate, Immigration and Naturalization Service (INS) forms, and passports.

4. Proof of employment.

5. Letter from contractor reflecting the contract number and term of the contract.

c. If an employee is terminated prior to the end of the contract, the contractor shall return the base identification card to the Contracting Officer. This requirement also applies to all subcontract employees.

d. In no event will a contractor employee be permitted access to the MCAS Cherry Point for the purpose of on-site performance without the documentation listed above. Failure to obtain this information will not result in extensions to contract start, delivery, or completion dates.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01310N

ADMINISTRATIVE REQUIREMENTS
10/03

PART 1 GENERAL

1.1 SUBMITTALS

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

SD-01 Preconstruction Submittals

List of contact personnel; G

1.2 MINIMUM INSURANCE REQUIREMENTS

Procure and maintain during the entire period of performance under this contract the following minimum insurance coverage:

a. Comprehensive general liability: $500,000 per occurrence

b. Automobile liability: $200,000 per person, $500,000 per occurrence for bodily injury, $20,000 per occurrence for property damage

c. Workmen's compensation as required by Federal and State workers' compensation and occupational disease laws.

d. Employer's liability coverage of $100,000, except in States where workers compensation may not be written by private carriers,

e. Others as required by North Carolina State law.

1.3 CONTRACTOR PERSONNEL REQUIREMENTS

1.3.1 Subcontractors and Personnel

Furnish a list of contact personnel of the Contractor and subcontractors including addresses and telephone numbers for use in the event of an emergency. As changes occur and additional information becomes available, correct and change the information contained in previous lists.

1.3.2 Identification Badges

Identification badges will be furnished without charge. Application for and use of badges will be as directed. Immediately report instances of lost or

stolen badges to the Contracting Officer.

Within five (5) days of contract award, the contractor shall provide the following information on all personnel that will be providing services aboard the US Marine Corps Air Station, Cherry Point, NC.

(1) A list of all employees including name, social security number, date of birth and mailing address.

(2) In order to obtain access to the US Marine Corps Air Station, Cherry Point, NC and obtain an identification badge, per Air Station Order 5500.14 dated 15MAR2002, each contractor employee shall be required to present the following information to the Pass and Identification Office:

a. Documentation of a criminal records check from the state or county covering the previous two years. Criminal records checks may be obtained from, but is not limited to the following sources: County Courthouse, Defense Security Service (www.dss.mil) and/or Infolink Screening Services, Inc. (www.infolinkscreening.com). Infolink Screening Services is listed as another possible source to obtain a criminal background check. The Government does not endorse nor is it affiliated with Infolink Screening Services.

b. Picture Identification Card from a state or federal agency.

c. Proof of immigration status. Acceptable documents include birth certificate, Immigration and Naturalization Service (INS) forms, and passports.

d. Proof of employment.

e. Letter from contractor reflecting the contract number and term of the contract.

(3) If an employee is terminated prior to end of the contract, the contractor shall return the base identification card to the Contracting Officer. This requirement also applies to all sub-contract employees.

(4) In no event will a contractor employee be permitted access to the US Marine Corps Air Station for the purpose of on-site performance without the documentation listed above. Failure to obtain this information will not result in extensions to contract start, delivery, or completion dates.

1.3.3 Contractor Personnel Requirements

Failure to obtain entry approval will not affect the contract price or time of completion.

1.4 SUPERVISION

Have at least one qualified supervisor capable of reading, writing, and conversing fluently in the English language on the job site during working hours. In addition, if a Quality Control (QC) representative is required on the contract, then that individual shall also have fluent English

communication skills.

1.5 PRECONSTRUCTION CONFERENCE

After award of the contract but prior to commencement of any work at the site, meet with the Contracting Officer to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation of the schedule prices, shop drawings, and other submittals, scheduling programming, and prosecution of the work. Major subcontractors who will engage in the work shall also attend.

1.6 LEVEL "C" PARTNERING

To most effectively accomplish the contract, the Government requires the formation of a cohesive partnership with the contractor and its subcontractors. The partnering relationship is based upon trust, dedication to common goals, an understanding of each other's expectations and values, and a commitment to success. The goals of the partnering process are improved communication, efficiency and cost effectiveness, increased opportunity for innovation, and the continuous improvement of product quality. The partnership will strive to draw in the strength of each organization in an effort to achieve a quality project done right the first time, within budget, on schedule, and without any safety mishaps, thereby providing the opportunity for the contractor to make a reasonable profit. This level of partnering is an introduction to partnering concepts and benefits and should become a part of the preconstruction conference. The senior ROICC and contract persons present will jointly host the initial session. The partners will determine the frequency of the follow-on sessions. Partnering sessions should be held at or near the location of the ROICC office.

1.7 ELECTRONIC MAIL (E-MAIL) ADDRESS

The Contractor shall establish and maintain electronic mail (e-mail) capability along with the capability to open various electronic attachments in Microsoft, Adobe Acrobat, and other similar formats. Within 10 days after contractor award, the Contractor shall provide the Contracting Officer a single (only one) e-mail address for electronic communications from the Contracting Officer related to this contract including, but not limited to contract documents, invoice information, request for proposals, and other correspondence. The Contracting Officer may also use e-mail to notify the Contractor of base access conditions when emergency conditions warrant, such as hurricanes, terrorist threats, etc. Multiple e-mail addresses will not be allowed.

It is the Contractor's responsibility to make timely distribution of all Contracting Officer initiated e-mail with its own organization including the field office(s). The Contractor shall promptly notify the Contracting Officer, in writing, of any changes to this e-mail address.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01330

SUBMITTAL PROCEDURES
10/03

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Submittal

Shop drawings, product data, samples, operation and maintenance data,and administrative submittals presented for review and approval. Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

1.1.2 Types of Submittals

All submittals are classified as indicated in paragraph "Submittal Descriptions (SD)". Submittals also are grouped as follows:

a. Shop drawings: As used in this section, drawings, schedules, diagrams, and other data prepared specifically for this contract, by contractor or through contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier contractor, to illustrate portion of work.

b. Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.

c. Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.

d. Operation and Maintenance (O&M) Data:
Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item. The data is required when the item is delivered to the project site.

e. Administrative submittals: Data presented for reviews and approval to ensure that administrative requirements of project are adequately met but not to ensure directly that work is per design concept and in compliance with contract documents.

1.2 SUBMITTAL IDENTIFICATION (SD)

SD-01 Preconstruction Submittals

Certificates of insurance.
Surety bonds.
List of proposed subcontractors.
List of proposed products.
Construction Progress Schedule.
Schedule of values.
Health and safety plan.
Work plan.
Quality control plan.
Environmental protection plan.

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

Factory test reports.

SD-10 Operation and Maintenance Data

Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

1.2.1 Approving Authority

Person authorized to approve submittal.

1.2.2 Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.3 SUBMITTALS

Submit the following per the requirements of this section.

SD-01 Preconstruction Submittals

1.4 PROCEDURES FOR SUBMITTALS

1.4.1 Reviewing, Certifying, Approving Authority

QC organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. Approving authority on submittals is QC manager unless otherwise specified for specific submittal. At each "Submittal" paragraph in individual specification sections, a notation "G," following a submittal item, indicates contracting officer is approving authority for that submittal item.

1.4.2 Constraints

a. Submittals listed or specified in this contract shall conform to provisions of this section, unless explicitly stated otherwise.

b. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time.

c. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

d. Approval of a separate material, product, or component does not

imply approval of assembly in which item functions.

1.4.3 Scheduling

a. Coordinate scheduling, sequencing, preparing and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.

b. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for A/E approval and 20 working days for submittals for contracting officer approval. Period of review for submittals with contracting officer approval begins when Government receives submittal from QC organization. Period of review for each resubmittal is the same as for initial submittal.

c. For submittals requiring review by fire protection engineer, allow review period, beginning when government receives submittal from QC organization, of 30 working days for return of submittal to the contractor. Period of review for each resubmittal is the same as for initial submittal.

1.4.4 Variations

Variations from contract requirements require Government approval pursuant to contract Clause entitled "FAR 52.236-21, Specifications and Drawings for Construction" and will be considered where advantageous to government.

1.4.4.1 Considering Variations

Discussion with contracting officer prior to submission, will help ensure functional and quality requirements are met and minimize rejections and resubmittals. When contemplating a variation which results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

1.4.4.2 Proposing Variations

When proposing variation, deliver written request to the contracting officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to government. If lower cost is a benefit, also include an estimate of the cost saving. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

1.4.4.3 Warranting That Variations Are Compatible

When delivering a variation for approval, contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.4.4.4 Review Schedule Is Modified

In addition to normal submittal review period, a period of 15 working days will be allowed for consideration by the Government of submittals with variations.

1.4.4.5 Contractor Is Responsible

The Contractor shall take actions and bear the additional costs, including review costs by the Government, necessary due to the proposed variation.

1.4.5 Contractor's Responsibilities

a. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.

b. Transmit submittals to QC organization per schedule, and to prevent delays in the work, delays to government, or delays to separate contractors.

c. Advise contracting officer of variation, as required by paragraph entitled "Variations."

d. Correct and resubmit submittal as directed by approving authority. When resubmitting disapproved transmittals or transmittals noted for resubmittal, the contractor shall provide copy of that previously submitted transmittal including all reviewer comments for use by approving authority. Direct specific attention in writing or on resubmitted submittal, to revisions not requested by approving authority on previous submissions.

e. Furnish additional copies of submittal when requested by contracting officer, to a limit of 20 copies per submittal.

f. Complete work which must be accomplished as basis of a submittal in time to allow submittal to occur as scheduled.

g. Ensure no work has begun until submittals for that work have been returned as "approved," or "approved as noted", except to the extent that a portion of work must be accomplished as basis of submittal.

1.4.6 QC Organization Responsibilities

a. Note date on which submittal was received from contractor on each submittal.

b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.

c. Review submittals for conformance with project design concepts and compliance with contract documents.

d. Act on submittals, determining appropriate action based on QC

organization's review of submittal.

(1) When QC manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Actions Possible."

(2) When contracting officer is approving authority or when variation has been proposed, forward submittal to Government with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.

e. Ensure that material is clearly legible.

f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.

(1) The QC organization will certify submittals forwarded to contracting officer with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number _____, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for Government approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"
(Signature)

g. Sign certifying statement or approval statement. The person signing certifying statements shall be QC organization member designated in the approved QC plan. The signatures shall be in original ink. Stamped signatures are not acceptable.

h. Retain a copy of approved submittals at project site, including contractor's copy of approved samples.

1.4.7 Government's Responsibilities

When approving authority is Contracting Officer, the Government will:

a. Note date on which submittal was received from QC manager, on each submittal for which the contracting officer is approving authority.

b. Review submittals for approval within scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in

paragraph entitled "Actions Possible" and with markings appropriate for action indicated.

1.4.8 Actions Possible

Submittals will be returned with one of the following notations:

a. Submittals marked "not reviewed" will indicate submittal has been previously reviewed and approved, is not required , does not have evidence of being reviewed and approved by contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by contractor or for being incomplete, with appropriate action, coordination, or change.

b. Submittals marked "approved" "approved as submitted" authorize contractor to proceed with work covered.

c. Submittals marked "approved as noted" or "approval except as noted; resubmission not required" authorize contractor to proceed with work as noted provided contractor takes no exception to the notations.

d. Submittals marked "revise and resubmit" or "disapproved" indicate submittal is incomplete or does not comply with design concept or requirements of the contract documents and shall be resubmitted with appropriate changes. No work shall proceed for this item until resubmittal is approved.

1.5 FORMAT OF SUBMITTALS

1.5.1 Transmittal Form

Transmit each submittal, except sample installations and sample panels, to office of approving authority. Transmit submittals with transmittal form prescribed by Contracting Officer and standard for project. The transmittal form shall identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.

1.5.2 Identifying Submittals

Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

a. Project title and location.

b. Construction contract number.

c. Section number of the specification section by which submittal is required.

d. Submittal description (SD) number of each component of submittal.

e. When a resubmission, add alphabetic suffix on submittal description, for example, SD-10A, to indicate resubmission.

f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier contractor associated with submittal.

g. Product identification and location in project.

1.5.3 Format for Shop Drawings

a. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 30 by 42 inches.

b. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."

d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

1.5.4 Format of Product Data

a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project.

1.5.5 Format of Samples

a. Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

(1) Sample of Equipment or Device: Full size.

(2) Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

(3) Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

(4) Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

(5) Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.

(6) Color Selection Samples: 2 by 4 inches.

(7) Sample Panel: 4 by 4 feet.

(8) Sample Installation: 100 square feet.

b. Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.

c. Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples shall be in undamaged condition at time of use.

d. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final clean up of project.

1.5.6 Format of Operation and Maintenance (O&M) Data

a. O&M Data format shall comply with the requirements specified in Section 01781, Operation and Maintenance Data"

1.5.7 Format of Administrative Submittals

a. When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply contractor's approval stamp to document, but to a separate sheet accompanying document.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of Shop Drawings.
Submit shop drawings in compliance with quantity requirements specified for product data.

1.6.2 Number of Copies of Product Data

Submit seven copies of submittals of product data requiring review and approval only by contracting officer.

1.6.3 Number of Samples

a. Submit one sample, or one set of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to contractor.

b. Submit one sample panel. Include components listed in technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of non-solid materials.

1.6.4 Number of Copies of Operation and Maintenance Data

Submit three copies of O&M Data to the Contracting Officer for review and approval

1.6.5 Number of Copies of Administrative Submittals

a. Unless otherwise specified, submit administrative submittals compliance with quantity requirements specified for shop drawings.

1.7 FORWARDING SUBMITTALS

1.7.1 Samples Required from the Contractor

Submit samples to Architect-Engineer: Utility Technology Engineer-Consultants, 147B Dublin Square Road, Asheboro, NC 27203.

1.7.2 Shop Drawings, Product Data, and O&M Data

As soon as practicable after award of contract, and before procurement of fabrication, submit, except as specified otherwise, to the Architect-Engineer, the shop drawings, product data and O&M Data required in the technical sections of this specification. The Architect-Engineer for this project will review and provide surveillance for the Contracting Officer to determine if Contractor-approved submittals comply with the contract requirements, and will review and approve for the Contracting Officer those submittals not permitted to be Contractor approved to determine if submittals comply with the contract requirements. One copy of the transmittal form for submittals shall be forwarded to the Resident Officer in Charge of Construction. Forward one copy of the transmittal form for submittals to the OIC, NAVFAC Contracts, Facilities MCAS, PSC Box 8006, Cherry Point, North Carolina 28533-0006. Submit to the OIC, NAVFAC Contracts, at the above address, for review and approval, the following:

a. All submittals required by Division 01 - General Requirements.

b. All submittals with "G" designation.

Submittals for asbestos removal and disposal Environmental Protection Plan

shall be submitted to the Resident Officer in Charge of Construction for review and approval thereby.

1.7.3 Submittals Reserved for LANTNAVFACENGCOM Approval

As an exception to the standard submittal procedure specified above, submit the following to the Commander, LANTNAVFACENGCOM, Code CI4A1, 1510 Gilbert Street, Norfolk, Virginia 23511-2699:

a. Pile driving records

b. All fire protection system submittals

c. All fire alarm system submittals

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01420

SOURCES FOR REFERENCE PUBLICATIONS
05/03

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization, (e.g. ASTM B 564 Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the standards producing organization should be ordered from the source by title rather than by number.

ACI INTERNATIONAL (ACI)
P.O. Box 9094
Farmington Hills, MI 48333-9094
Ph: 248-848-3700
Fax: 248-848-3701
Internet: http://www.aci-int.org

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
444 N. Capital St., NW, Suite 249
Washington, DC 20001
Ph: 202-624-5800
Fax: 202-624-5806
Internet: http://www.aashto.org

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Fax: 703-907-7501
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INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
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e-mail: info@iec.ch

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
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-- End of Section --

01450N

QUALITY CONTROL
10/03

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A 880	(1995) Criteria for Use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys
ASTM C 1077	(2002) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D 3666	(2002) Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 3740	(2001) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(2002) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
ASTM E 543	(2002) Agencies Performing Nondestructive Testing

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) Safety and Health Requirements Manual

1.2 SUBMITTALS

Submit the following per Section 01330, "Submittal Procedures."

SD-01 Preconstruction Submittals

Quality Control (QC) plan; G

Submit a QC plan within 20 calendar days after receipt of Notice of Award.

The QC Plan shall include a preliminary submittal of the list of definable features of work that shall cover the first 90 days of construction.

Any approval by the Government of the QC Plan shall be considered to be "approved as noted, resubmittal required" and will be in effect only until the completed list of definable features of work is received and approved.

1.3 INFORMATION FOR THE CONTRACTING OFFICER

At the Preconstruction Conference, the Contractor can obtain a single copy set of the current report forms from the Contracting Officer. The report forms will consist of the Contractor Production Report, Contractor Production Report (Continuation Sheet), Contractor Quality Control Report, Contractor Quality Control Report (Continuation Sheet), Preparatory Phase Checklist, Initial Phase Checklist, Rework Items List, and Testing Plan and Log. Other reports referenced below may be in formats customarily used by the Contractor, Testing Laboratories, etc. and will contain the information required by this specification.

Deliver the following to the Contracting Officer:

a. Combined Contractor Production Report/Contractor Quality Control Report; original and 1 copy, by 10:00 AM the next working day after each day that work is performed.

b. Preparatory Phase Checklist: Original attached to the original Contractor Quality Control Report and 1 copy attached to each copy.

c. Initial Phase Checklist: Original attached to the original Contractor Quality Control Report and 1 copy attached to each copy.

d. Field Test Reports: 2 copies, within 2 working days after the test is performed, attached to the Contractor Quality Control Report.

e. Monthly Summary Report of Tests: 2 copies attached to the Contractor Quality Control Report.

f. Testing Plan and Log, 2 copies, at the end of each month.

g. Rework Items List: 2 copies, by the last working day of the month.

h. QC Meeting Minutes: 2 copies, within 2 working days after the meeting.

i. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Organization, a QC Plan, a QC Plan Meeting, a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, completion inspections, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this Contract. The QC program shall cover on-site and off-site work and shall be keyed to the work sequence. No work or testing may be performed unless the QC Manager is on the work site. The QC Manager shall report to an officer of the firm and shall not be subordinate to the Project Superintendent or the Project Manager. The QC Manager, Project Superintendent and Project Manager must work together effectively. Although the Quality Control Manager is the primary individual responsible for quality control, all three individuals will be held responsible for the quality of work on the job. The project superintendent will be held responsible for the quality of production.

1.4.1 Preliminary Work Authorized Prior to Approval

The only work that is authorized to proceed prior to the approval of the QC Plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.2 Approval

Approval of the QC Plan is required prior to the start of construction. The Contracting Officer reserves the right to require changes in the QC Plan and operations as necessary, including removal of personnel, to ensure the specified quality of work. The Contracting Officer reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications. All QC organization personnel shall be subject to acceptance by the Contracting Officer. The Contracting Officer may require the removal of any individual for non-compliance with quality requirements specified in the contract.

1.4.3 Notification of Changes

Notify the Contracting Officer, in writing, of any proposed change, including changes in the QC organization personnel, a minimum of seven calendar days prior to a proposed change. Proposed changes shall be subject to acceptance by the Contracting Officer.

1.5 QC ORGANIZATION

1.5.1 QC Manager

1.5.1.1 Duties

Provide a QC Manager at the work site to implement and manage the QC program. In addition to implementing and managing the QC program, the QC Manager may perform the duties of project superintendent. The QC Manager is required to attend the QC Plan Meeting, attend the Coordination and

Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, perform submittal review and approval, ensure testing is performed and provide QC certifications and documentation required in this contract. The QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by Testing Laboratory personnel and any other inspection and testing personnel required by this Contract.

1.5.1.2 Qualifications

An individual with a minimum of 10 years experience as a superintendent, inspector, QC Manager, project manager, project engineer or construction manager on similar size and type construction contracts which included the major trades that are part of this Contract. The individual must be familiar with the requirements of EM 385-1-1, and have experience in the areas of hazard identification and safety compliance.

or

A graduate of a four year accredited college program in one of the following disciplines: Engineering, Architecture, Construction Management, Engineering Technology, Building Construction, or Building Science, with a minimum of 5 years experience as a superintendent, inspector, QC Manager, project manager, project engineer or construction manager on similar size and type construction contracts which included the major trades that are part of this Contract. The individual must be familiar with the requirements of EM 385-1-1, and have experience in the areas of hazard identification and safety compliance.

1.5.1.3 Construction Quality Management Training

In addition to the above experience and education requirements, the QC Manager shall have completed the course entitled "Construction Quality Management for Contractors." If the QC Manager does not have a current certification, they shall obtain the CQM course certification within 90 days of award. Contact Associated Builders and Contractors (ABC), 703-968-6205, joanna@abdva.org; mervin@abc.org for availability and cost associated with the class.

1.5.2 Alternate QC Manager Duties and Qualifications

Designate an alternate for the QC Manager at the work site to serve in the event of the designated QC Manager's absence. The period of absence may not exceed two weeks at one time, and not more than 30 workdays during a calendar year. The qualification requirements for the Alternate QC Manager shall be the same as for the QC manager.

1.6 QUALITY CONTROL (QC) PLAN

1.6.1 Requirements

Provide, for approval by the Contracting Officer, a QC plan submitted in a 3-ring binder with pages numbered sequentially that covers both on-site and off-site work and includes the following:

a. A table of contents listing the major sections identified with tabs in the following order:

I. QC ORGANIZATION
II. NAMES AND QUALIFICATIONS
III. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONNEL
IV. OUTSIDE ORGANIZATIONS
V. APPOINTMENT LETTERS
VI. SUBMITTAL PROCEDURES
VII. TESTING LABORATORY INFORMATION
VIII. TESTING PLAN AND LOG
IX. PROCEDURES TO COMPLETE REWORK ITEMS
X. DOCUMENTATION PROCEDURES
XI. LIST OF DEFINABLE FEATURES
XII. PROCEDURES FOR PERFORMING THE THREE PHASES OF CONTROL
XIII. PERSONNEL MATRIX
XIV. PROCEDURES FOR COMPLETION INSPECTION

b. A chart showing the QC organizational structure.

c. Names and qualifications, in resume format, for each person in the QC organization. Include the CQM course certifications for the QC Manager and Alternate QC Manager as required by the paragraphs entitled "Construction Quality Management Training" and "Alternate QC Manager Duties and Qualifications".

d. Duties, responsibilities and authorities of each person in the QC organization.

e. A listing of outside organizations such as, architectural and consulting engineering firms that will be employed by the Contractor and a description of the services these firms will provide.

f. Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for implementing and managing the QC program as described in this contract. Include in this letter the responsibility of the QC Manager and Alternate QC Manager to implement and manage the three phases of quality control, and their authority to stop work which is not in compliance with the contract. The QC Manager shall issue letters of direction to all outlining their duties, authorities, and responsibilities. Copies of the letters shall be included in the QC plan.

g. Procedures for reviewing, approving and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval. Provide the initial submittal as specified in section entitled "Submittal Procedures."

h. Testing laboratory information required by the paragraphs entitled "Accreditation Requirements" or "Construction Materials Testing

Laboratory Requirements", as applicable.

i. A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.

j. Procedures to identify, record, track and complete rework items.

k. Documentation procedures, including proposed report formats.

l. List of definable features of work. A definable feature of work (DFOW) is a task which is separate and distinct from other tasks, has the same control requirements and work crews. The list shall be cross-referenced to the contractor's Construction Schedule and the specification sections. For projects requiring a Progress Chart, the list of definable features of work shall include but not be limited to all items of work on the schedule. For projects requiring a Network Analysis Schedule, the list of definable features of work shall include but not be limited to all critical path activities.

m. Procedures for Performing the Three Phases of Control. For each DFOW, provide the DFOW's Preparatory and Initial Phase Checklists. Each list shall include a breakdown of quality checks that will be used when performing the quality control functions, inspections, and tests required by the contract documents. The Preparatory and Initial Phases and meetings shall be conducted with a view towards obtaining quality construction by planning ahead and identifying potential problems for each definable feature of work.

n. A personnel matrix showing for each section of the specification who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document the testing.

o. Procedures for Identifying and Documenting the Completion Inspection process. Include in these procedures the responsible party for punch out inspection, prefinal inspection, and final acceptance inspection.

1.7 QC PLAN MEETING

Prior to submission of the QC plan, meet with the Contracting Officer to discuss the QC plan requirements of this Contract. The purpose of this meeting is to develop a mutual understanding of the QC plan requirements prior to plan development and submission.

1.8 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QC Plan, and prior to the start of construction, meet with the Contracting Officer to present the QC program required by this Contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration

for on-site and off-site work, and the coordination of the Contractor's management, production and QC personnel. At the meeting, the Contractor will be required to explain in detail how three phases of control will be implemented for each definable feature of work. As a minimum, the Contractor's personnel required to attend shall include an officer of the firm, the project manager, project superintendent, QC Manager, Alternate QC Manager, and subcontractor representatives. Each subcontractor who will be assigned QC responsibilities shall have a principal of the firm at the meeting. Minutes of the meeting will be prepared by the QC Manager and signed by the Contractor, and the Contracting Officer. A copy of the signed minutes shall be provided to all attendees by the Contractor. Repeat the coordination and mutual understanding meeting when a new QC Manager is appointed.

1.9 QC MEETINGS

After the start of construction, the QC Manager shall conduct weekly QC meetings at the work site with the project superintendent. The QC Manager shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within 2 working days after the meeting. The Contracting Officer may attend these meetings. The QC Manager shall notify the Contracting Officer at least 48 hours in advance of each meeting. As a minimum, the following shall be accomplished at each meeting:

a. Review the minutes of the previous meeting;

b. Review the schedule and the status of work:

(1) Work or testing accomplished since last meeting

(2) Rework items identified since last meeting

(3) Rework items completed since last meeting;

c. Review the status of submittals:

(1) Submittals reviewed and approved since last meeting

(2) Submittals required in the near future;

d. Review the work to be accomplished in the next week and documentation required:

(1) Establish completion dates for rework items

(2) Update the schedule showing planned and actual dates of the preparatory, initial and follow-up phases, including testing and any other inspection required by this contract

(3) Discuss construction methods and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each definable feature of work

(4) Discuss status of off-site work or testing

(5) Documentation required;

(6) Discuss upcoming Activity Hazard Analyses:

e. Resolve QC and production problems:

(1) Assist in resolving Request for Information issues; and

f. Address items that may require revising the QC plan:

(1) Changes in QC organization personnel

(2) Changes in procedures;

g. Review health and safety plan

1.10 THREE PHASES OF CONTROL

The Three Phases of Control shall adequately cover both on-site and off-site work and shall include the following for each definable feature of work.

1.10.1 Preparatory Phase

Notify the Contracting Officer at least 2 work days in advance of each preparatory phase. This phase shall include a meeting conducted by the QC Manager and attended by the superintendent, and the foreman responsible for the definable feature. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report and in the Preparatory Phase Checklist. Perform the following prior to beginning work on each definable feature of work:

a. Review each paragraph of the applicable specification sections;

b. Review the Contract drawings;

c. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;

d. Review the testing plan and ensure that provisions have been made to provide the required QC testing;

e. Examine the work area to ensure that the required preliminary work has been completed;

f. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;

g. Discuss construction methods, construction tolerances, workmanship standards, and the approach that will be used to provide quality construction by planning ahead and identifying potential problems

for each definable feature of work; and

h. Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.

1.10.2 Initial Phase

Notify the Contracting Officer at least 2 work days in advance of each initial phase. When construction crews are ready to start work on a definable feature of work, conduct the initial phase with the superintendent, and the foreman responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with Contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report and in the Initial Phase Checklist. Repeat the initial phase for each new crew to work on-site, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

a. Establish the quality of workmanship required;

b. Resolve conflicts;

c. Ensure that testing is performed by the approved laboratory, and

d. Check work procedures for compliance with the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met.

1.10.3 Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary until the completion of each definable feature of work and document in the daily Contractor Quality Control Report:

a. Ensure the work is in compliance with Contract requirements;

b. Maintain the quality of workmanship required;

c. Ensure that testing is performed by the approved laboratory;

d. Ensure that rework items are being corrected; and

e. Perform safety inspections.

1.10.4 Additional Preparatory and Initial Phases

Additional Preparatory and Initial Phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a definable feature is resumed after substantial period of inactivity, or if other problems develop.

1.10.5 Notification of Three Phases of Control for Off-Site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

1.11 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review and approval of submittals are described in section entitled "Submittal Procedures."

1.12 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this Contract.

1.12.1 Accreditation Requirements

Construction materials testing laboratories performing work for Navy construction contracts will be required to submit the following:

a. A copy of the Certificate of Accreditation and Scope of Accreditation by an acceptable laboratory accreditation authority.

Construction materials testing laboratories performing work for Navy construction contracts must be accredited by one of the laboratory accreditation authorities. The laboratory's scope of accreditation must include the ASTM standards listed in the paragraph titled "Construction Materials Testing Laboratory Requirements" as appropriate to the testing field. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office".

1.12.2 Construction Materials Testing Laboratory Requirements

Provide an independent construction materials testing laboratory accredited by an acceptable laboratory accreditation authority to perform sampling and tests required by this Contract. Testing laboratories that have obtained accreditation by an acceptable laboratory accreditation authority listed in the paragraph entitled "Laboratory Accreditation Authorities" submit to the Contracting Officer, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract. For testing laboratories that have not yet obtained accreditation by an acceptable laboratory accreditation authority listed in the paragraph entitled "Laboratory Accreditation Authorities" submit an acknowledgment letter from one of the laboratory accreditation authorities indicating that the application for accreditation has been received and the accreditation process has started, and submit to the Contracting Officer for approval, certified statements, signed by an official of the testing laboratory attesting that the proposed laboratory, meets or conforms to the ASTM standards listed below as appropriate to the testing field.

a. Laboratories engaged in testing of construction materials shall meet the requirements of ASTM E 329.

b. Laboratories engaged in testing of concrete and concrete aggregates shall meet the requirements of ASTM C 1077.

c. Laboratories engaged in testing of bituminous paving materials shall meet the requirements of ASTM D 3666.

d. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, shall meet the requirements of ASTM D 3740.

e. Laboratories engaged in inspection and testing of steel, stainless steel, and related alloys will be evaluated according to ASTM A 880.

f. Laboratories engaged in nondestructive testing (NDT) shall meet the requirements of ASTM E 543.

g. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA.

1.12.3 Laboratory Accreditation Authorities

Laboratory Accreditation Authorities are the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology, the American Association of State Highway and Transportation Officials (AASHTO) program, ICBO Evaluation Service, Inc. (ICBO ES), and the American Association for Laboratory Accreditation (A2LA) program and the Washington Association of Building Officials (WABO) (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) (Approval authority by WACEL is limited to projects within the Chesapeake Division and Public Works Center Washington geographical area).

Furnish to the Contracting Officer, a copy of the Certificate of Accreditation and Scope of Accreditation. The scope of the laboratory's accreditation shall include the test methods required by the Contract.

1.12.4 Capability Check

The Contracting Officer retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this Contract.

1.12.5 Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify Contracting Officer immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the

Contracting Officer via the QC Manager. Furnish a summary report of field tests at the end of each month. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.12.6 Test Reports and Monthly Summary Report of Tests

The QC Manager shall furnish the signed reports, certifications, and a summary report of field tests at the end of each month to the Contracting Officer. Attach a copy of the summary report to the last daily Contractor Quality Control Report of each month.

1.13 QC CERTIFICATIONS

1.13.1 Contractor Quality Control Report Certification

Each Contractor Quality Control Report shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report."

1.13.2 Invoice Certification

Furnish a certificate to the Contracting Officer with each payment request, signed by the QC Manager, attesting that as-built drawings are current and attesting that the work for which payment is requested, including stored material, is in compliance with contract requirements.

1.13.3 Completion Certification

Upon completion of work under this Contract, the QC Manager shall furnish a certificate to the Contracting Officer attesting that "the work has been completed, inspected, tested and is in compliance with the Contract."

1.14 COMPLETION INSPECTIONS

1.14.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Contract Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC Manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Include in the punch list any remaining items on the "Rework Items List" which were not corrected prior to the Punch-Out Inspection. The punch list shall include the estimated date by which the deficiencies will be corrected. A copy of the punch list shall be provided to the Contracting Officer. The QC Manager or staff shall make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished the Contractor shall notify the Government that the facility is ready for the Government "Pre-Final Inspection."

1.14.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" may be developed as a result of this inspection. The QC Manager shall ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the customer can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in timely manner and shall be accomplished before the contract completion date for the work or any particular increment thereof if the project is divided into increments by separate completion dates.

1.14.3 Final Acceptance Inspection

The QC Manager, the superintendent or other primary contractor management personnel, and the Contracting Officer's representative will be in attendance at this inspection. Additional Government personnel may be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the "Pre-Final" inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final inspection stating that all specific items previously identified to the Contractor as being unacceptable, along with all the remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost per the Contract Clause entitled "Inspection of Construction." When the Contracting Officer takes possession of partially completed work, it will be per Contract Clause "Use and Possession Prior to Completion".

1.15 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities.

1.15.1 Contractor Production Report

Reports are required for each day that work is performed and shall be attached to the Contractor Quality Control Report prepared for the same day. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Production Reports are to be prepared, signed and dated by the project superintendent and shall contain the following information:

a. Date of report, report number, name of contractor, Contract number, title and location of Contract and superintendent present.

b. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.

c. Identify work performed by corresponding Schedule Activity No., PC#, Modification No., etc.

d. A list of Contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed, hours worked by trade, daily total work hours on work site this date (incl hours on continuation sheets), and total work hours from start of construction.

e. A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met including the results on the following:

(1) Was a job safety meeting held this date? (If YES, attach a copy of the meeting minutes.)

(2) Were there any lost time accidents this date? (If YES, attach a copy of the completed OSHA report.)

(3) Was crane/manlift/trenching/scaffold/hv electrical/high work/hazmat work done? (If YES, attach a statement or checklist showing inspection performed.)

(4) Was hazardous material/waste released into the environment? (If YES, attach a description of incident and proposed action.)

f. Identify Schedule Activity No. related to safety action and list safety actions taken today and safety inspections conducted.

g. Identify Schedule Activity No., Submittal # and list equipment/material received each day that is incorporated into the job.

h. Identify Schedule Activity No., Owner and list construction and plant equipment on the work site including the number of hours used.

i. Include a "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site. For each remark given, identify the Schedule Activity No. that is associated with the remark.

1.15.1.1 Contractor Production Report (Continuation Sheet)

Additional space required to contain daily information on the Contractor Production Report will be placed on its Continuation Sheet(s). An unlimited number of Continuation Sheets may be added as necessary and attached to the Production Report.

1.15.2 Contractor Quality Control Report

Reports are required for each day that work is performed and for every seven consecutive calendar days of no-work and on the last day of a no-work

period. Account for each calendar day throughout the life of the Contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the QC Manager and shall contain the following information:

a. Date of report, report number, Contract Number, and Contract Title.

b. Indicate if Preparatory Phase work was performed today (Yes/No checkboxes).

c. If Preparatory Phase work was performed today (including on-site and off-site work), identify its Schedule Activity No. and Definable Feature of Work. The Index # is a cross reference to the Preparatory Phase Checklist. An example of the Index # is: 0025-P01, where "0025" is the Contractor Quality Control Report Number, "P" indicates Preparatory Phase, and "01" is the Preparatory Phase Checklist number(s) for this date. Each entry in this section must be accompanied with a corresponding Preparatory Phase Checklist.

d. Indicate if Initial Phase work was performed today (Yes/No checkboxes).

e. If Initial Phase work was performed today (including on-site and off-site work), identify its Schedule Activity No. and Definable Feature of Work. The Index # is a cross reference to the Initial Phase Checklist. An example of the Index # is: 0025-I01, where "0025" is the Contractor Quality Control Report Number, "I" indicates Initial Phase, and "01" is the Initial Phase Checklist number(s) for this date. Each entry in this section must be accompanied with a corresponding Initial Phase Checklist.

f. Results of the Follow-up Phase inspections held today (including on-site and off-site work), including Schedule Activity No., the location of the definable feature of work, Specification Sections, etc. Indicate in the report for this definable feature of work that the work complies with the Contract as approved in the Initial Phase, work complies with safety requirements, and that required testing has been performed and include a list of who performed the tests.

g. List the rework items identified, but not corrected by close of business; along with its associated Schedule Activity Number.

h. List the rework items corrected from the rework items list along with the corrective action taken and its associated Schedule Activity Number.

i. Include a "remarks" section in this report which will contain pertinent information including directions received, quality control problem areas, deviations from the QC plan, construction deficiencies encountered, QC meetings held, acknowledgement that as-built drawings have been updated, corrective direction given by

the QC Organization and corrective action taken by the Contractor. For each remark given, identify the Schedule Activity No. that is associated with the remark.

j. Contractor Quality Control Report certification, signature and date.

1.15.2.1 Contractor Quality Control Report (Continuation Sheet)

Additional space required to contain daily information on the Contractor Quality Control Report will be placed on its Continuation Sheet(s). An unlimited number of Continuation Sheets may be added as necessary and attached to the Contractor Quality Control Report.

1.15.3 Preparatory Phase Checklist

Each Definable Feature of Work that is in the Preparatory Phase shall have this checklist filled out for it. The checklist shall be identified by terminology consistent with the construction schedule. Attach this checklist to the Contractor Quality Control Report of the same date.

a. Specification Section, date of report, and Contract number shall be filled out. Duplicate this information in the header of the second page of the report.

b. Definable Feature of Work, Schedule Activity No. and Index # entry and format will match entry in the Preparatory Phase section of the Contractor Quality Control Report. Duplicate this information in the header of the second page of the report.

c. Personnel Present: Indicate the number of hours of advance notice that was given to the Government Representative and indicate (Yes/No checkboxes) whether or not the Government Rep was notified. Indicate the Names of Preparatory Phase Meeting attendees, their position and company/government they are with.

d. Submittals: Indicate if submittals have been approved (Yes/No checkboxes), if no indicate what has not been submitted. Are materials on hand (Yes/No checkboxes) and if not, what items are missing. Check delivered material/equipment against approved submittals and comment as required.

e. Material Storage: Indicate if materials/equipment is stored properly (Yes/No checkboxes) and if not, what action is/was taken.

f. Specifications: Review and comment on Specification Paragraphs that describe the material/equipment, procedure for accomplishing the work and clarify any differences.

g. Preliminary Work & Permits: Ensure preliminary work is per the contract documents and necessary permits are on file, if not, describe the action taken.

h. Testing: Identify who performs tests, the frequency, and where

tests are to occur. Review the testing plan, report abnormalities, and if the test facilities have been approved.

i. Safety: Indicate if the activity hazard analysis has been approved (Yes/No checkboxes) and comment on the review of the applicable portions of the EM 385-1-1.

j. Meeting Comments: Note comments and remarks during the Preparatory Phase Meeting that was not addressed in previous sections of this checklist.

k. Other Items or Remarks: Note any other remarks or items that were a result of the Preparatory Phase.

l. QC Manager will sign and date the checklist.

1.15.4 Initial Phase Checklist

Each Definable Feature of Work that is in the Initial Phase shall have this checklist filled out for it. The checklist shall be identified by terminology consistent with the construction schedule. Attach this checklist to the Contractor Quality Control Report of the same date.

a. Specification Section, date of report, and Contract number shall be entered.

b. Definable Feature of Work, Schedule Activity No. and Index # entry and format will match entry in the Initial Phase section of the Contractor Quality Control Report.

c. Personnel Present: Indicate the number of hours of advance notice that was given to the Government Representative and indicate (Yes/No checkboxes) whether or not the Government Rep was notified. Indicate the Names of Initial Phase Meeting attendees, their position and company/government they are with.

d. Procedure Compliance: Comment on compliance with procedures identified at Preparatory Phase of Control and assurance that work is per plans, specifications and submittals.

e. Preliminary Work: Ensure preliminary work being placed is in compliance and if not, what action is/was taken.

f. Workmanship: Identify where initial work is located; if a sample panel is required (Yes/No checkboxes); is the initial work the sample (Yes/No checkboxes); and if Yes, describe the panel location and precautions taken to preserve the sample.

g. Resolution: Comment on any differences and the resolutions reached.

h. Check Safety: Comment on the safety review of the job conditions.

i. Other: Note any other remarks or items that were a result of the

Initial Phase.

j. QC Manager will sign and date the checklist.

1.15.5 Quality Control Validation

Establish and maintain the following in a series of 3 ring binders. Binders shall be divided and tabbed as shown below. These binders shall be readily available to the Government's Quality Assurance Team during all business hours.

a. All completed Preparatory and Initial Phase Checklists, arranged by specification section.

b. All milestone inspections , arranged by Activity/Event Number.

c. A current up-to-date copy of the Testing and Plan Log with supporting field test reports, arranged by specification section.

d. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.

e. A current up-to-date copy of the Rework Items List.

f. Maintain up-to-date copies of all punch lists issued by the QC Staff on the Contractor and Sub-Contractors and all punch lists issued by the Government.

1.15.6 Testing Plan and Log

As tests are performed, the QC Manager shall record on the "Testing Plan and Log" the date the test was conducted, the date the test results were forwarded to the Contracting Officer, remarks and acknowledgement that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated "Testing Plan and Log" to the last daily Contractor Quality Control Report of each month.

1.15.7 Rework Items List

The QC Manager shall maintain a list of work that does not comply with the Contract, identifying what items need to be reworked, the date the item was originally discovered, the date the item will be corrected by, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the "Rework Items List" to the last daily Contractor Quality Control Report of each month. The Contractor shall be responsible for including on this list items needing rework including those identified by the Contracting Officer.

1.15.8 As-Built Drawings

The QC Manager is required to ensure the as-built drawings, required by Section 01770N "Closeout Procedures," are kept current on a daily basis and marked to show deviations which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying

documentation (e.g. PC No., Modification No., Request for Information No., etc.). The QC Manager shall initial each deviation and each revision. Upon completion of work, the QC Manager shall furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the Contracting Officer.

1.15.9 Report Forms

The following forms, are acceptable for providing the information required by the paragraph entitled "Documentation." Use of these specific formats are required, any other format shall not be used. One copy of each form will be provided at the Preconstruction Conference:

a. Combined Contractor Production Report and Contractor Quality Control Report w/ separate continuation sheet(s).

b. Contractor Quality Control Report w/ continuation sheet(s).

c. Contractor Production Report w/ continuation sheet(s).

d. Preparatory Phase Checklist.

e. Initial Phase Checklist.

f. Testing Plan and Log.

g. Rework Items List.

1.16 NOTIFICATION ON NON-COMPLIANCE

The Contracting Officer will notify the Contractor of any detected non-compliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time for excess costs or damages by the Contractor.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01500N

TEMPORARY FACILITIES AND CONTROLS
10/03

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.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
NFPA 241	(2000) Safeguarding Construction, Alteration, and Demolition Operations

1.2 TEMPORARY UTILITIES

1.2.1 Utilities at Special Locations

Reasonable amounts of utilities will be made available to the Contractor at the prevailing Government rates. These rates may be obtained upon application to the Commanding Officer, by way of the Contracting Officer. A $300.00 deposit will be required before connecting electricity. The Contractor will be responsible for making connections, providing transformers and meters (THE CONTRACTOR MUST CERTIFY THAT ALL TRANSFORMERS INSTALLED FOR TEMPORARY POWER DURING THIS CONTRACT ARE PCB FREE), and making disconnections; and for providing backflow preventer devices on connections to domestic water lines. Under no circumstances will taps to base fire hydrants be allowed for obtaining domestic water. Neither potable water nor sanitary facilities will be available at the main Contractor laydown area at Marine Corps Air Station (MCAS), Cherry Point, NC.

1.3 WEATHER PROTECTION

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

1.3.1 Building and Site Storm Protection

When a warning of gale force winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Government property. Precautions shall include, but are not limited to, closing openings; removing loose materials, tools and equipment from exposed locations; and

removing or securing scaffolding and other temporary work. Close openings in the work when storms of lesser intensity pose a threat to the work or any nearby Government property.

1.3.1.1 Hurricane Condition of Readiness

Unless directed otherwise, comply with:

a. Condition FOUR (Sustained winds of 50 knots or greater expected within 72 hours): Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers scrap lumber, waste material, and rubbish for removal and disposal at the close of each work day. Maintain the construction site including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards. Contact ROICC for Condition of Readiness (COR) updates and completion of required actions.

b. Condition THREE (Sustained winds of 50 knots or greater expected within 48 hours): Maintain "Condition FOUR" requirements and commence securing operations necessary for "Condition ONE" which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to "Condition TWO" and continue action as necessary to attain "Condition THREE" readiness. Contact Contracting Officer for weather and COR updates and completion of required actions.

c. Condition TWO (Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment, materials, or remove from the jobsite. Expend every effort to clear all missile hazards and loose equipment from general base areas. Contact Contracting Officer for weather and Condition of Readiness (COR) updates and completion of required actions.

d. Condition ONE. (Sustained winds of 50 knots or greater expected within 12 hours): Secure the jobsite, and leave Government premises.

1.4 TEMPORARY SANITARY FACILITIES

Provide adequate sanitary conveniences of a type approved for the use of persons employed on the work, properly secluded from public observation, and maintained in such a manner as required and approved by the Contracting Officer. Maintain these conveniences at all times without nuisance. Upon completion of the work, remove the conveniences from the premises, leaving the premises clean and free from nuisance. Dispose of sewage through connection to a municipal, district, or station sanitary sewage system. Where such systems are not available, use chemical toilets or comparably effective units, and periodically empty wastes into a municipal, district,

or station sanitary sewage system, or remove waste to a commercial facility. Include provisions for pest control and elimination of odors.

1.5 TEMPORARY BUILDINGS

Trailers or storage buildings will be permitted, where space is available, subject to the approval of the Contracting Officer. The trailers or buildings shall be in good condition, free from visible damage rust and deterioration, and meet all applicable safety requirements. Trailers shall be roadworthy and comply with all appropriate state and local vehicle requirements. Failure to maintain storage trailers or buildings to these standards shall result in the removal of non-complying units at the Contractor's expense. A sign not smaller than 24 by 24 inches shall be conspicuously placed on the trailer depicting the company name, business phone number, and emergency phone number. Trailers shall be anchored to resist high winds and must meet applicable state of local standards for anchoring mobile trailers.

A laydown site will be provided as indicated for trailers, storage buildings, and/or bulk storage within five miles of the construction site. As this contract involves multiple construction sites, a small staging area in the vicinity of each site will be permitted where space is available, subject to the approval of the Contracting Officer. All trailers or storage buildings shall be suitably painted, kept in a good state of repairs, and clearly identified with the Contractor's name and telephone number. All laydown sites, staging areas, and construction sites shall be kept free of debris and trash, fences properly maintained, and all vegetation trimmed. Failure of the Contractor to maintain his trailers or storage buildings in good condition will be considered sufficient reason to require their removal from the job site. Trailers shall be anchored to resist high winds and must meet applicable state or local standards for anchoring mobile trailers.

1.5.1 Maintenance of Temporary Facilities

Suitably paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 TEMPORARY PHYSICAL CONTROLS

3.1.1 Access Controls

3.1.1.1 Temporary Barricades

Contractor shall provide for barricading around all work areas to prevent public access.

3.1.1.2 Fencing

Fencing shall be provided along the construction site for each road segment and isolated areas of work to prevent access by unauthorized people (special emphasis shall be placed on preventing access by children). Fencing shall be a four feet high orange plastic grid supported at intervals sufficient to resist at least 250 pounds of force applied against the fence. Fencing shall be moved as work progresses. Place fencing on the side opposite the street side of the walkway to allow adequate work space for the Contractor's activities.

3.1.1.3 Signs

Place warning signs at the construction area perimeter designating the presence of construction hazards requiring unauthorized persons to keep out. Signs must be placed on all sides of the project, with at least one sign every 300 feet. All points of entry shall have signs designating the construction site as a hard hat area.

3.2 TEMPORARY WIRING

Provide temporary wiring per NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Program shall include frequent inspection of all equipment and apparatus.

3.3 GRASS CUTTING

Cut grass (or annual weeds) within the construction and storage sites to a maximum 4 inch height at least once a week during the growing season unless the grass area is not visible to the public. Trim the grass around fences at time of grass cutting. Maintain grass or weeds on stockpiled earth as descried above.

-- End of Section --

SECTION 01525N

SAFETY REQUIREMENTS
10/03

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z359.1	(1999) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
ANSI A10.14	(1991) Construction and Demolition Operations - Requirements for Safety Belts, Harnesses, Lanyards and Lifelines for Construction and Demolition Use

ASME INTERNATIONAL (ASME)

ASME B30.5	(2000) Mobile and Locomotive Cranes
ASME B30.22	(2000) Articulating Boom Cranes

THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.94	Ventilation
29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
29 CFR 1926.502 Subpart F	Warning Line Systems

U. S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) Safety and Health Requirements Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(1998) Portable Fire Extinguishers

NFPA 70	(2002) National Electrical Code
NFPA 241	(2000) Safeguarding Construction, Alteration, and Demolition Operations

1.2 SUMMARY

1.2.1 Related Sections

a. Section 01310N, "Administrative Requirements"

b. Section 01500N, "Temporary Facilities and Controls"

1.3 DEFINITIONS

a. Certified Industrial Hygienist. An industrial hygienist is an individual who is certified by the American Board of Industrial Hygiene.

b. Certified Safety Professional. A safety manager or safety engineer that has passed the CSP exam administered by the Board of Certified Safety Professionals.

c. Competent Person. A competent person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

d. Confined Space. A space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include, but are not limited to storage tanks, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines. The following locations within the area of responsibility of MCAS Cherry Point are classified as permit required confined spaces (PRCS). All sewer manholes and wet-wells, electrical manholes, steam pits, vaults, tanks, vessels, silos, storage bins, hoppers, piping systems large enough for entrance by a person, and excavations four feet and deeper. Additionally, all locations classified as Permit Required Confined Spaces (PRCS) that have one or more of the following characteristics (1) contains or has the potential to contain a hazardous atmosphere, (2) contains a material that has the potential for engulfing an entrant, (3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or (4) contains any other recognized serious safety or health hazard. A mechanical retrieval device is required to retrieve personnel from vertical type permit required confined spaces more than five feet deep. Communications with the MCAS Fire Department is mandatory at all

times entrants are in a confined space. Additionally, Check-in with the MCAS Fire Department prior to entrants entering and also upon Exit from a confined space is mandatory.

e. First Aid. First aid is any one-time treatment, and any follow-up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, and so forth, which do not ordinarily require medical care, even though provided by a physician or registered professional personnel.

f. Health and Safety Plan (HASP). The HASP is the Navy equivalent Army term of SHP or SSHP used in EM 385-1-1. "USACE" property and equipment specified in EM 385-1-1 should be interpreted as Government property and equipment.

g. Lost Workdays. The number of days (consecutive or not) after, but not including, the day of injury or illness during which the employee would have worked but could not do so; that is, could not perform all or part of his normal assignment during all or any part of the workday or shift; because of the occupational injury or illness.

h. Medical Treatment. Medical treatment includes 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 though provided by a physician or registered personnel.

i. Multi-employer work site (MEWS). A multi-employer work site, as defined by OSHA, is one in which many employers occupy the same site. The Navy considers the prime contractor to be the "controlling authority" for all work site safety and health of the subcontractors.

j. Operating Envelope. There is an "operating envelope" around any crane, and inside the envelope are the operator, riggers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).

k. Qualified Person. One who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve or resolve problems related to the subject matter, the work or the project.

l. Recordable Occupational Injuries or Illnesses. Any occupational injuries or illnesses which result in:

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

(2) Lost Workday Cases, other than fatalities, that result in lost workdays, or

(3) Non-Fatal Cases without lost workdays which result in transfer to another job or termination of employment, or require medical treatment (other than first aid) or involve: loss of consciousness or restriction of work or motion. This category also includes any diagnosed occupational illnesses which are reported to the employer but are not classified as fatalities or lost workday cases.

m. Safety Officer. The superintendent or other qualified or competent person who is responsible for the on-site safety required for the project, even though the QC has safety inspection responsibilities as part of the QC duties.

n. Serious Accidents. Any work-related incident, which results in, a fatality, in-patient hospitalization of three or more employees, or property damage in excess of $200,000.

o. Significant Accident. Any contractor accident which involves falls of (4 feet) or more, electrical accidents, confined space accidents, diving accidents, equipment accidents, crane accident or fire accidents, which, result in property damage of $10,000 or more, but less than $200,000; or when fire department or emergency medical treatment (EMT) assistance is required.

p. 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 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.).

1.4 SUBMITTALS

Submit the following per Section 01330, "Submittal Procedures."

SD-07 Certificates

Accident Prevention Plan (APP); G

Activity Hazard Analysis (AHA); G

SD-11 Closeout Submittals

Daily Confined Space Entry Permit

Submit one copy of each permit attached to each Daily Production

Report.

Reports

Submit reports as their incidence occurs, per the requirements of the paragraph entitled, "Reports."

Crane Reports

Crane Critical Lift Plan

Certificate of Compliance

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

a. Qualifications of Safety Officer, On-Site Superintendent and/or Contractor QC Person:

(1) Ability to manage the on-site contractor safety program through appropriate management controls.

(2) Ability to identify hazards and have the capability to expend resources necessary to abate the hazards.

(3) Must have worked on similar types of projects that are equal to or exceed the scope of the project assigned with the same responsibilities.

(4) Shall, as a minimum, have attended an OSHA training qualification class including at least 10 hours of classroom instruction.

b. Qualifications of Qualified Person, Confined Space Entry. The qualified person shall be capable (by education and specialized training) of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions in a confined space. This person shall be capable of specifying necessary control and protective action to ensure worker safety. Since this work involves marine operations that handle combustible or hazardous materials, this qualified person shall be a NFPA certified marine chemist.

c. Qualification of Crane Operators. Crane operators shall meet the requirements in EM 385-1-1, Appendix G.

1.5.2 Meetings

1.5.2.1 Preconstruction Conference

The safety officer/On-site Superintendent shall attend the preconstruction conference.

1.5.2.2 Meeting on Work Procedures

a. Meet with Contracting Officer to discuss work procedures and safety precautions required by the APP. Ensure the participation of the contractor's superintendent, the quality control, and the CSP or CIH.

b. Meet with Contracting Officer to discuss work procedures and safety precautions required by the HASP. Ensure the participation of the contractor's superintendent, the quality control, and the CSP or CIH.

1.5.2.3 Weekly Safety Meetings

Hold weekly at the project site. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractor Production/Contractor Quality Control daily report.

1.5.2.4 Work Phase Meetings

The appropriate AHA shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection.

1.5.2.5 New Employee Indoctrination

New employees will be informed of specific site hazards before they begin work. Documentation of this orientation shall be kept on file at the project site.

1.5.3 Certifications

1.5.3.1 Accident Prevention Plan (APP)

Submit the APP at least 15 calendar days prior to start of work at the job site, following Appendix A of EM 385-1-1. Make the APP site specific. Notice To Proceed will be given after Government finds the APP acceptable.

1.5.3.2 Activity Hazard Analysis (AHA)

Submit the AHA for review at least 15 calendar days prior to the start of each phase. Format subsequent AHA as amendments to the APP. per contract quality control requirements each AHA will be reviewed during an on-site preparatory inspection.

1.5.4 Reports

1.5.4.1 Crane Reports

Submit crane inspection reports required per EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.5.4.2 Crane Critical Lift Plan

Submit crane critical lift plan EM 385-1-1 section 16 when crane loads meet or exceed 75 percent of the crane load capacity in any configuration.

1.5.4.3 Certificate of Compliance

The Contractor shall provide a Certificate of Compliance for each crane entering a Naval activity under this contract (see Contracting Officer for a blank certificate). Certificate shall state 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 shall comply with 29 CFR 1926. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. The Contractor shall also certify that all of its crane operators working on the Naval activity have been trained not to bypass safety device (e.g., anti-two block devices) during lifting operations. These certifications shall be posted on the crane.

1.6 ACCIDENT PREVENTION PLAN (APP)

Prepare the APP per the required and advisory provisions of EM 385-1-1 including Appendix A, "Minimum Basic Outline for Preparation of Accident Prevention Plan," and as modified herein. Include the associated AHA and other specific plans, programs and procedures listed on Pages A-3 and A-4 of EM 385-1-1, some of which are listed below.

1.6.1 Contents of the Accident Prevention Plan

a. Name and safety related qualifications of safety officer (including training and any certifications).

b. Qualifications of competent and of qualified persons.

c. Identity of the individual who will complete exposure data (hours worked); accident investigations, reports and logs; and immediate notification of accidents to include subcontractors.

d. Emergency response plan. Conform to EM 385-1-1, paragraph 01.E and include a map denoting the route to the nearest emergency care facility with emergency phone numbers. Contractor may be required to demonstrate emergency response.

e. Confined Space Entry Plan. 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.)

f. Hazardous Material Use. Provisions to deal with hazardous materials, pursuant to the Contract Clause "FAR 52.223-3, Hazardous Material Identification and Material Safety Data." And

the following:

(1) Inventory of hazardous materials to be introduced to the site with estimated quantities.

(2) Plan for protecting personnel and property during the transport, storage and use of the materials.

(3) Emergency procedures for spill response and disposal, including a site map with approximate quantities on site at any given time. The site map will be attached to the inventory, showing where the hazardous substances are stored.

(4) Material Safety Data Sheets for inventoried materials not required in other section of this specification.

(5) Labeling system to identify contents on all containers on-site.

(6) Plan for communicating high health hazards to employees and adjacent occupants.

g. Hazardous Energy Control Plan. For hazardous energy sources, comply with EM 385-1-1, paragraph 12.A.07.

h. Critical Lift Plan. Weight handling critical lift plans shall be prepared and signed per EM 385-1-1, paragraph 16.c.18.

i. Alcohol and Drug Abuse Plan

(1) Describe plan for random checks and testing with pre-employment screening per the DFAR Clause subpart 252.223-7004, "Drug Free Work Force."

(2) Description of the on-site prevention program

j. Fall Protection and Prevention (FP&P) Plan. The plan shall be site specific and address all fall hazards in the work place. It shall 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 shall prepare the plan. The plan shall include fall protection and prevention systems, equipment and methods employed, responsibilities, rescue and escape equipment and operations, training requirements, and monitoring methods. FP&P Plan shall be revised for lengthy projects, to reflect any new changes during the course of construction, due to changes of personnel, equipment, systems or work habits.

k. Silica Exposure Reduction. The plan shall include specific procedures to prevent employee silica inhalation exposures.

l. Training Records and Requirements. List of mandatory training and certifications which are applicable to this project (e.g. explosive actuated tools, confined space entry, fall protection,

crane operation, vehicle operator, forklift operators, personal protective equipment); list of requirements for periodic retraining/certification; outline requirements for supervisory and employee safety meetings.

m. Severe Weather Plan. Procedures of ceasing on-site operations during lightning or upon reaching maximum allowed wind velocities.

n. Emergency Lighting and Power Systems Plan (e.g. periodic testing of batteries for emergency lighting.)

1.6.2 Hazardous Material Use

Each hazardous material must receive approval prior to bringing 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. Any work or storage involving hazardous chemicals or materials must be done in a manner that will not expose government employees to any unsafe or unhealthful conditions. Adequate protective measures must be taken to prevent government employees from being exposed to any hazardous condition that could result from the work or storage. Approval by the Contracting Officer of protective measures and storage area is required prior to the start of the work.

1.7 ACTIVITY HAZARD ANALYSIS (AHA)

Prepare for each phase of the work. As a minimum, define activity being performed, sequence of work, specific hazards anticipated, control measures to eliminate or reduce each hazard to acceptable levels, training requirements for all involved, and the competent person in charge of that phase of work. For work with fall hazards, including fall hazards associated with scaffold erection and removal, identify the appropriate fall arrest systems. For work with materials handling equipment, address safeguarding measures related to materials handling equipment. For work requiring excavations, include excavation safeguarding requirements. The appropriate AHA shall be reviewed and attendance documented by the Contractor at the preparatory, initial, and follow-up phases of quality control inspection.

1.8 DRUG PREVENTION PROGRAM

Conduct a proactive drug and alcohol use prevention program for all workers, prime and subcontractor, on the site. Ensure that no employees either use illegal drugs or consume alcohol during work hours. Ensure there are no employees under the influence of drugs or alcohol during work hours. After accidents, collect blood, urine or saliva specimens and test injured employee's influence. A copy of the test shall be made available to the Contracting Officer upon request.

1.9 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

1.9.1 Scaffolds

Delineate the fall protection requirements necessary during the erection

and dismantling operation of scaffolds used on the project in the Fall Protection and Prevention (FP&P) plan and activity hazard analysis for the phase of work.

1.9.2 Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, Contractor shall provide training for each employee who might be exposed to fall hazards.

1.10 DUTIES OF THE SAFETY OFFICER ON-SITE SUPERINTENDENT

a. Ensure construction hazards are identified and corrected.

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

c. Maintain a log of safety inspections performed.

d. Attend the pre-construction conference as required.

e. Identify hazardous conditions and take corrective action. Failure to do so will result in a dismissal from the site, with a work stoppage pending approval of suitable replacement personnel.

1.11 DISPLAY OF SAFETY INFORMATION

Display the following information in clear view of the on-site construction personnel:

a. Map denoting the route to the nearest emergency care facility with emergency phone numbers.

b. AHA

c. Confined space entry permit.

d. A sign indicating the number of hours worked since last lost workday accident.

1.12 SITE SAFETY REFERENCE MATERIALS

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

1.13 HIGH HAZARD WORK AND LONG DURATION

Work under this contract is potentially hazardous. Pursuant to contract clause "FAR 52.236-13, Accident Prevention, Alternate I," submit in writing additional proposals for effecting accident prevention under hazardous conditions. Meet in conference with Contracting Officer to discuss and develop mutual understanding relative to the administration of the overall safety program.

1.14 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. Government has no responsibility to provide emergency medical treatment. However, if in a life threatening situation emergency medical care is rendered by Navy medical services, charges may be billed to Contractor at prevailing rates established in BUMED Instruction 6320.4 series. Reimbursement shall be made by Contractor to Naval Regional Medical Center Collection Agent upon receipt of monthly statement.

1.15 SITE CONDITIONS

1.15.1 Noise

The adjacent Government activities produce sound-pressure levels of 85 dBA steady state, or 140 dBA for impulse. Enforce hearing protection protecting contractor's site personnel from Government produced noise.

1.16 REPORTS

1.16.1 Accident Reports

a. For recordable occupational injuries and illnesses, the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the Navy Contractor Significant Incident Report (CSIR) form and provide to the Contracting Officer within 5 calendar days of the accident. The Contracting Officer will provide a copy of the CSIR form.

b. For a weight handling equipment accident the Prime Contractor shall conduct an accident investigation to establish the root cause(s) of the accident, complete the WHE Accident Report form and provide to the Contracting Officer within 30 calendar days of the accident. The Contracting Officer will provide a blank copy of the WHE accident report form.

1.16.2 Notification

Notify the Contracting Officer as soon as practical, but not later than four hours, of any accident meeting the definition of Recordable Occupational Injuries or Illnesses or Significant Accidents. Information shall 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; and brief description of accident (to include type of construction equipment used, PPE used, etc.).

1.16.3 Monthly Exposure Report

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.

1.16.4 OSHA Citations and Violations

Provide the Contracting Officer with a copy of each OSHA citation, OSHA report and contractor response. Correct violations and citations promptly and provide written corrective actions to the Contracting Officer.

1.16.5 Crane Notification

Notify Contracting Officer at least 15 days prior to bringing any crane equipment on-site so that the contracting officer may arrange for any additional quality assurance spot checks necessary by the government.

PART 2 PRODUCTS

2.1 FALL PROTECTION ANCHORAGE

Fall protection anchorage, conforming to ANSI Z359.1, will be left in place and so identified for continued customer use.

2.2 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 -" on 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.

PART 3 EXECUTION

3.1 CONSTRUCTION

Comply with EM 385-1-1, NFPA 241, the accident prevention plan, the activity hazard analysis and other related submittals and activity fire and safety regulations.

3.1.1 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocynates, lead-based paint are prohibited. Exceptions to the use of any of the above excluded materials may be considered by Contracting Officer upon written request by Contractor.

3.1.2 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and nonfriable asbestos. If additional 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 a minimum of 15 calendar days in advance. As a minimum, the request should include the location of the outage, utilities being effected, 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, the Contractor shall attend a pre-outage coordination meeting with the Contracting Officer and the Station Utilities Department to review the scope of work and the lock out/tag out procedures for worker protection. No work will be performed on energized electrical equipment unless proven impassable. Working equipment "hot" must be considered the last option.

3.3 PERSONNEL PROTECTION

3.3.1 Hazardous Noise

Provide hazardous noise signs, and hearing protection, wherever equipment and work procedures produce sound-pressure levels greater than 85 dBA steady state or 140 dBA impulse, regardless of the duration of the exposure.

3.3.2 Fall Protection

Enforce use of the fall protection device designated for each specific work activity in the FP&P plan and/or AHA all times when an employee is on a surface 6 feet or more above lower levels. Personal fall arrest systems are required when working from an articulating or extendible boom, scissor lifts, swing stages, or suspended platform. Fall protection must comply with ANSI A10.14.

3.3.2.1 Personal Fall Arrest Device

Personal fall arrest device equipment, systems, subsystems, and components shall meet ANSI Z359.1, "Safety Requirements for Personal Fall Arrest Systems". Only a full-body harness with a shock absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest device. Body belts may only be used as a positioning device system such as steel reinforcing assembly and in conjunction with another fall arrest system. Harnesses shall have a fall arrest attachment, which is a connector, affixed to the body support (usually a D-ring) and specifically designated for attachment to the rest of the system. Only double locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber.

3.3.2.2 Fall Protection for Roofing Work

Fall protection controls shall be implemented based on the type of roof being constructed and work being performed. The roof area to be accessed

shall be evaluated for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

(1) For work within 6 feet of an edge, on low-slope roofs, personnel shall be protected from falling by use of personal fall arrest systems, guardrails, or safety nets. Safety monitoring system is not adequate fall protection and is not authorized.

(2) For work greater than 6 feet from an edge, warning lines shall be erected and installed per 29 CFR 1926.502 Subpart F.

b. Steep Roofs: Work on steep roofs requires personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also includes residential or housing type construction.

3.3.2.3 Safety Nets

If safety nets are used as the selected fall protection system on the project, they shall be provided at unguarded workplaces, over water, machinery, dangerous operations and leading edge work.

3.3.2.4 Existing Anchorage

Existing anchorages, used for attachment of personal fall arrest equipment, if to be used by the Contractor, shall be re-certified by the contractor's fall protection engineer (QP).

3.4 SCAFFOLDING

Employees shall be provided 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. Stair towers or ladders built into scaffold systems per USACE EM 385-1-1 Appendix J are required for work platforms greater than 20 feet in height. Contractor shall ensure that employees that are qualified perform scaffold erection. 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 plan. Minimum platform size shall be based on the platform not being greater in height than three times the dimension of the smallest width dimension for rolling scaffold. Some Baker type scaffolding has been found not to meet these requirements. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Special care shall be given to ensure scaffold systems are not overloaded. Outrigger 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.

3.5 EQUIPMENT

3.5.1 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 per manufacturers printed instructions.

3.5.2 Weight Handling Equipment

a. Cranes must be equipped with:

(1) Load Indicating Devices (LIDs) and a Boom Angle or Radius Indicator,

(2) or Load-Moment Indicating Devices (LMIs).

(3) Anti-two-block prevention devices.

(4) Boom Hoist Hydraulic Relief Valve, Disconnect, or Shutoff (stops hoist when boom reaches a predetermined high angle).

(5) Boom Length Indicator (for telescoping booms).

(6) Device to prevent uncontrolled lowering of a telescoping hydraulic boom.

(7) Device to prevent uncontrolled retraction of a telescoping hydraulic boom.

b. The Contractor shall notify the Contracting Officer, in advance, of any cranes entering the activity so that necessary quality assurance spot checks can be coordinated.

c. The Contractor shall comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Erection shall be performed under the supervision of a designated person (as defined in ASME B30.5). All testing shall be performed per the manufacturers recommended procedures.

d. The Contractor shall comply with ASME B30.5 for mobile cranes, and ASME B30.22 for articulating boom cranes.

e. The presence of Naval station safety and health inspectors does not relieve the Contractor of an obligation to comply with all applicable safety regulations. The Government will investigate all complaints of unsafe or unhealthful working conditions received in writing from contractor employees, federal civilian employees, or military personnel.

f. Each load shall be rigged/attached independently to the hook/master-link in such a fashion that the load cannot slide or otherwise become detached. Christmas-tree lifting (multiple rigged

materials) is not allowed.

g. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and shall follow the requirements of ASME B30.5 or ASME B30.22 as applicable.

h. Crane supported work platforms shall only be used in extreme conditions if the Contractor proves that using any other access to the work location would provide a greater hazard to the workers. Personnel shall not be lifted with a live hoist or friction crane.

i. A fire extinguisher having a minimum rating of 10BC and a minimum nominal capacity of 5lb of extinguishing agent shall be available at all operator stations or cabs of cranes. Portable fire extinguishers shall be inspected, maintained, and recharged as specified in NFPA 10, Standard for Portable Fire Extinguishers.

j. All employees shall be kept clear of loads about to be lifted and of suspended loads.

k. A weight handling equipment operator shall not leave his position at the controls while a load is suspended.

l. A Contractor Crane Operation Checklist shall be used by the CQC representative during oversight of contractor crane operations (refer to EM 385-1-1 Appendix H and Contracting Officer for copies).

m. Only contractor crane operators who have met the requirements of 29 CFR 1910.94, 29 CFR 1910.120, 29 CFR 1926.65, 29 CFR 1926.502 Subpart F, EM 385-1-1, ASME B30.5, and ASME B30.22 and other local and state requirements shall be authorized to operate the crane.

n. Cribbing shall be utilized by the Contractor when performing lifts on outriggers.

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

p. A physical barricade must be positioned to prevent personnel from entering the tailswing area of the crane.

q. A substantial and durable rating chart containing legible letters and figures shall be provided with each crane and securely mounted onto the crane cab in a location allowing easy reading by the operator while seated in the control station.

r. Certification records which include the date of inspection, signature of the person performing the inspection along with the serial number or other identifier of the crane which was inspected. This record will always be available for review by contracting officer personnel.

s. Written reports listing the load test procedures utilized along with any repairs or alterations performed on the crane will be available for review by the contracting officer personnel.

t. Contractor shall certify that all of the crane operators have been trained not to bypass safety devices (e.g. anti-two block devices) during lifting operations.

3.6 Excavations

The competent person for excavation performed as a result of contract work shall be on-site when work is being performed in excavation, and shall inspect excavations prior to entry by workers. The competent person must evaluate for all hazards, including atmospheric, that may be associated with the work, and shall have the resources necessary to correct hazards promptly. Prior to digging the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by a utility locating service and coordinated with Station Utility Departments. 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. If construction is parallel to an existing utility the utility shall be exposed by hand digging every 30 m (100 feet) if parallel within 5 feet of the excavation. Trench and shoring systems must be identified in the accepted safety plan and activity hazard analysis. Extreme care must be used when excavating near direct burial electric underground cables. Trenching machines with digging chain drives shall be operated only when the spotters/laborers are in plain view of the operator. Operator and spotters/laborers shall be provided 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. Documentation of the training shall be kept on file in the project site office or trailer.

3.7 ELECTRICAL

3.7.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cable intended to be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the Contracting Officer and Station Utilities for identification. The Contracting Officer will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified.Perform all high voltage cutting remotely. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers shall be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that

includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. Insulating blankets, hearing protection, and switching suits may be required, depending on the specific job and as delineated in the Contractor AHA.

3.7.2 Portable Extension Cords

Portable extension cords shall be sized per manufacturer ratings for the tool to be powered.

3.8 WORK IN CONFINED SPACES

Comply with the requirements in Section 06.I of EM 385-1-1. 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 06.I.05 of 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.

c. Ensure the use of rescue and retrieval devices in confined spaces greater than 5 feet in depth. Conform to Sections 06.I.09, 06.I.10 and 06.I.11 of EM 385-1-1.

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

e. Include training information for employees who will be involved as entrant attendants for the work. Conform to Section 06.I.06 of EM 385-1-1.

f. Entry Permit. Use ENGFORM 5044-R or other form with the same minimum information for the Daily Confined Space Entry Permit, completed by the qualified person. Post the permit in a conspicuous place close to the confined space entrance.

3.9 CRYSTALLINE SILICA

Grinding, abrasive blasting, and foundry operations of construction materials containing crystalline silica, shall comply with OSHA regulations, such as 29 CFR 1910.94, and EM 385-1-1, (Appendix C). The Contractor shall develop and implement effective exposure control and elimination procedures to include dust control systems, engineering controls, and establishment of work area boundaries, as well as medical surveillance, training, air monitoring, and personal protective equipment.

3.10 HOUSEKEEPING

3.10.1 Clean-up

All debris in work areas shall be cleaned up daily or more frequently as necessary. Construction debris may be temporarily located in an approved location, however garbage accumulation must be removed each day.

3.10.2 Dust Control

In addition to the dust control measures required elsewhere in the contract documents dry cutting of brick or masonry shall be prohibited. Wet cutting must address control of water run off.

3.11 ACCIDENT SCENE PRESERVATION

For serious accidents, and accidents involving weight handling equipment, ensure the accident site is secured and evidence is protected remaining undisturbed until released by the Contracting Officer.

3.12 FIELD QUALITY CONTROL

3.12.1 Inspections

Include safety inspection as a part of the daily Quality Control inspections required in Section 01450N, "Quality Control".

3.13 FLAMMABLE AND COMBUSTIBLE LIQUID HANDLING AND STORAGE

3.13.1 Safety Gas Containers

Handling of flammable and combustible liquids shall be in safety containers with flame arresters, with not more than 5 gallons capacity, having a spring-closing lid and spout cover and designed to safely relieve internal pressures under fire exposures. Flammable and combustible Liquids shall be stored in separate NFPA approved storage cabinets 50 feet away from any sources of ignition with suitable NO SMOKING OR OPEN FLAME signs posted in all such areas.

-- End of Section --

SECTION 01575N

TEMPORARY ENVIRONMENTAL CONTROLS
10/03

PART 1 GENERAL

1.1 REFERENCES

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

THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1200	Hazard Communication
40 CFR 112	Oil Pollution Prevention
40 CFR 241	Guidelines for Disposal of Solid Waste
40 CFR 243	Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
40 CFR 258	Subtitle D Landfill Requirements
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administrated Permit Programs: The Hazardous Waste Permit Program

40 CFR 271	Requirements for Authorization of State Hazardous Waste Programs
40 CFR 272	Approved State Hazardous Waste Management Programs
40 CFR 273	Universal Waste Management
40 CFR 279	Used Oil Regulations
40 CFR 280	Owners and Operators of Underground Storage Tanks
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355	Emergency Planning and Notification
40 CFR 372-SUBPART D	EPA Toxic Chemical Release Reporting Regulations
49 CFR 173	Shipments and Packagings
49 CFR 178	Packagings

1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material (except hazardous waste as defined in paragraph entitled "Hazardous Waste" or hazardous debris as defined in paragraph entitled "Hazardous Debris"), including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations. Material not regulated as solid waste are: nuclear source or byproduct materials regulated under the Federal Atomic Energy Act of 1954 as amended; suspended or dissolved materials in domestic sewage effluent or irrigation return flows, or other regulated point source discharges; regulated air emissions; and fluids or wastes associated with natural gas or crude oil exploration or production.

a. Green waste: The vegetative matter from landscaping, land clearing and grubbing, including, but not limited to, grass, bushes, scrubs, small trees and saplings, tree stumps and plant roots. Marketable trees, grasses and plants that are indicated to remain, be re-located, or be re-used are not included.

b. Surplus soil: Existing soil that is in excess of what is required

for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.

c. Inert construction and demolition debris: Broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. Inert materials may be re-inforced with or contain ferrous wire, rods, accessories and weldments.

d. Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated and/or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included.

e. Scrap metal: Scrap and excess ferrous and non-ferrous metals such as re-inforcing steel, structural shapes, pipe and wire that are recovered or collected and disposed of as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

f. Paint cans: Metal cans that are empty of paints, solvents, thinners and adhesives. If permitted by the paint can label, a thin dry film may remain in the can.

g. Recyclables: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable.

1.2.3 Debris

Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.2.4 Hazardous Debris

As defined in paragraph entitled "Debris" of this section, debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) per 40 CFR 261; or debris that exhibits a characteristic of hazardous waste per 40 CFR 261.

1.2.5 Chemical Wastes

This includes salts, acids, alkalies, herbicides, pesticides, and organic chemicals.

1.2.6 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.7 Hazardous Waste

Any discarded material, liquid, solid, or gas, which meets the definition of hazardous material or is designated hazardous waste by the Environmental Protection Agency or State Hazardous Control Authority as defined in 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 271, 40 CFR 272, 40 CFR 273, 40 CFR 279, and 40 CFR 280.

1.2.8 Oily Waste

Petroleum products and bituminous materials.

1.2.9 Regulated Waste

Those solid waste that have specific additional Federal, state, or local controls for handling, storage, or disposal.

1.2.10 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act and includes the following chemicals:

chlorofluorocarbon-11 (CFC-11)	chlorofluorocarbon-213 (CFC-213)
chlorofluorocarbon-12 (CFC-12)	chlorofluorocarbon-214 (CFC-214)
chlorofluorocarbon-13 (CFC-13)	chlorofluorocarbon-215 (CFC-215)
chlorofluorocarbon-111 (CFC-111)	chlorofluorocarbon-216 (CFC-216)
chlorofluorocarbon-112 (CFC-112)	chlorofluorocarbon-217 (CFC-217)
chlorofluorocarbon-113 (CFC-113)	halon-1211
chlorofluorocarbon-114 (CFC-114)	halon-1301
chlorofluorocarbon-115 (CFC-115)	halon-2402
chlorofluorocarbon-211 (CFC-211)	carbon tetrachloride
chlorofluorocarbon-212 (CFC-212)	methyl chloroform

1.2.11 Hazardous Materials

Any material that is regulated as a hazardous material per 49 CFR 173, requires a Material Safety Data Sheet (MSDS) per 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste per 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.

1.3 SUBMITTALS

Submit the following per Section 01330, "Submittal Procedures."

SD-01 Preconstruction Submittals

Environmental protection plan; G

SD-06 Test Reports

Laboratory analysis

SD-11 Closeout Submittals

Some of the records listed below are also required as part of other submittals. For the "Records" submittal, maintain on-site a separate three-ring Environmental Records binder and submit at the completion of the project. Make separate parts to the binder corresponding to each of the applicable sub items listed below.

Preconstruction survey

Solid waste disposal permit

Waste determination documentation

Disposal documentation for hazardous and regulated waste

Contractor 40 CFR employee training records

Regulatory notification

Solid waste disposal report

Contractor Hazardous Material Inventory Log; G

1.4 LABORATORY ANALYSIS

Submit a copy of a laboratory analysis of solid waste and debris with the potential of becoming classified as a hazardous waste (i.e., abrasive/sand blasting debris, etc.). Waste stream determinations are required at the point of generation and must sufficiently document whether the waste will be a solid waste, hazardous waste, or Resource Conservation and Recovery Act (RCRA) exempt waste. Determinations must use EPA approved methods and provide written rational for whether the waste is classified as hazardous or non-hazardous. The Contractor will bear the cost of the waste stream determinations, and the Contracting Officer reserves the right to request waste stream determinations on questionable waste streams.

1.5 REPORTS

1.5.1 Preconstruction Survey

Perform a preconstruction survey of the project site with the Contracting Officer, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record.

1.5.2 Solid Waste Disposal Permit

Submit one copy of a State and local permit or license showing such agencies' approval of the disposal plan before transporting wastes off Government property.

1.5.3 Waste Determination Documentation

The Contractor will complete a Waste Determination form (provided at the pre-construction conference) for all contractor derived wastes to be generated. The waste determination must be based upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA approved analytical data, or laboratory analysis (Material Safety Data Sheets (MSDS) by themselves are not adequate). All support documentation must be attached to the Waste Determination form. As a minimum, a Waste Determination form must be provided for the following wastes (this listing is not all inclusive): oil and latex based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and all containers of the original materials.

1.5.4 Disposal Documentation for Hazardous and Regulated Waste

Submit a copy of the applicable EPA and State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities.

1.5.5 Contractor 40 CFR Employee Training Records

Prepare and maintain employee training records throughout the term of the contract meeting applicable 40 CFR requirements. The Contractor will ensure every employee completes a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures compliance with Federal, State and local regulatory requirements for RCRA Large Quantity Generator. The Contractor will provide a Position Description for each employee, by subcontractor, based on the Davis-Bacon Wage Rate designation or other equivalent method, evaluating the employee's association with hazardous and regulated wastes. This Position Description will include training requirements as defined in 40 CFR 265 for a Large Quantity Generator facility. Submit these training records to the Contracting Officer at the conclusion of the project, unless otherwise directed.

1.5.6 Regulatory Notification

The Contractor is responsible for all regulatory notification requirements per Federal, State and local regulations. The Contractor will forward copies to the Contracting Officer prior to commencement of work activities. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.5.7 Solid Waste Disposal Report

Monthly the Contractor will submit a solid waste disposal report to the Contracting Officer. For each waste, the report will state the classification (using the definitions provided in this section), amount, location, and name of the business receiving the solid waste. The Contractor will include copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, the Contractor may submit a statement indicating

the disposal location for the solid waste which is signed by an officer of the Contractor firm authorized to legally obligate or bind the firm. The sales documentation or Contractor certification will include the receiver's tax identification number and business, EPA or State registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained by the Contractor for his own use, the Contractor will submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received will not be reported to the Contracting Officer unless required by other provisions or specifications of this Contract or public law.

1.6 CLASS I ODS PROHIBITION

Class I ODS as defined and identified herein will not be used in the performance of this contract, nor be provided as part of the equipment. This prohibition will be considered to prevail over any other provision, specification, drawing, or referenced documents.

1.7 ENVIRONMENTAL PROTECTION REQUIREMENTS

Provide and maintain, during the life of the contract, environmental protection as defined. Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project. Comply with Federal, State, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution.

Environmental Brief: Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the activity; types and quantities of wastes/wastewater that may be generated during the contract.

Marine Corps Air Station, Cherry Point is listed on the National Priorities List pursuant to the Comprehensive Environmental Response, Compensation and Liability Act 42 USCA, Section 9601.et seq. as amended April 15, 1996 (CERCLA). Bogue Field, Oakgrove, BT-11 and Atlantic Field are not listed on the National Priorities List. The Contractor shall immediately bring to the Contracting Officer's attention any unanticipated site condition which may involve hazardous materials or hazardous waste and the Contractor shall not disturb such conditions without the Contracting Officer's prior written documentation as to whether such conditions are outside the contract requirements.

1.7.1 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause.

1.7.2 Contractor Liabilities for Environmental Protection

The Contractor is advised that this project and the station are subject to Federal, State, and local regulatory agency inspections to review compliance with environmental laws and regulations. The Contractor will fully cooperate with any representative from any Federal, State or local regulatory agency who may visit the job site and will provide immediate notification to the Contracting Officer, who will accompany them on any subsequent site inspections. The Contractor will complete, maintain, and make available to the Contracting Officer, station, or regulatory agency personnel all documentation relating to environmental compliance under applicable Federal, State and local laws and regulations. The Contractor will immediately notify the Contracting Officer if a Notice of Violation (NOV) is issued to the Contractor.

The Contractor will be responsible for all damages to persons or property resulting from Contractor fault or negligence as well as for the payment of any civil fines or penalties which may be assessed by any Federal, State or local regulatory agency as a result of the Contractor's or any subcontractor's violation of any applicable Federal, State or local environmental law or regulation. Should a Notice of Violation (NOV), Notice of Noncompliance (NON), Notice of Deficiency (NOD), or similar regulatory agency notice be issued to the Government as facility owner/operator on account of the actions or inactions of the Contractor or one of its subcontractors in the performance of work under this contract, the Contractor will fully cooperate with the Government in defending against regulatory assessment of any civil fines or penalties arising out of such actions or inactions.

1.8 ENVIRONMENTAL PROTECTION PLAN

Five days after the award of contract, the Contractor will meet with the Contracting Officer to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Environmental Protection Plan will be submitted in the following format and will, at a minimum, address the following elements (also refer to paragraph entitled "Protection of Natural Resources" in this section):

a. Description of the Environmental Protection Plan

(1) General overview and purpose

(2) General site information

b. Protection of Natural Resources

(1) Land resources

(2) Tree protection

(3) Replacement of damaged landscape features

(4) Temporary construction

(5) Stream crossings

(6) Fish and wildlife resources

(7) Wetland areas

c. Protection of Historical and Archaeological Resources

(1) Objectives

(2) Methods

d. Storm Water Management and Control

(1) Ground cover

(2) Erodible soils

(3) Temporary measures

(a) Mechanical retardation and control of runoff

(b) Vegetation and mulch

e. Prevention of Releases to the Environment

(1) Procedures to prevent releases to the environment

(2) Notifications in the event of a release to the environment

f. Protection of the Environment from Waste Derived from Contractor Operations

(1) Control and disposal of solid and sanitary waste

(2) Control and disposal of hazardous waste (Hazardous Waste Management Section)

This item will consist of the management procedures for all hazardous waste to be generated. The elements of those procedures will coincide with the Activity Hazardous Waste Management Plan. A copy of the Activity Hazardous Waste Management Plan will be provided by the Contracting Officer. As a minimum, include the following:

(a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;

(b) Sampling/analysis plan;

(c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);

(d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);

(e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268);

(f) Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and the like;

(g) Used oil management procedures per 40 CFR 279;

(h) Pollution prevention\hazardous waste minimization procedures;

(i) Plans for the disposal of hazardous waste by permitted facilities;

(j) Procedures to be employed to ensure all required employee training records are maintained.

1.8.1 Environmental Protection Plan Review

Fourteen days after the environmental protection meeting, submit the proposed Environmental Protection Plan for further discussion, review, and approval. Commencement of work will not begin until the environmental protection plan has been approved.

1.9 UNFORESEEN HAZARDOUS OR REGULATED MATERIAL

If material that is not indicated in the contract documents is encountered that may be dangerous to human health upon disturbance during construction operations, stop that portion of work and notify the Contracting Officer immediately. Intent is to identify materials such as PCB, lead paint, mercury, petroleum products, and friable and nonfriable asbestos. Within 14 calendar days the Government will determine if the material is hazardous. If the material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If the 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."

1.10 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

Submit the "Contractor Hazardous Material Inventory Log" (copy at end of section), which provides information required by (EPCRA Sections 312 and 313) along with corresponding Material Safety Data Sheets (MSDS) to the Contracting Officer at the start and at the end of construction (30 days from final acceptance), and update no later than January 31 of each calendar year during the life of the contract. Documentation for any spills/releases, environmental reports or off-site transfers may be requested by the Contracting Officer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Preserve the natural resources within the project boundaries and outside the limits of permanent work. Restore to an equivalent or improved condition upon completion of work. Confine construction activities to within the limits of the work indicated or specified. Conform to the national permitting requirements of the Clean Water Act.

3.1.1 Land Resources

Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the Contracting Officer's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the Contracting Officer. Where such use of attached ropes, cables, or guys is authorized, the Contractor will be responsible for any resultant damage.

3.1.1.1 Protection of Trees

Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed.

3.1.1.2 Replacement

Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain Contracting Officer's approval before replacement.

3.1.2 Water Resources

3.1.2.1 Oily and Hazardous Substances

Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. per 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with a temporary berm or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm will be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

3.1.3 Fish and Wildlife Resources

Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the Contracting Officer historical and archaeological items or human skeletal remains discovered in the course of work. Stop work in the immediate area of the discovery until directed by the Contracting Officer to resume work. The Government retains ownership and control over historical and archaeological resources.

3.3 EROSION AND SEDIMENT CONTROL MEASURES

3.3.1 Burnoff

Burnoff of the ground cover is not permitted.

3.3.2 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

3.3.3 Temporary Protection of Erodible Soils

Use the following methods to prevent erosion and control sedimentation:

3.3.3.1 Mechanical Retardation and Control of Runoff

Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, berms, and use of silt fences and straw bales to retard and divert runoff to protected drainage courses.

3.3.3.2 Vegetation and Mulch

Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydroseeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.

a. Seeding: Provide new seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to establish a suitable stand of grass.

3.4 CONTROL AND DISPOSAL OF SOLID WASTES

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the Contracting Officer and the

activity recycling coordinator. Remove all solid waste (including non-hazardous debris) from Government property and dispose off-site at an approved landfill. Solid waste disposal off-site must comply with most stringent local, State, and Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258.

3.5 CONTROL AND DISPOSAL OF HAZARDOUS WASTES

3.5.1 Hazardous Waste/Debris Management

The Contractor will identify all construction activities which will generate hazardous waste/debris. The Contractor must provide a documented waste determination for all resultant waste streams. Hazardous waste/debris will be identified, labeled, handled, stored, and disposed of per all Federal, State, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268. Hazardous waste will also be managed per the approved Hazardous Waste Management Section of the Environmental Protection Plan. Store hazardous wastes in approved containers per 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of Government facilities will be identified as being generated by the Government. Prior to removal of any hazardous waste from Government property, all hazardous waste manifests must be signed by activity personnel from the Station Environmental Office. No hazardous waste will be brought onto Government property. Provide to the Contracting Officer a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. For hazardous wastes spills, verbally notify the Contracting Officer immediately.

3.5.1.1 Regulated Waste Storage/Satellite Accumulation/90 Day Storage Areas

If the work requires the temporary storage/collection of regulated or hazardous wastes, the Contractor will request the establishment of a Regulated Waste Storage Area, a Satellite Accumulation Area, or a 90 Day Storage Area at the point of generation. The Contractor must submit a request in writing to the Contracting Officer providing the following information:

Contract Number	_____	Contractor	_____
Haz/Waste or Regulated Waste POC	_____	Phone Number	_____
Type of Waste	_____	Source of Waste	_____
Emergency POC	_____	Phone Number	_____

Location of the Site: _____
(Attach Site Plan to the Request)

Attach a waste determination form. Allow ten working days for processing this request.

3.5.2 Pollution Prevention/Hazardous Waste Minimization

The Contractor will actively pursue minimizing the use of hazardous materials and the generation of hazardous waste while on-base. The Hazardous Waste Management Section of the Environmental Protection Plan will include the Contractor's procedures for pollution prevention/ hazardous waste minimization. For preparing this part of the plan, the Contractor may consult the activity Environmental Office for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for reference material. If no written plan exists, the Contractor may obtain information by contacting the Contracting Officer. The Contractor will describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.5.3 Hazardous Material Control

The Contractor will include hazardous material control procedures in the Safety Plan. The procedures will address and ensure the proper handling of hazardous materials, including the appropriate transportation requirements. The Contractor will submit a MSDS and estimated quantities to be used for each hazardous material to the Contracting Officer prior to bringing the material on base. Typical materials requiring MSDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. At the end of the project, the Contractor will provide the Contracting Officer with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. The Contractor will also ensure that hazardous materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. The Contractor will ensure that all containers of hazardous materials have NFPA labels or their equivalent. Copies of the MSDS for hazardous materials will be kept on site at all times and provided to the Contracting Officer at the end of the project. The Contractor will certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 261.

3.5.4 Petroleum Products

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. All used oil generated on site will be managed per 40 CFR 279. The Contractor will determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. In addition, used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste. All hazardous waste will be managed per the paragraph entitled Hazardous Waste/Debris Management of this section and will be managed per the approved Environmental Protection Plan.

3.5.5 Releases/Spills of Oil and Hazardous Substances

Take precautions to prevent releases/spills of oil and hazardous substances. In the event of any releases of oil and hazardous substances,

chemicals, or gases; immediately (within 15 minutes) notify the Base or Activity Fire Department, the activity's Command Duty Officer, and the Contracting Officer. The Contractor is responsible for verbal and written notifications as required by the federal 40 CFR 355, State, local regulations and Navy Instructions. Spill response will be per 40 CFR 300 and applicable State and local regulations. Contain and clean up these spills without cost to the Government. If Government assistance is requested or required, the Contractor will reimburse the Government for such assistance. Provide copies of the written notification and documentation that a verbal notification was made within 20 days.

3.6 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning nonparticulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.7 NOISE

Make the maximum use of low-noise emission products, as certified by the EPA. Blasting or use of explosives will not be permitted without written permission from the Contracting Officer, and then only during the designated times.

3.8 SOIL

Soils encountered during project activities shall be managed per Air Station soil management polices in affect for the duration of the project. If soil is encountered during construction operations that may be contaminated (as indicated by odor, color, or unusual appearance) that was not previously indicated as contaminated, stop the portion of work immediately and notify the Contracting Officer immediately.

3.8.1 Quarantine for Imported Fire Ants

Onslow, Jones, and Carteret Counties and portions of Duplin and Craven Counties have been declared a generally infested area by the United States Department of Agriculture (USDA) for the imported fire ant. Compliance with the quarantine regulations established by this authority as set forth in USDA Publication 301.81 of 31 December 1992, is required for operations hereunder. Pertinent requirements of the quarantine for materials originating on the Camp Lejeune reservation, the Marine Corps Air Station (Helicopter), New River and the Marine Corps Air Station, Cherry Point, which are to be transported outside Onslow County or adjacent suppression areas, include the following:

a. Certification is required for the following articles and they shall not be moved from the reservation to any point outside Onslow County and adjacent designated areas unless accompanied by

a valid inspection certificate issued by an Officer of the Plant Protection and Quarantine Program (PPQ) of the U.S. Department of Agriculture.

(1) Bulk soil

(2) Used mechanized soil-moving equipment. (Used mechanized soil-moving equipment is exempt if cleaned of loose non compacted soil).

(3) Other products, articles, or means of conveyances, if it is determined by an inspector that they present a hazard of transporting spread of the imported fire ant and the person in possession thereof has been so notified.

b. Authorization for movement of equipment outside the imported fire and regulated area shall be obtained from USDA, APHIS, PPQ, Attn: JB Perry, c/o NCSPA, 113 Arendell St. Room 216, Morehead City, NC 28557, telephone (252)726-4358, fax (252)726-5713. Requests for inspection shall be made sufficiently in advance of the date of movement to permit arrangements for the services of authorized inspectors. The equipment shall be prepared and assembled so that it may be readily inspected. Soil on or attached to equipment, supplies, and materials shall be removed by washing with water or such other means as necessary to accomplish complete removal. Resulting spoil shall be wasted as necessary and as directed.

-- End of Section --

SECTION 01770N

CLOSEOUT PROCEDURES
10/03

PART 1 GENERAL

1.1 SUBMITTALS

Submit the following per Section 01330, "Submittal Procedures."

SD-10 Operation and Maintenance Data

Equipment/product warranty list; G

SD-11 Closeout Submittals

As-built drawings; G

Record of materials; G

Equipment/product warranty tag; G

Certification of EPA Designated Items; G

1.2 Certification of EPA Designated Items

Submit the Certification of EPA Designated Items as required by FAR 52.223-9, "Certification and Estimate of Percentage of Recovered Material Content for EPA Designated Items".

1.3 PROJECT RECORD DOCUMENTS

1.3.1 As-Built Drawings

"FAC 5252.236-9310, Record Drawings."

1.3.2 As-Built Record of Materials

Furnish a record of materials.

Where several manufacturers' brands, types, or classes of the item listed have been used in the project, designate specific areas where each item was used. Designations shall be keyed to the areas and spaces depicted on the contract drawing. Furnish the record of materials used in the following format:

MATERIALS DESIGNATION	SPECIFICATION	MANUFACTURER	MATERIALS USED (MANUFACTURER'S DESIGNATION)	WHERE USED
_____	_____	_____	_____	_____

1.4 EQUIPMENT/PRODUCT WARRANTIES

1.4.1 Equipment/Product Warranty List

Furnish to the Contracting Officer a bound and indexed notebook containing written warranties for equipment/products furnished under the contract, and prepare a complete listing of such equipment/products. The equipment/products list shall state the specification section applicable to the equipment/product, duration of the warranty therefore, start date of the warranty, ending date of the warranty, and the point of contact for fulfillment of the warranty. The warranty period shall begin on the same date as project acceptance and shall continue for the full product warranty period. Execute the full list and deliver to the Contracting Officer prior to final acceptance of the facility.

1.4.2 Equipment Warranty Tags and Guarantor's Local Representative

Furnish with each warranty the name, address, and telephone number of the guarantor's representative nearest to the location where the equipment and appliances are installed. The guarantor's representative, upon request of the station representative, shall honor the warranty during the warranty period, and shall provide the services prescribed by the terms of the warranty. At the time of installation, tag each item of warranted equipment with a durable, oil- and water-resistant tag approved by the Contracting Officer. Attach tag with copper wire and spray with a clear silicone waterproof coating. Leave the date of acceptance and QC's signature blank until project is accepted for beneficial occupancy. Tag shall show the following information:

EQUIPMENT/PRODUCT WARRANTY TAG

Type of Equipment/Product _____
Warranty Period _____ From _____ To _____
Contract No. _____
Inspector's Signature _____ Date Accepted _____

Construction Contractor:
Name: _____
Address: _____
Telephone: _____

Warranty Contact: _____
Name: _____
Address: _____
Telephone: _____

STATION PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE

1.5 CLEANUP

Leave premises "broom clean." Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Replace filters of

operating equipment. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01781

OPERATION AND MAINTENANCE DATA
10/03

PART 1 GENERAL

1.1 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit per this section and Section 01330, "Submittal Procedures."

1.1.1 Quantity

Submit five sets of the supplier/manufacturers' O&M information specified herein for the components, assemblies, subassemblies, attachments, and accessories. The items for which O&M Data/Manuals are required are listed in the technical sections which specifies those particular items.

1.1.2 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.1.3 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission.

1.1.4 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the Contracting Officer for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.2.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation:

1.2.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.2.1.2 Operator Prestart

Include procedures required to set up and prepare each system for use.

1.2.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.2.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.2.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.2.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.2.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.2.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair.

1.2.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

a. A table showing recommended lubricants for specific temperature

ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.2.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.2.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs.

1.2.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.2.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.2.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.2.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list of required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.2.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.2.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.2.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.2.6 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies per the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog.

1.2.6.1 Warranty Information

List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.2.6.2 Personnel Training Requirements

Provide information available from the manufacturers that is needed for use in training designated personnel to properly operate and maintain the equipment and systems.

1.2.6.3 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests

and on special tools needed for the operation, maintenance, and repair of components.

1.2.6.4 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.3 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.3.1 Data Package 1

a. Safety precautions

b. Maintenance and repair procedures

c. Warranty information

d. Contractor information

e. Spare parts and supply list

1.3.2 Data Package 2

a. Safety precautions

b. Normal operations

c. Environmental conditions

d. Lubrication data

e. Preventive maintenance plan and schedule

f. Maintenance and repair procedures

g. Removal and replacement instructions

h. Spare parts and supply list

i. Parts identification

j. Warranty information

k. Contractor information

1.3.3 Data Package 3

a. Safety precautions

b. Normal operations

c. Emergency operations

d. Environmental conditions

e. Lubrication data

f. Preventive maintenance plan and schedule

g. Troubleshooting guides and diagnostic techniques

h. Wiring diagrams and control diagrams

i. Maintenance and repair procedures

j. Removal and replacement instructions

k. Spare parts and supply list

l. Parts identification

m. Warranty information

n. Testing equipment and special tool information

o. Contractor information

1.3.4 Data Package 4

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Lubrication data

i. Preventive maintenance plan and schedule

j. Troubleshooting guides and diagnostic techniques

k. Wiring diagrams and control diagrams

l. Maintenance and repair procedures

m. Removal and replacement instructions

n. Spare parts and supply list

o. Corrective maintenance man-hours

p. Parts identification

q. Warranty information

r. Personnel training requirements

s. Testing equipment and special tool information

t. Contractor information

1.3.5 Data Package 5

a. Safety precautions

b. Operator prestart

c. Start-up, shutdown, and post-shutdown procedures

d. Normal operations

e. Environmental conditions

f. Preventive maintenance plan and schedule

g. Troubleshooting guides and diagnostic techniques

h. Wiring and control diagrams

i. Maintenance and repair procedures

j. Spare parts and supply list

k. Testing equipments and special tools

l. Warranty information

m. Contractor information

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION 01800

REPORTS
10/03

PART 1 GENERAL

1.1 USE OF INFORMATION

1.1.1 Warranty

The information disclosed in the referenced reports is based on data obtained in specific locations and is assumed to be representative of conditions throughout the site. This information is furnished without warranty and is only for general information to be used by the contractor in the preparation of his bid and work schedule. It is not intended as a replacement for personal investigation and judgment, or interpretation of the information furnished, as required of the contractor in the performance of this contract.

1.1.2 Site Visit

Bidders should visit the site and acquaint themselves with all existing conditions prior to preparing their bid. This will include a review of the conditions contained in the enclosed report as they relate to the site. The contractor is responsible for including in his bid and work schedule, procedures for handling existing site conditions delineated in the included reports in accord with applicable laws and regulations as those conditions may effect the work.

1.1.3 Application of Information

Recommendations contained in the reports are to be used by the contractor only to the extent that these recommendations comply with applicable laws, regulations, and other sections of the these specifications.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 VARYING CONDITIONS

If during the course of the work, conditions are encountered which are not covered in the included reports or are different from conditions that would be reasonably anticipated from the included reports, the contractor shall immediately notify the Officer in Charge of Construction. If such conditions are hazardous or the continuation of work would cause a hazardous condition to develop, he shall stop work and proceed as directed by the Officer in charge of Construction as directed by provisions contained in other sections of this specification. This may include modifications to, or the development of a new, Health and Safety Plan for

this project, and alternate or additional appropriate abatement procedures.

3.2 CHANGES TO THE CONTRACT

Any changes to the contract made as a result of site conditions which differ from those delineated in the report may result in an adjustment of the contract amount. The adjustment will be an increase or decrease depending on the scope and nature of the change and will be in accord with other provisions of these specifications.

-- End of Section --

SECTION 02302N

EXCAVATION, BACKFILLING, AND COMPACTING FOR UTILITIES
07/03

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 698	(1991) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft (600 kN-m/m))
ASTM D 1556	(1990; R 1996) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft (2,700 kN-m/m))
ASTM D 2487	(1993) Classification of Soils for Engineering Purposes (Unified Soil Classification System)

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(1996) Safety and Health Requirements Manual

U.S. DEPARTMENT OF AGRICULTURE (USDA)

DOA SSIR	(April 1984) Soil Survey Investigation Report No. 1, Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples, Soil Conservation Service

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA TC 2	(1998) Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA TC 6	(1990) PVC and ABS Plastic Utilities Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 30	(1996) Flammable and Combustible Liquids

	Code
NFPA 70	(2002) National Electrical Code

1.2 DEFINITIONS

1.2.1 Backfill

Material used in refilling a cut, trench or other excavation.

1.2.2 Cohesive Materials

Soils classified by ASTM D 2487 as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when fines have a plasticity index greater than zero.

1.2.3 Cohesionless Materials

Soils classified by ASTM D 2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.2.4 Compaction

The process of mechanically stabilizing a material by increasing its density at a controlled moisture condition. "Degree of Compaction" is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D 698 or ASTM D 1557 for general soil types.

1.2.5 Granular Pipe Bedding

A dense, well-graded aggregate mixture of sand, gravel, or crushed stone (mixed individually, in combination with each other, or with suitable binder soil) placed on a subgrade to provide a suitable foundation for pipe. Granular bedding material may also consist of poorly graded sands or gravels where fast draining soil characteristics are desired.

1.2.6 In-Situ Soil

Existing in place soil.

1.2.7 Lift

A layer (or course) of soil placed on top of subgrade or a previously prepared or placed soil in a fill or backfill.

1.2.8 Porous Fill

A granular soil material having a large void ratio when placed and compacted, allowing a free flow of fluid to or from the surrounding soil.

1.2.9 Refill

Material placed in excavation to correct overcut in depth.

1.2.10 Topsoil

In natural or undisturbed soil formations, the fine-grained, weathered material on the surface or directly below any loose or partially decomposed organic matter. Topsoil may be a dark-colored, fine, silty, or sandy material with a high content of well decomposed organic matter, often containing traces of the parent rock material. Gradation and material requirements specified herein apply to all topsoil references in this contract. The material shall be representative of productive soils in the vicinity.

1.2.11 Unyielding Material

Rock rib, ridge, rock protrusion, or soil with cobbles in the trench bottom requiring a covering of finer grain material or special bedding to avoid bridging in the pipe or conduit.

1.2.12 Unsatisfactory Material

In-Situ soil or other material which can be identified as having insufficient strength characteristics or stability to carry intended loads in the trench without excessive consolidation or loss of stability. Also backfill material which contains refuse, frozen material, large rocks, debris, soluble particles, and other material which could damage the pipe or cause the backfill not to compact. Materials classified as PT, OH, or OL by ASTM D 2487 are unsatisfactory.

1.2.13 Unstable Material

Material in the trench bottom which lacks firmness to maintain alignment and prevent joints from separating in the pipe, conduit, or appurtenance structure during backfilling. This may be material otherwise identified as satisfactory which has been disturbed or saturated.

1.3 SUBMITTALS

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

SD-03 Product Data

Backfill

Topsoil

Pipe Bedding

SD-06 Test Reports

Test for moisture-density relation

Topsoil tests

Density and moisture tests

SD-07 Certificates

1.4 REGULATORY REQUIREMENTS

Materials and workmanship specified herein with reference to DOT shall be in accordance with the referenced articles, sections, and paragraphs of the standard except that contractual and payment provisions do not apply. Where the term "Engineer" is used, it shall mean the Contracting Officer. Where the term "state" is used, it shall mean "Federal Government."

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver and store materials in a manner to prevent contamination, segregation, freezing, and other damage. Store synthetic fiber filter fabric to prevent exposure to direct sunlight.

1.6 PROTECTION

1.6.1 Utilities

Movement of construction machinery and equipment over pipes and utilities during construction shall be at the Contractor's risk. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within two feet of known Government-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Contracting Officer. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

1.7 QUALITY ASSURANCE

1.7.1 Test for moisture-density relation

Submit 7 days prior to commencing utility excavation.

1.7.2 Topsoil tests

Submit topsoil tests verifying conformance to required parameters prior to commencing planting operations.

1.7.3 Density and moisture tests

Submit field test data not listed above sufficiently in advance of construction so as not to delay work. Submit within 14 days of test date.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

Provide soil materials as specified below free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, ice, or other deleterious and objectionable materials.

2.1.1 Backfill

Bring trenches to grade indicated on the drawings using material, classified as GM, SM or SC by ASTM D 2487 with a maximum particle size of 3 inches.

2.1.2 Sand

Clean, coarse-grained sand classified as SW or SP by ASTM D 2487 for bedding and backfill.

2.1.3 Topsoil Material

Salvaged topsoil from stockpile. Prior to spreading, test topsoil, and add necessary soil modifiers to bring material within the ranges specified in Table 2. Furnish additional topsoil from approved sources off the site meeting requirements specified in Table 2 if stockpiled material is insufficient to complete work indicated.

TABLE 2

DOA SSIR Soil Survey Investigation Report No. 1, Laboratory Test for:	Acceptable Limits
Sand Content	20 - 45 percent by weight
Silt Content	25 - 50 percent by weight
Clay Content	10 - 30 percent by weight
Organic Material (Walkley-Block)	5 percent
pH	5.0 to 7.6
Soluble Salts	600 ppm maximum
Absorption Rate	0.5 inch per hour minimum

2.1.4 Borrow

Provide materials meeting requirement for fill, sand, gravel, backfill, and topsoil. Obtain borrow materials in excess of those furnished from excavations specified herein from sources off Government property.

2.1.5 Pipe Bedding

TABLE 02302-1 UTILITY EARTHWORK REFERENCES

	PIPE MATERIALS	NAVY SPECIFICATION	SOIL MATERIALS REFERENCE	INSTALLATION REF
a.	Electrical Plastic Tubing and Conduit	16302N	NEMA TC 2 NFPA 30 NFPA 70	Section 16302N
b.	Concrete Encased Electrical Plastic Tubing (EPT) and Conduit	16302N	NEMA TC 2 , 3000 psi, Concrete, one inch max aggregate size	Section 16302N
c.	Direct Burial Electrical Cables Section 16302N	16302N	NFPA 70, Article 7l0-3 NFPA 70, Articles 300-5 and 300-6	Section 16302N
d.	PVC and ABS Plastic Utilities Duct	16302N	NEMA TC 6 NFPA 30 NFPA 70	Section 16302N
e.	Rigid Metallic Conduit (Electrical)	16302N		Section 16302N NFPA 70, Articles 300-6 NFPA 70, Articles 710-3 and 300-5

2.2 BURIED WARNING AND IDENTIFICATION TAPE

Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.

Warning Tape Color Codes

Yellow:	Electric
Orange:	Telephone and Other Communications

PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Shoring and Sheeting

Provide shoring where indicated. In addition to Section 25 A and B of EM 385-1-1, include provisions in the shoring and sheeting plan that will accomplish the following:

a. Prevent undermining of pavements, foundations and slabs.

b. Prevent slippage or movement in banks or slopes adjacent to the excavation.

3.1.2 Drainage and Dewatering

Plan for and provide the structures, equipment, and construction for the collection and disposal of surface and subsurface water encountered in the course of construction.

3.1.2.1 Drainage

Surface water shall be directed away from excavation and construction sites so as to prevent erosion and undermining of foundations. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.1.3 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, below the working level.

Operate the dewatering system until construction work below existing water levels is complete. Measure and record the performance of the dewatering system at the same time each day with observation wells and piezometers installed in conjunction with the dewatering system.

3.1.4 Underground Utilities

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall contact the Public Works Department for assistance in locating existing utilities.

3.1.5 Structures and Surfaces

Protect newly backfilled areas and adjacent structures, slopes, or grades from traffic, erosion settlement, or any other damage. Repair and reestablish damaged or eroded grades and slopes and restore surface construction prior to acceptance. Protect existing streams, ditches, and storm drain inlets from water-borne soil by means of straw bale dike or filter fabric dams as needed

3.1.5.1 Disposal of Excavated Material

Dispose of excavated material so that it will not obstruct the flow of runoff, streams, endanger a partly finished structure, impair the efficiency or appearance of any facilities, or be detrimental to the completed work.

3.2 SURFACE PREPARATION

3.2.1 Stockpiling Topsoil

Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

3.2.2 Cutting Pavement, Curbs, and Gutters

Make cuts with neat, parallel, straight lines one foot wider than trench width on each side of trenches and one foot beyond each edge of pits. When the saw cut is within 6 feet of an existing joint, remove pavement to the existing joint.

3.3 GENERAL EXCAVATION AND TRENCHING

Keep excavations free from water while construction is in progress. Notify the Contracting Officer immediately in writing if it becomes necessary to remove rock or hard, unstable, or otherwise unsatisfactory material to a depth greater than indicated. Make trench sides as nearly vertical as practicable except where sloping of sides is allowed. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the conduit or duct. Excavate ledge rock, boulders, and other unyielding material to an overdepth at least 6 inches below the bottom of the conduit, duct, and appurtenances unless otherwise indicated or specified. Use bedding material, gravel, or sand placed in 6 inch maximum

layers to refill overdepths to the proper grade. At the Contractor's option, the excavations may be cut to an overdepth of not less than 4 inches and refilled to required grade as specified. Grade bottom of trenches accurately to provide uniform bearing and support for each section of conduit, or duct on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints. Dig bell holes and depressions for joints after trench has been graded. Dimension of bell holes shall be as required for properly making the particular type of joint to ensure that the bell does not bear on the bottom of the excavation. Trench dimensions shall be as indicated or specified.

3.3.1 Shoring and Sheeting

Shore and sheet excavations as described in the plan submitted with various member sizes arranged to prevent injury to persons and damage to structures. Arrange shoring and sheeting to preclude injurious caving during removal. Obtain approval from the Contracting Officer prior to removing shoring, sheeting, or bracing in excavations adjacent to on-grade slabs, foundations, or other structural elements.

3.4 BEDDING

Of materials and depths as indicated for utility lines and utility line structures. Place bedding in 6 inch maximum loose lifts. Provide uniform and continuous support for each section of structure except at bell holes or depressions necessary for making proper joints.

3.5 BURIED WARNING AND IDENTIFICATION TAPE

Install tape in accordance with manufacturer's recommendations except as modified herein. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.6 BACKFILLING

Construct backfill in two operations (initial and final) as indicated and specified in this section. Place initial backfill in 6 inch maximum loose lifts to one foot above conduit and unless otherwise specified. Ensure that initially placed material is tamped firmly under pipe haunches. Bring up evenly on each side and along the full length of the conduit, or duct structure. Ensure that no damage is done to the utility or its protective coating. Place the remainder of the backfill (final backfill) in 9 inch maximum loose lifts unless otherwise specified. Compact each loose lift as specified in the paragraph entitled "General Compaction" before placing the next lift. Do not backfill in freezing weather or where the material in the trench is already frozen or is muddy, except as authorized. Where settlements greater than the tolerance allowed herein for grading occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation. Coordinate backfilling with testing of utilities.

3.7 COMPACTION

Use hand-operated, plate-type, vibratory, or other suitable hand tampers in areas not accessible to larger rollers or compactors. Avoid damaging pipes and protective pipe coatings. Compact material in accordance with the following unless otherwise specified. If necessary, alter, change, or modify selected equipment or compaction methods to meet specified compaction requirements.

3.7.1 Compaction of Material in Subcuts or Overexcavations

In rock, compact to 95 percent of ASTM D 1557 maximum density. In soft, weak, or wet soils, tamp refill material to consolidate to density of adjacent material in trench wall. In stable soils, compact to 90 percent of ASTM D 1557maximum density.

3.7.2 Compaction of Pipe and Conduit Bedding

In rock, compact to 95 percent and in soil, compact to 90 percent of ASTM D 1557 maximum density.

3.7.3 Compaction of Backfill

Compact initial backfill material surrounding pipes, cables, conduits, or ducts, to 90 percent of ASTM D 1557 maximum density except where bedding and backfill are the same material. Where bedding and backfill are the same material, compact initial backfill to the density of the bedding. Under areas to be seeded or sodded, compact succeeding layers of final backfill to 85 percent of ASTM D 1557 maximum density.

3.8 FINISH OPERATIONS

3.8.1 Grading

Finish to grades indicated within one-tenth of a foot. Provide sod or topsoil in areas to be seeded or sodded as indicated. Grade areas to drain water away from structures. Grade existing grades that are to remain but have been disturbed by the Contractor's operations.

3.8.2 Disposition of Surplus Material

Surplus or other soil material not required or suitable for filling, backfilling, or grading shall be removed from Government property.

3.8.3 Protection of Surfaces

Protect newly graded areas from traffic, erosion, and settlements that may occur and as required. Repair or reestablish damaged grades, elevations, or slopes.

3.8.4 Pavement Repair

Repair pavement, curbs, and gutters as indicated. Do not repair pavement until trench or pit has been backfilled and compacted as specified herein. Provide a temporary road surface of gravel or crushed stone over backfilled portion until permanent pavement is repaired. Remove and dispose of temporary road surface material when permanent pavement is placed. As a minimum, maintain one-way traffic on roads and streets crossed by trenches. Fully open roads and streets to traffic within 14 days.

3.9 FIELD QUALITY CONTROL

Test bedding, backfill, topsoil for conformance to specified requirements. Test bedding and backfill for moisture-density relations in accordance with ASTM D 1557as specified herein. Perform at least one of each of the required tests for each material provided. Perform sufficiently in advance of construction so as not to delay work. Provide additional tests as specified above for each change of source. Perform density and moisture tests in randomly selected locations and in accordance with ASTM D 1556 as follows:

a. Bedding and backfill in trenches: One test per 50 linear feet in each lift.

b. Appurtenance structures: One test per 100 square feet or fraction thereof in each lift.

-- End of Section --

SECTION 02821N

CHAIN LINK FENCES AND GATES
06/03

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 94	(1996) Ready-Mixed Concrete
ASTM F 883	(1997) Padlocks

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS RR-F-191	(Rev. K) Fencing, Wire and Post Metal (and Gates, Chain-Link Fence Fabric, and Accessories) (General Specification)
FS RR-F-191/1	(Rev. D) Fencing, Wire and Post, Metal (Chain-Link Fence Fabric) (Detail Specification)
FS RR-F-191/2	(Rev. D) Fencing, Wire and Post, Metal (Chain-Link Fence Gates) (Detail Specification)
FS RR-F-191/3	(Rev. D) Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces) (Detail Specification)
FS RR-F-191/4	(Rev. D) Fencing, Wire and Post, Metal (Chain-Link Fence Accessories) (Detail Specification)

1.2 DEFINITION

a. Year 2000 compliant - means computer controlled facility components that accurately process date and time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 and leap year calculations.

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Gates

Post spacing

Location of gate, corner, end, and pull posts

SD-03 Product Data

Chain-link fencing components

Accessories

SD-06 Test Reports

Thickness of PVC coating

Chemical composition and thickness of aluminum alloy coating

SD-07 Certificates

Fabric

Posts

Braces

Framing

Rails

Tension wires

Gates

Padlocks

SD-08 Manufacturer's Instructions

Fence

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

1.5 WARRANTY

1.6 QUALITY ASSURANCE

1.6.1 Required Report Data

Submit reports of listing of chain-link fencing and accessories regarding ounces for zinc coating, thickness of PVC coating, and chemical composition and thickness of aluminum alloy coating.

PART 2 PRODUCTS

2.1 CHAIN-LINK FENCING AND ACCESSORIES

FS RR-F-191 and detailed specifications as referenced and other requirements as specified.

2.1.1 Fabric

FS RR-F-191/1; Type III, aluminum alloy, 9. Mesh size, 2 inches. Height of fabric, as indicated.

2.1.2 Gates

FS RR-F-191/2; Type II, double swing. Shape and size of gate frame, as indicated. Framing and bracing members, round of steel alloy. Steel member finish, zinc-coated. Gate frames and braces of minimum sizes listed in FS RR-F-191/3 for each Class and Grade except that steel pipe frames shall be 1.90 inches od, 0.120 inches minimum wall thickness and aluminum pipe frames and intermediate braces shall be 1.869 inches od, 0.940 lb/ft of length. Gate fabric, as specified for fencing fabric. Barbed wire top on gate, as specified herein. Coating for steel latches, stops, hinges, keepers, and accessories, galvanized. Gate leaves more than 8 feet wide shall have intermediate members as necessary to provide rigid construction, free from sag or twist. Attach gate fabric to gate frame in accordance with manufacturer's standards, except that welding will not be permitted. Arrange padlocking latches to be accessible from both sides of gate, regardless of latching arrangement.

2.1.3 Posts, Top Rails, and Braces

FS RR-F-191/3 line posts; Class 1, steel pipe, Grade A. End, corner, and pull posts; Class 1, steel pipe, Grade A. Braces and rails; Class 1, steel pipe, Grade A, in minimum sizes listed in FS RR-F-191/3 for each class and grade.

2.1.4 Fencing Accessories

FS RR-F-191/4. Provide wire ties constructed of the same material as the fencing fabric.

2.1.5 Concrete

ASTM C 94, using 3/4 inch maximum-size aggregate, and having minimum compressive strength of 3000 psi at 28 days.

2.1.6 Grout

Provide grout of proportions one part portland cement to three parts clean, well-graded sand and a minimum amount of water to produce a workable mix.

2.1.7 Padlocks

ASTM F 883, with chain.

PART 3 EXECUTION

3.1 SITE PREPARATION

3.1.1 Clearing and Grading

Clear fence line of trees, brush, and other obstacles to install fencing. Establish a graded, compacted fence line prior to fencing installation. Compact fill used to establish fence line. Remove existing fence.

3.1.2 Excavation

Excavate to dimensions indicated for concrete-embedded items, except in bedrock. If bedrock is encountered, continue excavation to depth indicated or 18 inches into bedrock, whichever is less, with a diameter in bedrock a minimum of 2 inches larger than outside diameter of post. Clear post holes of loose material. Dispose of waste material on station, as directed.

3.2 FENCE INSTALLATION

Install fence on prepared surfaces to line and grade indicated and tie to existing Progress Energy Fence. Install fence in accordance with fence manufacturer's written installation instructions except as modified herein.

3.2.1 Post Spacing

Provide line posts spaced equidistantly apart, not exceeding 10 feet on center. Provide gate posts spaced as necessary for size of gate openings. Do not exceed 500 feet on straight runs between braced posts. Provide corner or pull posts, with bracing in both directions, for changes in direction of 15 degrees or more, or for abrupt changes in grade. Provide drawings showing location of gate, corner, end, and pull posts.

3.2.2 Post Setting

Set posts plumb. Allow concrete to cure a minimum of 72 hours before performing other work on posts.

3.2.2.1 Earth and Bedrock

Provide concrete bases of dimensions indicated. Compact concrete to eliminate voids, and finish to a dome shape.

3.2.3 Bracing

Brace gate, corner, end, and pull posts to nearest post with a horizontal brace used as a compression member, placed at least 12 inches below top of fence, and a diagonal truss rod and truss tightener used as a tension member.

3.2.4 Top Rails

Install top rails before installing chain-link fabric. Pass top rail through intermediate post caps. Provide expansion coupling spaced as indicated.

3.2.5 Bottom Tension Wires

Install bottom tension wires before installing chain-link fabric, and pull wires taut. Place bottom tension wires within 8 inches of respective fabric line.

3.2.6 Fabric

Pull fabric taut and secure fabric to top rail and bottom wire, close to both sides of each post and at maximum intervals of 24 inches on center. Secure fabric to posts using stretcher bars, ties or clips spaced 15 inches on center, or by integrally weaving to integral fastening loops of end, corner, pull, and gate posts for full length of each post. Install fabric on opposite side of posts from area being secured. Install fabric so that bottom of fabric is 2 inches above ground level. Install fence fabric to provide approximately 2 inch deflection at center of fabric span between two posts, when a force of approximately 30 pounds is applied perpendicular to fabric. Fabric should return to its original position when force is removed.

3.3 ACCESSORIES INSTALLATION

3.3.1 Post Caps

Install post caps as recommended by the manufacturer.

3.3.2 Supporting Arms

Design supporting arms to accommodate top rail. Install supporting arms as recommended by manufacturer. In addition to manufacturer's standard connections, permanently secure supporting arms to posts. Studs driven by low-velocity powder-actuated tools may be used with steel, wrought iron, ductile iron, or malleable iron. Do not use studs driven by powder-actuated tools with gray iron or other material that will fracture.

3.3.3 Barbed Wire

Install barbed wire on supporting arms above fence posts. Extend each end member of gate frames sufficiently above top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence. Pull each strand taut and securely fasten each strand to each supporting arm or extended member. Secure wires in accordance with fence manufacturer's recommendations.

3.3.4 Gates

Install swing gates to swing through 90 degrees from closed to open.

3.3.6 Padlocks

Provide padlocks, as specified by Contracting Officer, for gate openings and provide chains that are securely attached to gate or gate posts. Provide padlocks keyed alike, and provide two keys for each padlock.

3.4 GROUNDING

Ground fencing as specified in Division 16.

3.5 SECURITY

Install new security fencing, remove existing security fencing, and perform related work to provide continuous security for facility. Schedule and fully coordinate work with Contracting Officer.

3.6 CLEANUP

Remove waste fencing materials and other debris from the station.

-- End of Section --

SECTION 03300N

CAST-IN-PLACE CONCRETE
06/03

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(1991) Burlap Cloth Made from Jute or Kenaf

ACI INTERNATIONAL (ACI)

ACI 117	(1990) Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301/301M	(1999) Structural Concrete
ACI 302.1R	(1996) Concrete Floor and Slab Construction
ACI 304R	(2000) Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	(1999) Hot Weather Concreting
ACI 306.1	(1990; R1998) Cold Weather Concreting
ACI 315	(1999) Details and Detailing of Concrete Reinforcement
ACI 318/318M	(1999) Building Code Requirements for Structural Concrete
ACI 347R	(1994; R1999) Formwork for Concrete

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995) Basic Hardboard

ASTM INTERNATIONAL (ASTM)

ASTM A 82	(1997; Rev. A) Steel Wire, Plain, for Concrete Reinforcement

ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 496	(1997; Rev. A) Steel Wire, Deformed, for Concrete Reinforcement
ASTM A 497	(1999) Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615/A 615M	(2001) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 617/A 617M	(1996; Rev. A) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 775/A 775M	(2001) Epoxy-Coated Reinforcing Steel Bars
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C 31/C 31M	(2000) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(2001) Concrete Aggregates
ASTM C 39	(2001) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42/C 42M	(1999) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM C 143/C 143M	(2000) Slump of Hydraulic Cement Concrete
ASTM C 150	(2000) Portland Cement
ASTM C 171	(1997; Rev. A) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete
ASTM C 173/C 173M	(2001) Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 192/C 192M	(2000) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(1997) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete

ASTM C 309	(1998; Rev. A) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494/C 494M	(1999) Chemical Admixtures for Concrete
ASTM C 595	(2000) Blended Hydraulic Cements
ASTM C 618	(2000) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 920	(2001) Elastomeric Joint Sealants
ASTM C 989	(1999) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C 1017/C 1017M	(1998) Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C 1107	(1999) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM D 1190	(1997) Concrete Joint Sealer, Hot-Applied Elastic Type
ASTM D 1751	(1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	(1984; R 1996) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 4397	(2000) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4	(1998) Structural Welding Code - Reinforcing Steel

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 572	(1974) Polyvinylchloride Waterstop

U.S. DEPARTMENT OF COMMERCE (DOC)

PS1	(1995) Construction and Industrial Plywood

1.2 DEFINITIONS

a. "Cementitious material" as used herein shall include all portland cement, pozzolan, fly ash, ground iron blast-furnace slag.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Reinforcing steel; G

Formwork

Reproductions of contract drawings are unacceptable.

SD-03 Product Data

Materials for curing concrete

Joint sealants

Epoxy Bonding compound

Joint filler

Vapor retarder

Waterstops

SD-05 Design Data

Concrete mix design; G

Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, ground slag, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing

those required for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. The submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregate changes. In addition, copies of the fly ash, and pozzolan test results shall be submitted. The approval of fly ash, and pozzolan test results shall have been within 6 months of submittal date. Obtain acknowledgement of receipt prior to concrete placement.

SD-06 Test Reports

Concrete mix design; G

Fly ash

Pozzolan

Ground iron blast-furnace slag

Compressive strength tests

Air Content

SD-07 Certificates

Biodegradable Form Release Agent

Material Safety Data Sheets

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" had been substituted for the words "should" or "could" or "may," wherever they appear. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. ACI 301/301M for job site storage of materials. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or

racks raised above the ground . Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

1.6 Quality Assurance

1.6.1 Drawings

1.6.1.1 Formwork

Drawings showing details of formwork including; joints, supports, studding and shoring, and sequence of form and shoring removal. Reproductions of contract drawings are unacceptable.

1.6.1.2 Reinforcing Steel

ACI 315. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars.

1.6.2 Material Safety Data Sheets

1.6.2.1 Material Safety Data Sheets

Submit Material Safety Data Sheets (MSDS) for all materials that are regulated for hazardous health effects. Prominently post the MSDS at the construction site.

1.6.3 Test Reports

1.6.3.1 Concrete Mix Design

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cement, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design. Obtain approval before concrete placement.

1.6.3.2 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C 618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date.

1.6.3.3 Ground Iron Blast-Furnace Slag

Submit test results in accordance with ASTM C 989 for ground iron blast-furnace slag. Submit test results performed within 6 months of submittal date.

PART 2 PRODUCTS

2.1 MATERIALS FOR FORMS

Provide wood, plywood, steel or forms specifically manufactured and designed for drilled pier installations. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood: PS1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining. Steel form surfaces shall not contain irregularities, dents, or sags.

2.2 FORM TIES AND ACCESSORIES

The use of wire alone is prohibited. Form ties and accessories shall not reduce the effective cover of the reinforcement.

2.2.1 Polyvinylchloride Waterstops

COE CRD-C 572.

2.2.2 Dovetail Anchor Slot

Preformed metal slot approximately 1 by 1 inch of not less than 22 gage galvanized steel cast in concrete. Coordinate actual size and throat opening with dovetail anchors and provide with removable filler material.

2.3 CONCRETE

2.3.1 Contractor-Furnished Mix Design

ACI 211.1, ACI 301/301M, and ACI 318/318M except as otherwise specified. The compressive strength (f'c) of the concrete for each portion of the structure(s) shall be as indicated on the foundation drawings and in the design criteria.

2.3.1.1 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1. The trial mixture shall use at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratio required will be based on equivalent water-cement ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan, and ground granulated blast-furnace slag by weight equivalency

method. Laboratory trial mixture shall be designed for maximum permitted slump and air content. Each combination of material proposed for use shall have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39 for 7 and 28 days. From these results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition a curve shall be plotted showing the relationship between 7 and 28 day strengths.

2.3.1.2 Required Average Strength of Mix Design

The selected mixture shall produce an average compressive strength exceeding the specified strength by the amount indicated in ACI 301/301M. When a concrete production facility has a record of at least 15 consecutive tests, the standard deviation shall be calculated and the required average compressive strength shall be determined in accordance with ACI 301/301M. When a concrete production facility does not have a suitable record of tests to establish a standard deviation, the required average strength shall be as follows:

a. For f'c less than 3000 psi, 1000 psi plus f'c.

b. For f'c between 3000 and 5000 psi, 1200 psi plus f'c.

c. For f'c over 5000 psi, 1400 psi plus f'c.

2.4 MATERIALS

2.4.1 Cement

ASTM C 150, Type I or II or ASTM C 595, Type IP(MS) or IS(MS) blended cement except as modified herein. The blended cement shall consist of a mixture of ASTM C 150, Type II, cement and one of the following materials: ASTM C 618 pozzolan or fly ash, ASTM C 989 ground iron blast-furnace slag. The pozzolan or fly ash content shall not exceed 25 percent by weight of the total cementitious material. The ground iron blast-furnace slag shall not exceed 50 percent by weight of total cementitious material. For exposed concrete, use one manufacturer for each type of cement, ground slag, fly ash, and pozzolan.

2.4.1.1 Fly Ash and Pozzolan

ASTM C 618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Types N and F. Add with cement.

2.4.1.2 Ground Iron Blast-Furnace Slag

ASTM C 989, Grade 120.

2.4.2 Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

2.4.3 Aggregates

ASTM C 33, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalies in the cement.

2.4.4 Nonshrink Grout

ASTM C 1107.

2.4.5 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures.

2.4.5.1 Air-Entraining

ASTM C 260.

2.4.5.2 High Range Water Reducer (HRWR) (Superplasticizers)

ASTM C 494/C 494M, Type F and ASTM C 1017/C 1017M.

2.4.6 Vapor Retarder

ASTM D 4397 polyethylene sheeting, minimum 6 mil thickness.

2.4.7 Materials for Curing Concrete

2.4.7.1 Impervious Sheeting

ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

2.4.7.2 Pervious Sheeting

AASHTO M 182.

2.4.7.3 Liquid Membrane-Forming Compound

ASTM C 309, white-pigmented, Type 2, Class B.

2.4.8 Liquid Chemical Sealer-Hardener Compound

Compound shall be magnesium fluosilicate which when mixed with water seals and hardens the surface of the concrete. Do not use on exterior slabs exposed to freezing conditions. Compound shall not reduce the adhesion of

resilient flooring, tile, paint, roofing, waterproofing, or other material applied to concrete.

2.4.9 Expansion/Contraction Joint Filler

ASTM D 1751, ASTM D 1752, or 100% recycled material meeting ASTM D 1752 (subparagraphs 5.1 to 5.4). Material shall be 1/2 inch thick, unless otherwise indicated.

2.4.10 Joint Sealants

2.4.10.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D 1190 or ASTM C 920, Type M, Class 25, Use T.

2.4.10.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C 920, Type M, Grade NS, Class 25, Use T.

2.4.11 Epoxy Bonding Compound

ASTM C 881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; and Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces. Provide Class A if placement temperature is below 40 degrees F; Class B if placement temperature is between 40 and 60 degrees F; or Class C if placement temperature is above 60 degrees F.

2.4.12 Biodegradable Form Release Agent

Form release agent shall be biodegradable with a maximum of 350 grams/liter (g/l) volatile organic compounds (VOCs). Product shall not bond with, stain, or adversely affect concrete surfaces and shall not impair subsequent treatments of concrete surfaces. The form release agent shall not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

2.5 REINFORCEMENT

2.5.1 Reinforcing Bars

ACI 301/301M unless otherwise specified. ASTM A 615/A 615M and ASTM A 617/A 617M with the bars marked A, S, W, Grade 60;

2.5.2 Mechanical Reinforcing Bar Connectors

ACI 301/301M. Provide 125 percent minimum yield strength of the reinforcement bar.

2.5.3 Welded Wire Fabric

ASTM A 185 or ASTM A 497. Provide flat sheets of welded wire fabric for

slabs and toppings.

2.5.4 Wire

ASTM A 82 or ASTM A 496.

2.5.5 Reinforcing Bar Supports

Provide bar ties and supports of coated or non corrodible material.

PART 3 EXECUTION

3.1 FORMS

ACI 301/301M. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight.

3.1.1 Coating

Before concrete placement, coat the contact surfaces of forms with a nonstaining mineral oil, nonstaining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

3.1.2 Removal of Forms and Supports

After placing concrete, forms shall remain in place for the time periods specified in ACI 347R. Prevent concrete damage during form removal.

3.1.2.1 Special Requirements for Reduced Time Period

Forms may be removed earlier than specified if ASTM C 39 test results of field-cured samples from a representative portion of the structure indicate that the concrete has reached a minimum of 85 percent of the design strength.

3.1.3 Reshoring

Reshore concrete elements where forms are removed prior to the specified time period. Do not permit elements to deflect or accept loads during form stripping or reshoring. Forms on columns, walls, or other load-bearing members may be stripped after 2 days if loads are not applied to the members. After forms are removed, slabs and beams over 10 feet in span and cantilevers over 4 feet shall be reshored for the remainder of the specified time period in accordance with paragraph entitled "Removal of Forms." Perform reshoring operations to prevent subjecting concrete members to overloads, eccentric loading, or reverse bending. Reshoring elements shall have the same load-carrying capabilities as original shoring and shall be spaced similar to original shoring. Firmly secure and brace reshoring elements to provide solid bearing and support.

3.2 Waterstop Splices

Fusion weld in the field.

3.3 Formed Surfaces

3.3.1 Tolerances

ACI 347R and as indicated.

3.3.2 As-Cast Form

Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

ACI 301/301M. Provide bars, wire fabric, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement shall not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

3.4.1 Reinforcement Supports

Place reinforcement and secure with galvanized or non corrodible chairs, spacers, or metal hangers. For supporting reinforcement on the ground, use concrete or other non corrodible material, having a compressive strength equal to or greater than the concrete being placed.

ASTM A 775/A 775M. Epoxy-coated reinforcing bars supported from formwork shall rest on coated wire bar supports, or on bar supports made of dielectric material or other acceptable material. Wire bar supports shall be coated with dielectric material, compatible with concrete, for a minimum distance of 2 inches from the point of contact with the epoxy-coated reinforcing bars. Reinforcing bars used as support bars shall be epoxy coated. Spreader bars, where used, shall be epoxy coated. Proprietary combination bar clips and spreaders used in construction with epoxy-coated reinforcing bars shall be made corrosion resistant or coated with dielectric material. Epoxy-coated bars shall be tied with plastic-coated tie wire; or other materials acceptable to the Contracting Officer.

3.4.2 Splicing

As indicated. For splices not indicated ACI 301/301M. Do not splice at points of maximum stress. Overlap welded wire fabric the spacing of the cross wires, plus 2 inches. AWS D1.4. Welded splices shall be approved

prior to use. Repair the cut ends of hot-dipped galvanized reinforcement steel to completely coat exposed steel, ASTM A 780.

3.4.3 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Bolt threads shall match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is installed.

3.4.4 Cover

ACI 301/301M for minimum coverage, unless otherwise indicated.

3.4.5 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.6 Construction Joints

Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

3.4.7 Expansion Joints and Contraction Joints

Provide expansion joint at edges of interior floor slabs on grade abutting vertical surfaces, and as indicated. Make expansion joints 1/2 inch wide unless indicated otherwise. Fill expansion joints not exposed to weather with preformed joint filler material. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

ASTM C 94/C 94M, ACI 301/301M, ACI 302.1R, and ACI 304R, except as modified herein. Batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.5.1 Measuring

Make measurements at intervals as specified in paragraphs entitled "Sampling" and "Testing."

3.5.2 Mixing

ASTM C 94/C 94M and ACI 301/301M. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 85 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10 foot centers maximum in each direction when pouring interior slabs and on 20 foot centers maximum for exterior slabs.

3.6.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Contracting Officer. Excavation width shall be a minimum of 4 inches greater than indicated.

3.6.2 Vibration

ACI 301/301M and ASTM A 775/A 775M. Furnish a spare, working, vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a heavy leveling straightedge. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with

the vibrator when more than one lift is required. Place concrete in 18 inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

3.6.3 Application of Epoxy Bonding Compound

Apply a thin coat of compound to dry, clean surfaces. Scrub compound into the surface with a stiff-bristle brush. Place concrete while compound is stringy. Do not permit compound to harden prior to concrete placement. Follow manufacturer's instructions regarding safety and health precautions when working with epoxy resins.

3.6.4 Cold Weather

ACI 306.1. Do not allow concrete temperature to decrease below 50 degrees F Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 5 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

3.6.5 Hot Weather

ACI 305R. Maintain required concrete temperature using Figure 2.1.5 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.7 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.7.1 Defects

Repair formed surfaces by removing minor honeycombs, pits greater than 1 square inch surface area or 0.25 inch maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with nonshrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate, or other defects which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair. The surface of the concrete shall not vary more than the allowable tolerances of ACI 347R. Exposed surfaces shall be uniform in

appearance and finished to a smooth form finish unless otherwise specified.

3.7.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified shall be finished with wood floats to even surfaces. Finish shall match adjacent finishes.

3.7.3 Formed Surfaces

3.7.3.1 Tolerances

ACI 117 and as indicated.

3.7.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view. Patch this holes and defects and level abrupt irregularities. Remove or rub off fins and other projections exceeding 0.25 inch in height.

3.8 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

ACI 302.1R, unless otherwise specified. Slope floors uniformly to drains where drains are provided. Where straightedge measurements are specified, Contractor shall provide straightedge.

3.8.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.8.1.1 Scratched

Use for surfaces intended to receive bonded applied cementitious applications. After the concrete has been placed, consolidated, struck off, and leveled to a Class C tolerance as defined below, the surface shall be roughened with stiff brushes of rakes before final set.

3.8.1.2 Floated

Use for exterior slabs where not otherwise specified. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further, until ready for floating. Whether floating with a wood, magnesium, or composite hand float, with a bladed power trowel equipped with float shoes, or with a powered disc, float shall begin when the surface has stiffened sufficiently to permit the operation. During or after the first floating, surface shall be checked with a 10 foot straightedge applied at no less than two different angles, one of which is perpendicular to the direction of strike off. High spots shall be cut down and low spots filled during this procedure to produce a surface level within 1/4 inch in 10 feet.

3.8.1.3 Steel Troweled

Use for interior flooring for switchgear cubicles. First, provide a floated finish. The finish shall next be power troweled two times, and finally hand troweled. The first troweling after floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be essentially free of trowel marks and uniform in texture and appearance. The finished surface shall produce a surface level to within 1/4 inch in 10 feet. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor covering shall be removed by grinding.

3.8.1.4 Broomed

Use on surfaces of exterior walks, platforms, patios, ramps, and exterior areas of switchgear pads at station H unless otherwise indicated. Perform a floated finish, then draw a broom or burlap belt across the surface to produce a coarse scored texture. Permit surface to harden sufficiently to retain the scoring or ridges. Broom transverse to traffic or at right angles to the slope of the slab.

3.8.1.5 Concrete Toppings Placement

The following requirements apply to the placement of toppings of concrete on base slabs that are either freshly placed and still plastic, or on hardened base slabs.

a. Placing on a Fresh Base: Screed and bull float the base slab. As soon as the water sheen has disappeared, lightly rake the surface of the base slab with a stiff bristle broom to produce a bonding surface for the topping. Immediately spread the topping mixture evenly over the roughened base before final set takes place. Give the topping the finish indicated on the drawings.

b. Bonding to a Hardened Base: When the topping is to be bonded to a floated or troweled hardened base, roughen the base by scarifying, grit-blasting, scabbling, planing, flame cleaning, or acid-etching to lightly expose aggregate and provide a bonding surface. Remove dirt, laitance, and loose aggregate by means of a stiff wire broom. Keep the clean base wet for a period of 12 hours preceding the application of the topping. Remove excess water and apply a 1:1:1/2 cement-sand-water grout, and brush into the surface of the base slab. Do not allow the cement grout to dry, and spread it only short distances ahead of the topping placement. Do not allow the temperature differential between the completed base and the topping mixture to exceed 10 degrees F at the time of placing. Place the topping and finish as indicated.

3.8.2 Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

3.8.3 Curbs and Gutters

Provide contraction joints spaced every 10 feet maximum unless otherwise indicated. Cut contraction joints 3/4 inch deep with a jointing tool after the surface has been finished. Provide expansion joints 1/2 inch thick and spaced every 100 feet maximum unless otherwise indicated. Perform pavement finish.

3.9 CURING AND PROTECTION

ACI 301/301M unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating.

3.9.1 Moist Curing

Remove water without erosion or damage to the structure.

3.9.1.1 Ponding or Immersion

Continually immerse the concrete throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.9.1.2 Fog Spraying or Sprinkling

Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.9.1.3 Pervious Sheeting

Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

3.9.1.4 Impervious Sheeting

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.9.2 Liquid Membrane-Forming Curing Compound

Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.

3.9.2.1 Application

Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Re-spray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

3.9.2.2 Protection of Treated Surfaces

Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.9.3 Liquid Chemical Sealer-Hardener

Apply sealer-hardener to interior floors not receiving floor covering and floors located under access flooring. Apply the sealer-hardener in accordance with manufacturer's recommendations. Seal or cover joints and openings in which joint sealant is to be applied as required by the joint sealant manufacturer. The sealer-hardener shall not be applied until the concrete has been moist cured and has aged for a minimum of 30 days. Apply a minimum of two coats of sealer-hardener.

3.9.4 Curing Periods

ACI 301/301M except 10 days for retaining walls, pavement or chimneys, 21 days for concrete that will be in full-time or intermittent contact with seawater, salt spray, alkali soil or waters. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Contracting Officer.

3.9.5 Requirements for Type III, High-Early-Strength Portland Cement

The curing periods shall be not less than one-fourth of those specified for portland cement, but in no case less than 72 hours.

3.10 FIELD QUALITY CONTROL

3.10.1 Sampling

ASTM C 172. Collect samples of fresh concrete to perform tests specified. ASTM C 31/C 31M for making test specimens.

3.10.2 Testing

3.10.2.1 Slump Tests

ASTM C 143/C 143M. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.10.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.10.2.3 Compressive Strength Tests

ASTM C 39. Make five test cylinders for each set of tests in accordance with ASTM C 31/C 31M. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Samples for strength tests of each mix design of and for concrete placed each day shall be taken not less than once a day, nor less than once for each 100 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete

placed. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 500 psi, take a minimum of three ASTM C 42/C 42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be retested. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.10.2.4 Air Content

ASTM C 173/C 173M or ASTM C 231 for normal weight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

-- End of Section --

SECTION 05120

STRUCTURAL STEEL
06/03

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program Description
AISC 316	(1989) ASD Manual of Steel Construction
AISC 317	(1992; Errata 1994) Connections
AISC 326	(1983) Detailing for Steel Construction
AISC 303	(2000) Steel Buildings and Bridges
AISC 348	(1988) Load and Resistance Factor Design Specifications for Structural Joints Using ASTM A325 or A490 Bolts
AISC 335	(1989) Structural Steel Buildings Allowable Stress Design and Plastic Design
AISC S340	(1992) Metric Properties of Structural Shapes with Dimensions According to ASTM A6M

ASME INTERNATIONAL (ASME)

ASME B46.1	(1995) Surface Texture, (Surface Roughness, Waviness, and Lay)

ASTM INTERNATIONAL (ASTM)

ASTM A 6/A 6M	(1998a) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 36/A 36M	(2000) Carbon Structural Steel
ASTM A 53	(1999; Rev. B) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 143	(1974; R 1994) Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
ASTM A 153/A 153	2000) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(1997) Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 325	(1997) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 490	(1997) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 500	(1999) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(1999) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 563	(1997) Carbon and Alloy Steel Nuts
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 992/A 992M	(1998e1) Steel for Structural Shapes for Use in Building Framing
ASTM B 695	(1991; R 1997) Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM C 827	(1995; R 1997) Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
ASTM C 1107	(1999) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM F 436	(1993) Hardened Steel Washers
ASTM F 844	(1998) Washers, Steel, Plain (Flat), Unhardened for General Use
ASTM F 959	(1999; Rev. A) Compressible-Washer-Type Direct Tension Indicators for Use with

Structural Fasteners

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2000) Structural Welding Code - Steel

1.2 SYSTEM DESCRIPTION

Provide the structural steel system, including galvanizing, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing shall be provided in accordance with AISC 316 and AISC 317 except as modified in this contract.

1.3 MODIFICATIONS TO REFERENCES

In AISC 316, AISC 317, AISC 335, AISC 303, AISC 348, and AISC S340, except as modified in this section, shall be considered a part of AISC 316 and AISC 317 and is referred to in this section as AISC 316 and AISC 317.

1.4 SUBMITTALS

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

SD-02 Shop Drawings

Fabrication drawings, including description of connections; G

SD-03 Product Data

Load indicator washers

Include test report for Class B primer.

SD-06 Test Reports

Bolts, nuts, and washers

Supply the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners.

SD-07 Certificates

Steel

Bolts, nuts, and washers

Welding electrodes and rods

Nonshrink grout

Galvanizing

Welding procedures and qualifications

Erection Plan

1.5 QUALITY ASSURANCE

1.5.1 Drawing Requirements

Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC 326, AISC 316 and AISC 317. Drawings shall not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS standard welding symbols. as part of the drawings.

1.5.2 Certifications

1.5.2.1 Erection Plan

Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing, and a detailed sequence of welding, including each welding procedure required.

1.5.2.2 Welding Procedures and Qualifications

Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate shall be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months.

PART 2 PRODUCTS

2.1 STEEL

2.1.1 Structural Steel

ASTM A 36/A 36M.

2.1.2 High-Strength Structural Steel

2.1.3 Structural Shapes for Use in Building Framing

Wide flange shapes, ASTM A 992/A 992M.

2.1.4 Structural Steel Tubing

ASTM A 500, Grade B; ASTM A 501; .

2.1.5 Steel Pipe

ASTM A 53, Type E or S, Grade B, weight class STD (Standard).

2.2 BOLTS, NUTS, AND WASHERS

Provide the following unless indicated otherwise.

2.2.1 Structural Steel, Steel Pipe

2.2.1.1 Bolts

ASTM A 307, Grade A; ASTM A 325, Type 1. The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

2.2.1.2 Nuts

ASTM A 563, Grade and Style for applicable ASTM bolt standard recommended.

2.2.1.3 Washers

ASTM F 844 washers for ASTM A 307 bolts, and ASTM F 436 washers for ASTM A 325 and ASTM A 490 bolts.

2.2.2 High-Strength Structural Steel and Structural Steel Tubing

2.2.2.1 Bolts

ASTM A 325, Type 1 ASTM A 490, Type 1 or 2.

2.2.2.2 Nuts

ASTM A 563, Grade and Style as specified in the applicable ASTM bolt standard.

2.2.2.3 Washers

ASTM F 436, plain carbon steel.

2.2.3 Foundation Anchorage

2.2.3.1 Bolts

ASTM A 307.

2.2.3.2 Nuts

ASTM A 563, Grade A, hex style.

2.2.3.3 Washers

ASTM F 844.

2.2.4 Load Indicator Washers

ASTM F 959. Provide ASTM B 695, Class 50, Type 1 galvanizing.

2.3 STRUCTURAL STEEL ACCESSORIES

2.3.1 Welding Electrodes and Rods

AWS D1.1/D1.1M.

2.3.2 Nonshrink Grout

ASTM C 1107, with no ASTM C 827 shrinkage.

2.4 GALVANIZING

ASTM A 123/A 123M or ASTM A 153/A 153, as applicable, unless specified otherwise galvanize after fabrication where practicable.

2.5 FABRICATION

2.5.1 Markings

Prior to erection, members shall be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

2.5.2 Surface Finishes

ASME B46.1 maximum surface roughness of 125 for pin, pinholes, and sliding bearings, unless indicated otherwise.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC 316. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC FCD for Category Supplement structural steelwork. Compression joints depending on contact bearing shall have a surface roughness not in excess of 500 micro inches as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M. Structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, surfaces to be fireproofed, and contact

surfaces of friction-type high-strength bolted connections shall be prepared for painting in accordance with endorsement "P" of AISC FCD and primed with the specified paint.

3.2 INSTALLATION

3.3 ERECTION

a: Erection of structural steel, except as indicated in item b. below, shall be in accordance with the applicable provisions of AISC 316. Erection plan shall be reviewed, stamped and sealed by a licensed structural engineer.

Provide for drainage in structural steel. After final positioning of steel members, provide full bearing under base plates and bearing plates using nonshrink grout. Place nonshrink grout in accordance with the manufacturer's instructions.

3.3.1 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration.

3.4 CONNECTIONS

Except as modified in this section, connections not detailed shall be designed in accordance with AISC 335. Build connections into existing work. Do not tighten anchor bolts set in concrete with impact torque wrenches. Punch, subpunch and ream, or drill bolt and pin holes. Bolts, nuts, and washers shall be clean of dirt and rust, and lubricated immediately prior to installation.

3.4.1 Common Grade Bolts

ASTM A 307 bolts shall be tightened to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact. If firm contact of joint plies cannot be obtained with a few impacts of an impact wrench, or the full effort of a man using a spud wrench, contact the Contracting Officer for further instructions.

3.4.2 High-Strength Bolts

ASTM A 325 and ASTM A 490 bolts shall be fully tensioned to 70 percent of their minimum tensile strength. Bolts shall be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, bolts shall then be fully tensioned, progressing from the most rigid part of a connection to the free edges.

3.5 WELDING

AWS D1.1/D1.1M. Grind exposed welds smooth as indicated. Provide AWS D1.1/D1.1M qualified welders, welding operators, and tackers.

The contractor shall develop and submit the Welding Procedure Specifications (WPS) for all welding, including welding done using

prequalified procedures. Prequalified procedures may be submitted for information only; however, procedures that are not prequalified shall be submitted for approval.

3.5.1 Removal of Temporary Welds, Run-Off Plates, and Backing Strips

Remove only from finished areas.

3.6 GALVANIZING REPAIR

Provide as indicated or specified. Galvanize after fabrication where practicable. Repair damage to galvanized coatings using ASTM A 780 zinc rich paint for galvanizing damaged by handling, transporting, cutting, welding, or bolting. Do not heat surfaces to which repair paint has been applied.

3.7 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. The Contracting Officer shall be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of weld inspection.

3.7.1 Welds

3.7.1.1 Visual Inspection

AWS D1.1/D1.1M. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet weld end returns.

3.7.1.2 Nondestructive Testing

AWS D1.1/D1.1M. Test locations shall be selected by the Contracting Officer. All circumferential welds and other critical welds shall be tested utilizing magnetic particle or ultrasonic inspections. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be tested by radiographic or ultrasonic testing, as approved by the Contracting Officer. When all welds made by an individual welder are required to be tested, magnetic particle testing shall be used only in areas inaccessible to either radiographic or ultrasonic testing. Retest defective areas after repair.

a. Testing frequency: Provide the types and number of tests as specified in article 6.7 of the AWS structural welding code, AWS D1.1.

3.7.2 Load Indicator Washers

3.7.2.1 Load Indicator Washer Compression

Load indicator washers shall be tested in place to verify that they have been compressed sufficiently to provide the 0.015 inch gap when the load

indicator washer is placed under the bolt head and the nut is tightened, and to provide the 0.005 inch gap when the load indicator washer is placed under the turned element, as required by ASTM F 959.

3.7.3 High-Strength Bolts

3.7.3.1 Testing Bolt, Nut, and Washer Assemblies

Test a minimum of 3 bolt, nut, and washer assemblies from each mill certificate batch in a tension measuring device at the job site prior to the beginning of bolting start-up. Demonstrate that the bolts and nuts, when used together, can develop tension not less than the provisions specified in AISC 348, Table 4, depending on bolt size and grade. The bolt tension shall be developed by tightening the nut. A representative of the manufacturer or supplier shall be present to ensure that the fasteners are properly used, and to demonstrate that the fastener assemblies supplied satisfy the specified requirements.

3.7.3.2 Inspection

Inspection procedures shall be in accordance with AISC 348, Section 9. Confirm and report to the Contracting Officer that the materials meet the project specification and that they are properly stored. Confirm that the faying surfaces have been properly prepared before the connections are assembled. Observe the specified job site testing and calibration, and confirm that the procedure to be used provides the required tension. Monitor the work to ensure the testing procedures are routinely followed on joints that are specified to be fully tensioned.

3.7.3.3 Testing

The Government has the option to perform nondestructive tests on 5 percent of the installed bolts to verify compliance with pre-load bolt tension requirements. The nondestructive testing will be done in-place using an ultrasonic measuring device or any other device capable of determining in-place pre-load bolt tension. The test locations shall be selected by the Contracting Officer. If more than 10 percent of the bolts tested contain defects identified by testing, then all bolts used from the batch from which the tested bolts were taken, shall be tested. Retest new bolts after installation.

3.7.4 Testing for Embrittlement

ASTM A 143 for steel products hot-dip galvanized after fabrication.

-- End of Section --

SECTION 13451A

POWER MONITORING SYSTEM
06/02

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C12.16	(1991) Electricity Metering Solid-State Electricity Meters
ANSI C62.61	(1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits

THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA ANSI/EIA/TIA-232-F	(1997) Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
EIA ANSI/TIA/EIA-485-A	(1988) Electrical Characteristics of Generators and Receivers for use in Balanced Digital Multipoint Systems
EIA ANSI/TIA/EIA-568-A	(1995; Addendum 3 1998) Commercial Building Telecommunications Cabling Standard

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 61000-4-5	(1995) Electromagnetic Compatibility (EMC) - Part 4: Testing and Measurement Techniques - Section 5: Surge Immunity Test

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C37.90.1	(1989; R 1994) IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems

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

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ICS 1	(1993) Industrial Controls and Systems
NEMA WC 74	(2000) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

1.2 SYSTEM DESCRIPTION

1.2.1 System Requirements

The power monitoring system, consisting of commercial, off-the-shelf intelligent electronic devices (IEDs), communication channels, and PC-based workstation equipment, will be used by Utility and Engineering Staff to monitor the operation of relays and breakes at Substations 1 and 2 and Sectionalizing Stations A-H. The power monitoring system shall be a multiple workstation system utilizing an Ethernet local area network (LAN). The power monitoring system workstations will be located at Builidng 87 with HMIs at Builidng 124 and 163.

The primary requirments for the system are in Attachment 4. These spefications in Section 13451 are subliminary to Attachment 4. In the case of conflicting requirments of the same type between the two sections, the more rigerous of the two shall rule. In the case of mutally exclusive requiremnets, Attachment 4 shal rule. The SCADA system shall coordinate with with the communications system described in Attachment 5.

1.2.2 System Response Times

a. Any new display shall begin to update the workstation monitor within 2 seconds after being requested. Preformatted displays shall be completely presented within 5 seconds after the request.

b. All calculated values shall be updated from the database, when displayed at the workstation, at least every 15 seconds.

c. Digital status indications, when displayed at the workstation, shall be updated within 15 seconds from the IED.

d. Analog values, when displayed at the workstation shall be updated within 15 seconds from the IED.

1.2.3 System Accuracy and Display

The system shall maintain the specified end-to-end accuracy from sensor to all workstation displays, including the effects of transmitters, transducers, and engineering units conversions, for one year for the applications specified and shall report and display changes in sensed values as specified. The system accuracy and display requirements are as follows:

a. Current: with a range for the specific application ± 1.0% of reading; display and print to nearest ampere.

b. Voltage: with a range for the specific application ± 1.0% of reading; display and print to nearest volt.

c. Power Factor: 1.0% of reading; display and print to nearest hundredth.

d. kWh: with a range for the specific application ± 1.0% of reading; display and print to nearest kWh.

e. KW: with a range for the specific application ± 1.0% of readings.

f. KVA: with a range for the specific application ± 1.0% of reading; display and print to nearest KVA.

g. KVAR: with a range for the specific application ± 1.0% of reading; display and print to nearest KVAR.

h. Frequency: ± 0.05 Hz; display and print to nearest 0.1 Hz.

i. Total Harmonic Distortion (THD) in percent for current and voltage, each phase.

j. K-Factor (dimensionless ratio based on harmonic content of current waveform).

k. Special application(s) added by the designer, as needed.

1.2.4 Environmental Requirements

a. Workstation and associated equipment shall operate without damage or degradation under the following ambient conditions, unless otherwise noted.

(1) Operating Temperature: 60 to 85 degrees F.

(2) Operating Humidity: 20 to 80 %, non-condensing.

b. All field equipment shall operate without damage or degradation under the following ambient conditions, unless otherwise noted.

(1) Operating Temperature: 32 to 122 degrees F.

(2) Operating Humidity: 10 to 90 %, non-condensing.

1.2.5 Electrical Transients and Electromagnetic Interference

1.2.5.1 Power Line Surge Protection

Workstation equipment connected to ac circuits shall be protected from power line surges and meet the requirements of IEEE C62.41 location category A3, while equipment is operating. In addition, all IEDs shall be protected to meet the requirements of IEEE C37.90.1 or the requirements of IEC 61000-4-5, test level 4, while the equipment is operating. Fuses shall not be used for surge protection.

1.2.5.2 Sensor Wiring Surge Protection

All digital and analog inputs of all IEDs shall be protected against surges induced on sensor wiring to meet the requirements of IEEE C37.90.1 or the requirements of IEC 61000-4-5, test level 4, while the equipment is operating. Fuses shall not be used for surge protection.

1.2.5.3 Communications Channels Surge Protection

Communications equipment shall be protected against surges induced on its communications channels. Communication interfaces to all field equipment shall be protected to meet the requirements of IEEE C37.90.1 or the requirements of IEC 61000-4-5, test level 4, while the equipment is operating. Fuses shall not be used for surge protection. Metallic cables and conductors which serve as communications channels between buildings shall have surge protection installed at equipment and additional triple electrode gas surge protectors rated for the application installed at each end, within three feet of the building cable entrance. Surge protectors shall meet the requirements of ANSI C62.61.

1.2.6 Communications

The Workstations and associated local area network shall be configured to accept a minimum of 32 EIA ANSI/EIA/TIA-232-F or EIA ANSI/TIA/EIA-485-A data communications channels by way of Ethernet gateways. Each communication channel shall support communication with at least 30 IEDs and shall meet the performance requirements as specified.

1.3 DELIVERY OF TECHNICAL DATA AND COMPUTER SOFTWARE

1.3.1 Data, Drawings, CD-ROMs, and Manuals

All items of software and technical data (including technical data which relates to computer software), which is specifically identified in this specification shall be delivered strictly in accordance with the CONTRACT CLAUSES and the Contract Data Requirements List, DD Form 1423. All data delivered shall be identified by reference to the particular specification paragraph against which it is furnished. All drawings submitted shall be in DXF and AutoCAD v14 file structure. Five sets of CD-ROMs shall be provided after final drawings are approved. Manuals provided shall contain the minimum content specified, although varied packaging and formats are acceptable. The Contractor may submit standard manuals with additions as

necessary to conform to the requirements listed below.

1.3.2 Technical Data Package 1 - Existing Conditions Report

The data package shall include the existing conditions report as specified in Paragraph: Existing Conditions Survey, and associated documentation as specified.

1.3.3 Technical Data Package 2 - System Data

1.3.3.1 System and Installation Drawings

a. Power monitoring system block diagram.

b. Layout plans showing equipment locations and cable routing.

c. Field equipment installation drawings including dimensional drawings of any existing enclosures showing equipment cutouts and mounting locations, and indicating adequate clearance from existing wiring and devices per manufacturer's recommendations.

1.3.3.2 Equipment Data

A complete data package shall be delivered for all materials and equipment as specified, including the following:

a. Catalog data for workstation equipment demonstrating compliance with specified requirements.

b. Catalog data for field equipment indicating outline and mounting dimensions and schematic external wiring arrangement, and

c. Catalog data for instrument transformers demonstrating compliance with specified requirements.

1.3.3.3 Installation, Setup and Operation Guides

The data package shall include the manufacturer's standard installation, setup and operation guides for workstation equipment and field equipment, and shall include details of the published open protocol for communications.

1.3.3.4 User's Guides

The data package shall include the manufacturer's standard user's guides for all software provided with the system.

1.3.3.5 Certifications

The Contractor shall provide written certifications that system components meet the requirements specified including:

a. 47 CFR 15
b. IEEE C62.41
c. ANSI C12.16

d. ANSI C62.61
e. IEEE C37.90.1 or IEC 61000-4-5.

1.3.4 Technical Data Package 3 - Training Data

Lesson plans and training manuals for the training phases, including type of training to be provided and with a list of reference material shall be submitted for approval as specified.

1.3.5 Technical Data Package 4 - Performance Verification Testing Procedures

The Contractor shall submit test procedures for the Performance Verification Test (PVT). The test procedures shall explain in detail, step-by-step actions and expected results to demonstrate compliance with the requirements of this specification. The Contractor shall submit the PVT procedures for approval.

1.3.6 Technical Data Package 5 - Performance Verification Testing Data

The Contractor shall submit the performance verification test data to the Government after the Government approves the performance verification test.

1.3.7 Technical Data Package 6 - Operation and Maintenance Manuals

The operation and maintenance manuals shall consist of a resubmission of all technical data identified as Technical Data Package 2, bound in three-ring binder, with as-built corrections and revisions and with addenda/appendices as necessary to identify any special characteristics or operations not covered in the manufacturer's standard documentation. The Contractor shall submit 6 copies of the operation and maintenance manuals within 30 days following successful completion of the PVT.

1.4 TESTING

1.4.1 General Requirements for Testing

The Contractor shall perform testing of the workstation and field equipment, at the site, including adjustments of the completed system as specified. The Contractor shall provide all personnel, test equipment, instrumentation, and supplies necessary to perform all testing. Written notification shall be given to the Government at least 21 days prior to the PVT, and in no case shall notice be given until after the Contractor has received written Government approval of the specific testing procedures.

1.4.2 Test Procedures and Reports

The procedures shall consist of detailed instructions for test setup, execution, and evaluation of test results. The test reports shall be used to document results of the tests. Reports shall be delivered to the Government within 7 days after completion of test.

1.5 MAINTENANCE AND SERVICE

1.5.1 General Requirements

The Contractor shall provide all maintenance services required and equipment necessary to maintain the entire system operational, as specified, for a period of 1 year after system acceptance. Maintenance shall include preventive maintenance in addition to repairs, replacements, and adjustments and software updates. Written permission shall be obtained from the Government prior to performing any service work or adjustments which have any impact on facility operations.

1.5.2 Description of Work

The adjustment and repair of the system includes all workstation equipment and field equipment including software updates. Contractor shall perform each manufacturer's required adjustments and all other work necessary for proper operation as specified.

1.5.3 Service Calls

The Government will initiate service calls when the system is not functioning properly. The Government shall be furnished with a telephone number where the service supervisor can be reached at all times. Service personnel shall be at the site within three working days after receiving a request for service. The system shall be restored to proper operating condition within seven working days after receiving a request for service.

1.5.4 Records and Logs

The Contractor shall keep records and logs of each maintenance and service task, and shall organize cumulative records for each major component, and for the complete system chronologically. A continuous log shall be maintained for all devices on a site-by-site basis. The log shall contain all initial analog span and zero calibration values and testing of all digital points. Complete logs shall be kept and shall be available for inspection onsite, demonstrating that planned and systematic adjustments and repairs have been accomplished for the system. The Contractor shall provide the Government with a summary report of the maintenance and service performed during each previous month.

1.5.5 System Modifications

The Contractor shall make any recommendations for system modification as part of maintenance and service in writing to the Government. No system modifications, including operating parameters and control settings, shall be made without prior approval of the Government. Any modifications made to the system shall be incorporated into the system documentation including drawings and manuals.

1.5.6 Software

The Contractor shall provide notices of all software updates and verify operation in the system, if the Government chooses to incorporate the update. These updates shall be accomplished in a timely manner, fully coordinated with system operators, and shall be incorporated into the manuals and software documentation. The Contractor shall install and

validate the latest released version of the software, upon receiving written approval by the Government.

1.5.7 Telephone Consultation

The Contractor shall provide up to 40 hours per year of telephone consultation to Government personnel. The Contractor shall keep a log by month, identifying caller, date and length of call, and results of call.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

Units of the same type of equipment shall be products of a single manufacturer. Each major component of equipment shall have the manufacturer's name and address, with model and serial number in a conspicuous place. All materials and equipment shall be currently in production at time of delivery to the Government.

2.1.2 Nameplates

Laminated plastic nameplates shall be provided for each equipment enclosure and device furnished. Laminated plastic shall be 1/8 inch thick, white with black center core. Nameplates shall be a minimum of 1 by 3 inches, with minimum 1/4 inch high engraved block lettering. Nameplates for devices smaller than 1 by 3 inches shall be attached by a non-ferrous metal chain. All other nameplates shall be attached to the device. The nameplate for each equipment enclosure or device shall include the designator or number as shown, and the site name. Site names shall be provided after order placement. Nameplates shall be attached to the equipment with stainless steel panhead screws.

2.1.3 Field Wiring, Cabling, and Terminal Blocks

a. Internal wiring in factory pre-wired enclosures shall be installed according to the Contractor's standard as to wire size, insulation, and method of termination on internal equipment. The individual conductors of the interconnecting cables shall meet the flame resisting test requirements of NEMA WC 74 . Each individual conductor in individual enclosures shall be uniquely identified in accordance with NEMA ICS 1. Splices shall not be permitted.

b. Rail mounted compression clamp terminal blocks shall be provided for conductors requiring connection to circuits external to the specified equipment, and shall be suitable for up to 12 AWG wire. Terminal blocks for analog circuits shall be knife switch disconnecting type. Terminal blocks shall be grouped for easy accessibility unrestricted by interference from structural members and internal devices. Sufficient space shall be provided on each side of each terminal block to allow an orderly arrangement of all leads to be terminated on the block. Plastic wiring duct or other factory mounted cable support devices shall be provided to support

cables for external circuit wiring.

c. Terminal blocks, interposing relays, switches, or similar devices shall be readily accessible. The equipment shall be located in compartments, enclosures, or junction boxes in such arrangement that maintenance personnel shall have direct access to the equipment without removal of barriers, cover plates, or wiring. Grouped terminal blocks for all external connections shall be provided. All wiring leaving an enclosure shall leave from terminal blocks or prefabricated connectors and not from other devices in the enclosure. Terminal blocks and jumpers shall be permanently and uniquely marked in conformance with NEMA ICS 1.

2.1.4 Enclosures

Enclosures shall conform to the requirements of NEMA 250 for the types specified. Damaged surfaces shall be repaired and refinished using original type finish. Enclosures installed outdoors shall be type 4X stainless steel, unless otherwise shown, and shall contain a thermostatically controlled space heater to maintain the enclosure above the dew point, if required by the equipment installed. Enclosures shall have removable hinged, key-locked front doors. All enclosure locks shall be keyed alike. A total of 5 keys shall be turned over to the Government.

2.1.5 EMI/RFI Compliance

Equipment shall be designed to minimize the generation of electromagnetic and radio frequency interference. Workstation equipment shall be in compliance with 47 CFR 15, for Class B computing devices.

2.2 COMMUNICATIONS CHANNELS

The Contractor shall provide communications channels as shown between the IEDs and workstations as specified in Sections 16768A FIBER OPTIC DATA TRANSMISSION SYSTEM. The Contractor shall use Government-furnished communications channels where shown.

2.3 LAN SOFTWARE

The LAN software shall provide for transparent communication with any node on the network. LAN software shall support operation of the system configured as shown. A network operating system shall be supplied as part of the LAN software. The network operating system shall support central and remote database maintenance, servers, file transfer, security, and job entry. A configured and operational shell menu interface shall be provided, and shall be user-configurable.

PART 3 EXECUTION

3.1 INSTALLATION

The Contractor may start installation after Government acceptance of the Technical Data Packages 1 and 2.

3.1.1 Existing Condition Survey

The Contractor shall connect to and utilize existing devices as shown. Devices that are usable in their original configuration without modification may be reused. The Contractor shall perform a field survey, including inspection of all existing devices intended to be incorporated into the system and furnish an existing conditions report to the Government. The report shall identify those items considered nonfunctioning. The Contractor shall provide (with the report) specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency. If a device fails after the Contractor has commenced work on that device, the Contractor shall diagnose the failure and report the failure to the Government. The Contractor shall be held responsible for repair costs due to Contractor negligence or abuse of Government equipment.

3.1.2 Scheduling of Work and Outages

The Contract Clauses shall govern regarding permission for power outages, scheduling of work, coordination with Government personnel, and special working conditions.

3.1.3 Installation of Field Equipment

3.1.3.1 Installation General Requirements

The Contractor shall install all field equipment as specified and required for a fully functional and operational system. The Contractor shall exercise caution when drilling holes in panels housing energized equipment. When mounting field equipment, the Contractor shall not allow metal shavings to fall into energized equipment.

3.1.3.2 Grounding

The Contractor shall provide grounding in accordance with manufacturer's recommendations and as specified. The Contractor shall provide an adequate ground for all enclosure circuits and cable shields to prevent ground loops and electrical noise from adversely affecting operation of the system.

3.1.3.3 Communications Equipment

The Contractor shall be responsible for installing and testing communications equipment.

3.1.4 Installation of Workstation Equipment

The Contractor shall install all Workstation and peripheral equipment as specified and shown for an operational system.

3.1.5 Installation of Software

3.1.5.1 General

The Contractor shall install all software as specified and required for an

operational system including databases, operational parameters, LAN, system, command, application, and Workstation programs. Upon successful completion of the PVT, the Contractor shall provide original and backup copies of object modules for all accepted software including diagnostics, on each type of media utilized. The hard drive on each workstation shall be partitioned and formatted at the factory, and all workstation software shall be installed on the hard drive at the factory. The Contractor shall provide one master copy and one back-up copy of all software, including the operating system, on CD-ROM.

3.1.5.2 Development of Database

The Contractor shall develop the entire system database, using data shown, and the Contractor shall supply all other data required for the database.

3.1.5.3 Displays Required

The Contractor shall provide the displays specified and as shown. All real-time inputs for the displays shall be included. All graphics provided shall be in the format and meet the requirements of paragraph USER INTERFACE SOFTWARE.

3.1.6 Installation of LAN Equipment

a. The Contractor shall install all LAN equipment as specified for an operational system.

b. LAN cable shall be prepared in accordance with the cable and connector manufacturer's instructions. Category 5 rated connectors, as defined by EIA ANSI/TIA/EIA-568-A, shall be used for direct connection to the cable. Cables shall be of sufficient length to allow equipment displacement of at least 8 feet in any direction.

3.2 SITE TESTING

3.2.1 General

The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all site testing. The Government will witness all PVT testing. Original copies of all data produced, including results of each test procedure, during the PVT shall be turned over to the Government prior to approval of the test.

3.2.2 Field Testing

The Contractor shall test, adjust, and calibrate all field equipment and verify system communications before the system is placed on line. The Contractor shall verify operation of all systems as specified upon loss of power, and that all systems return to proper operation automatically upon resumption of power. The Contractor shall deliver a report describing results of functional tests, diagnostics, and system calibrations including written certification to the Government that the installed complete system has been tested, adjusted, and calibrated, and is ready to begin the PVT.

The report shall also include a copy of the approved PVT procedure.

3.2.3 PVT

The Contractor shall demonstrate compliance of the completed system with the contract documents. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The PVT as specified shall not be started until after receipt by the Contractor of written permission by the Government, based on the Contractor's written report including certification of successful completion of Contractor's Field Testing as specified, and upon successful completion of training as specified. The PVT shall be performed as an integrated test with the data transmission system, and with all equipment specified operating and exchanging actual data under fully loaded conditions.

3.3 TRAINING

3.3.1 General

The Contractor shall conduct training courses for designated personnel in the maintenance and operation of the system as specified. The training shall be oriented to the specific system being installed under this contract. Training manuals shall be delivered for each trainee with two additional copies delivered for archival at the project site. The Contractor shall furnish all audiovisual equipment and all other training materials and supplies. Where the Contractor presents portions of the course material by audiovisuals, copies of those audiovisuals shall be delivered to the Government either as a part of the printed training manuals or on the same media as that used during the training sessions. A training day is defined as eight hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the training facility. For guidance in planning the required instruction, the Contractor shall assume that attendees have a high school education or equivalent, and are familiar with utility systems. Approval of the planned training schedule shall be obtained from the Government at least 30 days prior to the training.

-- End of Section --

ATTACHMENT 4
SCADA System

1. GENERAL REQUIREMENTS

The Contractor shall furnish, install, program, start-up, and train the owner in the use of a Supervisory Control and Data Acquisition (SCADA) System (referred to as the System) as described in this specification and the attached drawings.

1.1 DOCUMENTATION

The System shall include adequate documentation for the Owner to set-up and operate the System. The documentation listed in this section is a minimum.

The System shall include the following printed documentation:

- Three sets of SCADA software manuals.
- Three sets of database construction manuals.
- Three sets of instruction manuals for each software module.
- A set of instruction manuals and installation manuals for each field device.

The Contractor shall also provide three sets of this data in electronic format on CDs in a combination of MS Word Documents, AutoCAD drawings, and .PDF form.

1.2 DATABASE CONSTRUCTION

The Contractor shall, at no additional charge to the Owner, develop the real-time database, including each point listed in the point count in Attachment 6 and develop the specified displays. It is the express intent of this specification to require the Contractor to deliver complete and ready for operation a fully functional SCADA system with all data points, displays, controls, alarms, reports, historical archiving, file transfer, security, and backup routines fully functional.

Since some items in the design of the database will require Owner input, the Contractor shall include in his cost all expenses and materials for three full days of on site meetings with the Owner to obtain client input.

1.3 FACTORY ACCEPTANCE TEST

The System shall include a factory acceptance test (FAT) to be witnessed by two Owner staff members. The FAT shall include a demonstration of all features required by this specification provided by the Contractor and shall be for no less than a full day. Prior to the FAT, the Contractor shall complete a full System check out. The FAT shall demonstrate all System features. The Contractor shall provide a written checklist of all features demonstrated.

The FAT will include, as a minimum, one each of every IED connected to the System.

1.4 TECHNICAL SUPPORT

The Contractor shall provide, at no additional charge to the Owner, one year of toll free technical support. Bidders shall include in their Proposal a quotation for subscription to the technical support for the following two years.

1.5 COORDINATION WITH BASE ENERGY MANAGEMENT CONTROL SYSTEM

The Contractor shall ensure, as a specific requirement of this contract, that the equipment provided under this specification shall coordinate with the existing Johnson Controls EMCS Ethernet network. The EMCS network shall provide communications between the remote units and the master station and between the master station and the remote operator stations. The SCADA system shall provide selected real-time data to the EMCS system.

At no additional cost to the owner, the Contractor shall engage the services of the vendor of the Ethernet switches, Allied Telesyn (AT), to configure the switches. The Contractor shall contract with AT to travel to the job site, confer with the base staff and program the network. The bid price shall include any material, labor and expenses.

1.5.1 Communications

The Contractor shall, at no additional expense to the owner, provide the equipment as specified, configured to work with the EMCS system to provide SCADA communications. The Contractor shall participate in at least one full day, 8 hour meeting, on base, to review the coordination requirements. The Contractor shall provide to the Owner a document detailing the specifications of any Ethernet switches provided under this contract and shall request and obtain from the Owner similar information on the EMCS Ethernet switches. The Contractor shall then provide coordination services as required to ensure the SCADA system provides the connectivity, virtual LANS, and quality of service required by this specification.

1.5.2 Data Sharing

It is an explicit requirement of this contract that the Contractor include the engineering and materials required to transfer real-time data to the Johnson Controls EMCS System as described in the technical specifications.

1.6 TRAINING

The Contractor shall provide, at no additional charge to the Owner, on site training as described in this section. The contract price shall include all travel, per diem, materials, supplies, and equipment for the training required by this section. NOTE: As required by this section, a “DAY” of training means availability of the trainer to the staff, onsite, for a full 0800 to 1700 day. Travel time is not to be included in the training days.

- User Training: Minimum three days with instruction and materials for six individuals. Topics shall include the following:
  - Operator Training: Moving within screens, executing controls, tagging procedures, responding to alarms, retrieving relay data (oscillographic), creating reports, saving data to file, and accessing historical data.

- System Administration: Starting and restarting the system, backup procedure, recovery procedures, diagnostic tools, dial-up procedures, review of communications and network equipment, updating software, transfer data to other computers, dynamic linking with the Johnson Controls EMCS System.

- Database Construction: Minimum five days with instruction and materials for six individuals. Topics shall include the following:
  - Addition of new points to the system.
  - Development of new displays.
  - Development of trend graphs.
  - Development of reports.
  - Modifications of the historical data files.
  - Development of new symbols.
  - Screen animation.
  - Development of password security.
  - Development of calculated, pseudo, and manual data points.
  - Development of logical routines.
- Maintenance Training: Minimum two days with instruction and materials for six individuals. Topics shall include the following:
  - Trouble shooting the fiber system.
  - Trouble shooting each of the system components including relays, fiber optic transceivers, network components, and data concentrators.

1.7 STARTUP AND FIELD SUPPORT

The Contractor shall provide, at no additional charge to the Owner, the following field support services as required to install, start and test the system. At the Owner's sole option, the demonstrations shall be witnessed by the Owner or the Owner's designated representative. Startup will include the following items:

- Full and complete installation.
- Installation of all software, database, and displays.
- Start-up of system, initiation of database, required displays, historical database and reports.
- Demonstration of all control points (trip/close and tagging).
- Simulation and demonstration of alarms.
- Demonstration of transceiver loop to radial to loop recovery in response to a loop break and restoration at each node.
- Demonstration of the database editor, display editor, report generator, historical database and dynamic data link to the Johnson Controls EMCS System.

1.8 SOFTWARE UPGRADES

The Contractor shall provide, at no additional charge to the Owner, any upgrades of the operating system, SCADA software or any module provided with the System that are released within one year of final acceptance of the System.

2. TECHNICAL SPECIFICATIONS

The System shall be able to sense, collect, display, and store real time data; control equipment; create alarms; create historical data files; and perform calculations based on monitored points and manually entered data. The System shall be able to do each of the functions described in the following sections.

2.1 GENERAL REQUIREMENTS

As shown in Drawing S-070, the System shall collect data from relays at ten remote sites. The master station shall include redundant control and SQL/Historical servers located in Building 87. The system shall also include two remote operator stations (referred to in this specification as Human Machine Interfaces or HMIs), located in Building 163 and Building 93 and a laptop dial-in remote. The SCADA system shall use the Johnson Controls EMCS Ethernet network as modified in this contract for communications.

2.2 SYSTEM EXPANSION

Each aspect of the hardware and software shall be such that the System can accommodate, without upgrade, a remote point count, database and display library two (2) times the size of the original configuration.

2.3 CONTROL SERVER CONFIGURATION

The development and SCADA servers shall meet the requirements of this section.

2.3.1 Processor

All servers must be XEON Processor System, 2.4 GHz or faster 512 cache.

2.3.2 Memory

Servers shall include a minimum 2 Gb of RAM.

2.3.3 Bus Speed

Servers shall have a minimum 533 MHz bus.

2.3.4 Fixed Storage

Servers shall have SCSI RAID 5 capable hot-swap disk drives and controllers, minimum of four (4) spindles. The minimum usable storage space shall be sufficient for the operating system, the application software, 48 hours of online data, and sufficient spare capacity to double the number of points in the database.

2.3.5 Removable Storage

The SCADA server shall include an internal tape backup system sufficient for the operating system, the application software, 48 hours of online data, and sufficient spare capacity to double the number of points in the database.

The tape drive shall be VXA or DLT format with a minimum data transfer rate of 40 GB/h. The Contractor shall supply two times the sufficient number of cartridges for the minimum storage requirement listed above. The unit shall include a PCI SCSI controller to support the drive.

The Contractor shall provide schedulable automated backup software and ensure the tape drive is compatible with the software.

2.3.6 Chassis

The Server shall be in a tower configuration and include at least eight (8) fixed drive bays and two (2) front accessible drive bays.

2.3.7 Features

The Servers shall include the following features:

- Minimum of 6 RAM slots with at least 4 free for expansion.
- Minimum 512Mb of L2 cache.
- Minimum RAM speed of 400 MHz or greater.
- Minimum 32 Mb video RAM.
- Minimum 48X speed internal DVD/CD-ROM drive.
- 3.5” internal diskette drive.
- Minimum 3 standard height PCI card slots.
- 1 parallel, 2 serial, 2 PS2, 2 USB ports included.
- Dual processor capable motherboard.
- Enhanced keyboard.
- 17 inch flat panel monitor 0.26 dots per inch minimum.
- Microsoft mouse.
- Two 100Mb network interface cards.

2.3.8 Operating System

The Servers shall function in a MS 2000 Server environment. The Contractor shall furnish and assign licensed copies of the software to the Owner.

2.4 SQL/HISTORICAL DATA SERVERS CONFIGURATION

The SQL/Historical Data Servers shall meet the requirements of this section.

2.4.1 Processor

All servers must be XEON dual processor system, 2.4 GHz or faster 512 cache.

2.4.2 Memory

Servers shall include a minimum 2 Gb of RAM.

2.4.3 Bus Speed

Servers shall have a minimum 533 MHz bus.

2.4.4 Fixed Storage

Servers shall have SCSI RAID 5 capable hot-swap disk drives and controllers, minimum of four (4) spindles. The minimum usable storage space shall be sufficient for the operating system, the application software, one year of archived data, and sufficient spare capacity to double the number of points in the database.

2.4.5 Removable Storage

One of the Servers shall include an internal tape backup system sufficient for the operating system, the application software, one year of archived data, and sufficient spare capacity to double the number of points in the database.

The tape drive shall be VXA or DLT format with a minimum data transfer rate of 40 GB/h. The contractor shall supply two times the sufficient number of cartridges for the minimum storage requirements listed above. The unit shall include a PCI SCSI controller to support the drive.

The Contractor shall provide schedulable automated backup software and ensure the tape drive is compatible with the software.

2.4.6 Chassis

The Server shall be in a tower configuration and include at least eight (8) fixed drive bays and two (2) front accessible drive bays.

2.4.7 Features

The Servers shall include the following features:

- Minimum of 6 RAM slots with at least 4 free for expansion.
- Minimum 512Mb of L2 cache.
- Minimum RAM speed of 400 MHz or greater.
- Minimum 32 Mb video RAM.
- Minimum 48X speed internal DVD/CD-ROM drive.
- 3.5” internal diskette drive.
- Minimum 3 standard height PCI card slots.
- 1 parallel, 2 serial, 2 PS2, 2 USB ports included.
- Dual processor capable motherboard.
- 15 inch monitor.

- Enhanced keyboard.
- Microsoft mouse.
- Two 100Mb network interface cards.

2.4.8 Operating System

The Servers shall function in a MS 2000 Server environment. The Contractor shall furnish and assign licensed copies of the software to the Owner.

2.5 WORKSTATION HUMAN MACHINE INTERFACE (HMI)

The System shall also include two remote HMIs workstations that shall meet the requirements of this section.

2.5.1 Processor

All workstations must be P4 processor system, 2.5 GHz or faster 512 cache.

2.5.2 Memory

HMIs shall include a minimum 1 Gb of RAM.

2.5.3 Bus Speed

HMIs shall have a minimum 533 MHz bus.

2.5.4 Fixed Storage

HMIs shall have ATA/100 disk drives and controllers 80 Gb or greater.

2.5.5 Chassis

The HMIs shall be in a tower or desktop configuration and include at least two fixed drive bays and two front accessible drive bays.

2.5.6 Features

The HMIs shall include the following features:

- Minimum of 4 RAM slots with at least 2 free for expansion.
- Minimum 1 Gb of L2 cache.
- Minimum RAM speed of 533 MHz or greater.
- Minimum 32Mb video RAM.
- Minimum 48X speed internal DVD/CD-ROM drive.
- 3.5” internal diskette drive.
- Minimum 2 standard height PCI card slots.
- 1 parallel, 2 serial, 2 PS2, 2 USB ports included.

- Enhanced keyboard.
- 17 inch flat panel monitor 0.26 dots per inch minimum.
- Microsoft mouse.
- One 100Mb network interface card.

2.5.7 Operating System

The HMIs shall function in a MS XP Professional environment. The Contractor shall furnish and assign licensed copies of the software to the Owner.

2.6 LAPTOP HUMAN MACHINE INTERFACE (HMI)

The System shall also include one remote, dial-in laptop HMI. This HMI shall interface to the master station using a dial-up connection. This HMI shall meet the requirements of this section.

2.6.1 Processor

The Laptop HMI must be P4 processor system, 2.2 GHz or faster 512 cache.

2.6.2 Memory

The Laptop HMI shall include a minimum 1 Gb of RAM.

2.6.3 Fixed Storage

The Laptop HMI shall have an 80 Gb hard drive.

2.6.4 Features

The Laptop HMI shall include the following features:

- Minimum 32Mb video RAM.
- Minimum 48X speed internal DVD/CD-ROM drive.
- 3.5” internal diskette drive.
- 1 parallel, 1 serial, 1 PS2, 1 USB ports included.
- 15 inch UXGA (TFT) display (1600x1200) screen.
- Touch pad.
- Microsoft mouse.
- One 100Mb network interface.
- One internal 56k modem.
- Carrying case.
- Spare battery.

- Three year warranty (comparable to DELL CompleteCare®).

2.6.5 Operating System

The Laptop HMI shall function in a MS XP Professional environment. The Contractor shall furnish and assign licensed copies of the software to the Owner.

2.7 SCADA SOFTWARE FUNCTIONAL REQUIREMENTS

The System shall include SCADA application software that meets the requirements of this specification. Each aspect of the software shall be such that the System can accommodate, without upgrade, a remote point count and database two (2) times the size of the original configuration.

2.7.1 Data Acquisition

The System shall be equipped to monitor, display, record, store and perform calculations based on data from intelligent electronic devices (IEDs) discrete status points, discrete analog points, and discrete accumulator points.

The System shall be able to obtain digital data from the station relays using the relay's native protocol.

The System shall be able to automatically retrieve event data from the relays after system events (short circuits, voltage sags, and swells) and display the data in oscillographic format.

2.7.2 Control

The System shall be able to perform control based on operation action, schedules, set-points or executable instruction from an operator developed logical program. The System shall be equipped to provide digital protocol driven, discrete contact, and discrete analog control outputs.

2.7.3 Display

Using the HMIs, the operator shall be able to perform the following functions:

- Activate any device controlled by the System.
- Observe any parameter monitored by the System.
- Alarm important events with an audible alarm.
- Alarm inhibit or enable any single monitored device.
- Change any state name or device operational parameter.
- Add, modify, or delete any device's database entry.
- Silence, acknowledge, and delete any alarm.
- Call a System index of all of the displays and reports.
- Call a display of status of all peripherals and communication lines.
- Call a display showing the number of unacknowledged alarms in each station.

- Call a display showing the most recent alarm events. The display shall accommodate up to 3000 alarm events.
- Call a display showing all points in the System that are alarm inhibited (up to 200).
- Call a display showing all points in the System in an abnormal state or region (up to 200).
- Call a display showing a given set of historical data. This data may either be viewed in a numerical format or compressed pixel resolution graphic trend format.
- Call for a printout of any report or display in the System.
- Page forward or back through a multi-page display with one keystroke per page.
- Return to the previous display with a single keystroke.
- Retrieve, display, store, and modify the spreadsheet program and any files.
- Access to data and control screens shall be configurable on a per console basis. Definition of console assignments to areas of responsibility shall be dynamically re-allocatable on-line.

2.7.4 Calculation

The System shall provide the calculation functions described in this section.

2.7.4.1 The System shall be equipped to provide real time calculated values, derived from any number of System variables or states, using any common arithmetic or trigonometric operators.

2.7.4.2 The master station shall be equipped to link real time, logged, or historical data to a spreadsheet program (MS Excel).

2.7.4.3 The System master station shall be able to use the System clock to complete a variety of calculations. The System shall accept an operator-entered time as defining the reset time for the contract day. The System shall be able to calculate the remaining hours in the contract day and be able to reset calculated points and accumulator registers at the start of the contract day.

2.7.5 Security

The SCADA System shall provide a user name and password system that will have, as a minimum, the following progressive levels of access assignable by user name:

- View displays only.
- View displays, silence alarms.
- View displays, silence alarms, acknowledge alarms.
- View displays, silence alarms, acknowledge alarms, place and remove tags, execute controls.
- View displays, silence alarms, acknowledge alarms, place and remove tags, execute controls, edit database and assign security levels.

The System shall require users at each HMI, including the dial-in unit, to log in and supply a password prior to opening a SCADA session.

2.7.6 Data Sharing

The System shall be delivered configured to perform the data sharing functions listed in this section.

- The master station shall be equipped to link real time, logged, or historical data to a spreadsheet program (MS Excel).
- The System shall be delivered with the ability to transfer a data file to a LAN connected PC. File transfers shall be accomplished using industry standard NTFS file shares.

2.7.7 Printing

The system shall include a network connected printer for printing reports, logs, display captures as selected by the operator. The printer shall be able to print on 8.5 inch by 11 inch, 8.5 inch by 14 inch or 11 inch by 17 inch paper.

2.7.8 Alarm

The System shall produce an audible alarm as described in this section. Each alarm will be able to be assigned per data point to an area of responsibility. Therefore, any alarm that is defined within the System can be reported to any area of responsibility or to multiple areas of responsibility as required.

2.7.8.1 The System will generate an alarm for any of the following conditions:

- An un-commanded change of state in any device controlled by the System.
- Any transgression of limits.
- Any changes of states of devices connected to the System including all of its peripherals.
- Failure by the System to accomplish any commanded action at the remote station.
- Failure of communications channels used by the System.
- Failure of hardware.

2.7.8.2 When one or more alarms occur, the operator will be alerted in several ways:

- The changed point (TABULAR AND/OR ONE-LINE DIAGRAM) will change color to identify the new state and will flash when those specific displays are being viewed by the operator.
- The changed point will be presented to the operator in the alarm-reporting zone of the display that is assigned to annunciate the alarm thereby eliminating the requirement to leave the current display to determine what happened.
- If the current alarm-reporting zone is filled, the total number of alarms in the queue will be displayed. The alarms will be queued to be presented to the operator once he removes those alarms which are currently under display or he may scroll up or down through the list without deleting any alarms. The alphanumeric alarm message appearing both in the alarm-reporting zone and on the alarm and serial printer will be identical.

2.7.8.3 The telemetry processor will provide both a LOW and HIGH limit to be checked. The operator will be able to define both the LOW and HIGH limits online without requiring access to the Database Generator/Modifier.

2.7.8.4 The master station will be equipped with a dialer System that will be able to call up to five telephone numbers in response to certain critical events. The dialer will deliver prerecorded voice messages and will have a method for confirming receipt of the messages.

2.8 SOFTWARE MODULES

The System shall provide the functions described by the following sections.

2.8.1 Display Generator/Editor

The Display Generator/Editor will generate, modify, or delete displays via interactive procedures. The primary use will be for adding one-line diagrams and station status displays and modifying directories and menus. The Generator/Editor will allow the operator to construct displays, link dynamic fields with the database, and store displays on mass memory.

The display definition process will involve interactive user commands that create displays to be generated by the Display Processor in conjunction with the various device handlers. As a minimum, the operator will be able to edit the following parameters per display:

- Display name.
- Area of responsibility.
- Telemetry refresh rate (fast and slow) with the *fast* rate a minimum of 2 seconds.
- Linkages to other related displays - both direct vectors and poke points.
- Definition of display areas/zones/windows including one-line diagram, alarm reporting, control execution, operator input, and System response zones.
- Definition of color for status states, bus, or line colors (minimum 64 combinations).
- Definition of symbol and color for each status point, both symbol and color must be definable per status state.
- Display of status or data values either vertically or horizontally.
- Definition when to force data values to zero when value is close to zero to keep from displaying noise for zero flow (definable by point in engineering units).
- Definition of leading zero suppression per data point.
- Definition of format for each data point using either integer or FORTRAN like format codes.
- Definition of sign character for each data point (+, -, $\leq$, $\geq$, up arrow, or down arrow, etc.) or suppress sign altogether.
- Definition of telemetry points as both digital and bar graph on the same display with selectable colors and characters for bar graphs.

- Definition of *point deactivation* and *inhibit* symbols with color for all status, data values, and control points.
- Definition of all control targets for control points.

Each display to be created or modified will have a numeric or alphanumeric name that allows symbolic reference to the particular display, not only at display edit time but also when the user actually causes the display to appear on the appropriate display device. The user-entered display definitions will be stored in disc-resident display definition files for later use by both the Display Generator/Modifier and the Display Processor.

All displays will contain a mixed background of titles, headers, etc., and dynamic data which can be user-entered or merely displayed data. The fixed background shall remain constant regardless of dynamic data content. The dynamic data, on the other hand, shall depend on current data values, either database-resident or user-associated dynamic data fields. Both schematic and tabular displays will be definable using the Display Generator/Modifier. As a minimum, the System will support 1,000 graphic displays.

2.8.2 SCADA Command Processor

The Contractor will supply a SCADA Command Processor which will permit the operator to develop special algorithms that deal with computational parameters for status, telemetry and/or accumulator data and also for developing control outputs based upon results of an operator developed algorithm. A non-programmer should be able to develop control and computational algorithms without having to be familiar with programming or having any familiarity with the System's database, or with the operating system. The SCADA Command Processor will allow a user to access any data within the System's database, perform computations upon that data, and either place the results back into the System's database or, based upon the results, generate System outputs. The following is an abbreviated list of the functions that will be supported under the SCADA Command Processor:

- Algebraic functions - addition, subtraction, multiplication and division.
- Trigonometric functions - sine, cosine, tangent, and all arc functions.
- Log functions - base e or base 10.
- Boolean functions - AND, NOT, OR, NOR and inclusive OR.
- Conditional branch instructions - such as branch if odd, if even, if greater than, if less than, or if equal to.
- Unconditional branch instructions.
- Read operation - such as read a status point or a data quantity from the System's database.
- Write operations - such as write a status point or a data quantity to the System's database.
- Schedule function - another program, itself, log, report, etc.
- Time/data function - read System date/time for schedule function.
- Stop execution and resume after a fixed delay.

- Generate an alarm - handled as a normal alarm.
- Generate a control action - handled as a normal control operation.

2.8.3 Programmer Support Software

The Contractor will furnish programmer support software which will allow the creation of new programs that coordinate with the supplied System. An interface to the real-time database is required to provide both read and write access to the real-time data from newly created programs.

2.8.4 Alarm Processing

The Contractor will provide an Advanced Alarm Processor software package that will work with the Knowledge-Based Alarm Processor. The System will provide the following additional alarm processing features:

- Emergency Limits - a second set of high and low limits for each analog data point will be provided to provide "emergency" high and low limit alarms.
- Rate-of-Change Limit - each point will be checked against a rate-of-change limit. This limit will include a definable deviation over a specified time for limit violation.
- Reasonability Limits - all operator-entered values will be checked against a set of "reasonability" limits and an alarm generated if values are entered which exceed the limits.

2.8.5 Historical Analysis and Report Generation

The Contractor will provide a Historical Analysis and Report Generation software feature that will permit the capture of real-time (telemetry and accumulator), calculated, and manually entered data in the computer's real-time database. This data will be saved on disc for generation of daily, weekly, monthly, quarterly and yearly reports.

The software will allow the Purchaser the flexibility of determining which data and at what rate the data will be captured. The software provided will have the following features and capabilities:

- The Purchaser will be able to specify a minimum of 3,000 points for data capture defined at intervals of 5, 15, 30 or 60 minutes. The captured data will be archived to the hard disc with only the disc size limiting the length of time the data may be retained. As a minimum, however, the disc will be sized for at least twelve (12) month's of data.
- The software will determine the daily peak and monthly peak for each value captured and save both the peak value, date of peak and time of occurrence.
- The software will permit calculations to be performed on the captured data and the calculated values kept in place of, or in addition to, the original data.
- A report writer will be provided which permits the generation of reports from the stored data on a daily, weekly, quarterly, monthly and yearly basis. The report writer will permit the Purchaser to develop his own report formats with their schedules and allow data manipulations, computations, summations, etc., to be made at report generation time.

- The software will also permit the historical data to be stored to disk for later analysis and report generation.

2.8.6 Data Trending

The Contractor will provide a Data Trending function that will allow any data value to be captured, saved and displayed in a "Strip Chart" format. The following are the minimum trending requirements:

- The trending package must support the ability to continuously capture at least 1,024 samples of up to 64 data values assigned to the System's database at any rate from one (1.0) second to one (1.0) hour for trending presentation.
- From any trending display, the operator will be able to select any point in the System's database for trending. During selection, the operator will also be able to specify the data capture rate. The data collection will then run continuously, saving the last 1,024 data samples until deactivated.
- The trending display software will permit multiple trend displays with up to four variables on the same display on the same axis or on separate axes definable by the Purchaser.
- The trending displays will have graphics with no greater than one pixel per data plot, on a 1280 x 1024 pixel resolution display.
- The trend axis will be automatically scaled in time and engineering units based upon the data point under trend.
- The database data point limits will also be available for presentation on each trend with color presentation to identify when any trend point has exceeded its assigned limits.
- Once any point is under trend, the associated trend display will be updated at the data capture rate specified, unless more than one point is under display; at which time the trend display will be updated at the fastest rate specified for the point under trend.
- The operator will have the ability to window through all 1,024 data samples of the data point under trend. Therefore the history of any point under trend may be viewed by the operator.

2.8.7 Geographic Information System (GIS) Interface

The graphics subsystem must support the ability to allow the user to integrate data from a Geographic Information System (GIS) into the SCADA System. This integration will allow customers to import their graphical data from an AM/FM and CAD system into the master station for use as SCADA displays.

The System must support a variety of widely accepted, defacto, interchange standards for the import of graphical data. As a minimum, DXF is required. Also, as a minimum, the Contractor must be able to provide tools that support importing graphical data into the SCADA System to be used as information displays, or as the background and foreground elements for a fully animated display. Tools must be provided to support the animation of two and three state real-time driven devices and to support color modification of lines and devices based on analog real-time values.

The SCADA System's LAN/WAN technology must be able to support connection to a GIS network and support the ability to move GIS files to the SCADA System using industry standard networking products.

The imported map must interface to the real time SCADA System so that the map's dynamic elements exactly reflect the status of all devices in the field. This data must be updated on any displayed map at the same frequency as for the one-lines. The SCADA System must also be able to layer real time analog data on top of the map data, such as flows. Analog data must be updated on the map at the same frequency as for the one-lines. Any real-time data (status, analog or control) should be able to be defined for any single or combination of declutter ranges. Each map or screen shall be able to have a different declutter task.

The full graphics SCADA System must provide 256 declutter levels when displaying mapping data. The user must be able to define the declutter levels, including when declutter is used, and the types of data that are shown on the mapping display at any declutter level.

2.9 DIAL-UP COMMUNICATIONS

The System shall support two separate dial-up communication ports. One shall be for remote HMI connections to view displays, acknowledge alarms or issue control commands. The other shall be for remote diagnosis and technical support by the vendor.

2.10 PROTOCOL

The Contractor shall supply the necessary drivers to communicate with specified relays using native relay protocol. The System shall also be able to communicate with future IEDs using DNP 3.0.

2.11 DISPLAYS

The Contractor shall deliver the System with the displays described in this section installed and functional.

2.11.1 System One-Line

The one-line shall include the entire 12.47 kV system and shall have the following features:

- Totalized MW and Mvar for Substation 1 and Substation 2.
- The following engineering data for Substation 1 and 2 and each Sectionalizing Station:
  - MW.
  - Power factor (three phase).
  - Bus volts for each phase (kVA phase to ground).
  - Phase currents for each line serving a station (amps).
- Breaker position for each 12.47 kV breaker (Red =closed, Green =open).
- Connectivity (Buses and lines energized from Sub 1 shall be one color (Owner selected); buses and lines energized from Sub 2 shall be a second color (Owner selected); dead bus and lines shall be a third color (Owner selected)). The colors shall change dynamically as the system is switched.
- Targets for each station to link the display to one-lines of each station.

2.11.2 MWh and Mvarh Data

This tabular display shall display the MWh and Mvarh data for Substation 1 and 2 for each metering interval for the current day. As the day progresses, the table will fill in the usage for each meter interval based on the accumulator data obtained from the CP&L Form C contacts (see Section 2.12.3 of this specification). The table will include a column for usage and demand for each interval. The display shall also display a calculated value labeled "Projected Demand for the Current Interval" based on a linear extrapolation of the current count divided by the length of the interval times the elapsed time in the current interval. This display shall also list the date, time, and the demand for the historical peak demand.

2.11.3 Station One-Lines

Station one-lines shall include the following data:

- MW.
- Power factor (three phase).
- Bus volts for each phase (kVA phase to ground).
- Phase currents for each breaker (amps).
- Station battery voltage.

- Breaker position for each 12.47 kV breaker (Red =closed, Green =open).
- Targets for each breaker to link the display to breaker control display.
- Targets to link the display to a station relay target summary display.
- Targets to link the display to a station communications summary display.

2.11.4 Breaker Control Display

The Breaker Control Display shall include the following features:

- Breaker Control - The pushbuttons in this area shall allow the operator to control the relay functions. The controllable functions are ground relay, recloser relay and remote control. If the feature is enabled, the text on the enable pushbutton will be grayed out and the text on the disable pushbutton will be black. If the feature is disabled, then the disable text will be grayed out and the enable text will be black.
- Breaker Status Display - This area of the breaker control screen functions the same as the Breaker Information area of the substation one line screen.
- Breaker Name/Description - This area on the breaker control screen displays the breaker name and some descriptive text.
- Metering Data Display - Metering data from the attached relay is displayed in this area. The data includes line currents, phase-to-phase voltages, real power, reactive power, and power factor.
- Breaker Control Status Display - This area of the breaker control screen displays the status of the breaker alarms and controls. The items displayed here include ground relay, recloser relay, remote control, spring energy, trip coil, and mirrored bits. If a feature is in the disabled state or alarm state, the text will be red.

- Tag Set/Remove Controls - These pushbuttons allow the operator to set/remove tags. If the tag is not set, then the apply text will be black and the remove text will be grayed out. It the tag is set then the remove text will be black and the apply text will be grayed out.
- Last Fault Data Display - This area of the breaker control screen displays the fault location, fault type and shout count from the last system fault.
- Breaker Trip/Close Controls - These pushbuttons allow the operator to trip and close the breaker. If the breaker is open then the trip text will be grayed out and the close text will be black. If the breaker is closed, then the trip text will be black and the close text will be grayed out.
- Relay Front Panel Targets Display - This area of the breaker control screen displays the relay front panel targets.
- Relay Front Panel Targets Reset Pushbutton - This pushbutton allows the operator to reset the relay front panel targets.

2.11.5 Relay Target Summary Display

The Relay Target Summary Display shall mimic the relay front panel targets of each relay in the station. The operators shall be able to reset the front panel targets for any of the relays in the substation.

This screen shall also provide relay alarm and substation battery voltage indication.

2.11.6 Communications Summary Display

This screen shall show the status of the communication lines from the master station to the data concentrator for the particular station and from the data concentrator to the relays.

2.11.7 Communications Statistics

This display shall be a tabular listing of each data concentrator with the following data for each unit"

- Communication status.
- Number of communications since last reset.
- Total good replies since last reset.
- Total bad replies since last reset.
- Total no replies since last reset.
- Reset target for statistics.

2.11.8 Analog Summary

This display shall be a tabular summary of all analog points with current value color coded [green = normal, yellow = warning level alarm (high or low), red = emergency (high or low), cyan = out of reasonability limits (high or low)]. The operator shall be able to page up and down within the display to see the entire list without changing the display.

2.11.9 Status Summary

This display shall be a tabular summary of all status points with current state color coded [green = normal state, red = abnormal state, yellow = transition (for multi-state points), cyan = illegal state (for multi-state points)]. The operator shall be able to page up and down within the display to see the entire list without changing the display.

2.11.10 Alarm Summary

This display shall be a tabular summary of all unacknowledged alarms. The operator shall be able to page up and down within the display to see the entire list without changing the display.

2.12 DATA CONCENTRATORS

The SCADA System shall provide the interface to IEDs for substation data acquisition and control by means of a suitable substation data concentrator or substation gateway. The substation data concentrator or gateway shall be able to acquire all data items from the substation IEDs and provide control for power equipment via the IEDs. The data concentrator shall operate a star communications network within the station and provide a combination of functions including Boolean logic processing, automatic transmission of outgoing messages and parsing of responses, data scaling, data aggregation, simultaneous collection of data from up to 16 slave devices and simultaneous data access for multiple master devices. Specific operational and functional requirements are as follows:

2.12.1 Relay Communications

The data concentrator shall communicate with SEL 351S relays using SEL native protocol or DNP 3.0.

2.12.2 Input/Output

There shall be an optional input/output module with 16 optoisolated inputs and 4 outputs. There shall be three types of inputs available rated for operation at a nominal 48 VDC, 125 VDC, or 250 VDC. The inputs shall draw no more than 4 mA when nominal control voltage is applied. The outputs shall be contact type with a 30 A make and 6 A carry with MOV protection.

2.12.3 Accumulator Inputs

The data concentrators at Substation 1 and Substation 2 (or an IED provided by the Contractor to meet the requirements of this section of the specification) shall accept Form C pulse contacts inputs. There shall be three sets of accumulators at each substation (MW-in, Mvar-in, Mvar-out). The data concentrator shall also accept a Form A pulse contact as an end of interval signal. After the end of the interval the data concentrator shall store the current count in a register and freeze that value. The data concentrator shall report the frozen value and the current value to the master station at the regular polling interval. The data concentrator shall have provisions to deal with rollover so that no data is lost at rollover.

The data concentrator shall communicate with the pulse counting meters at Substations 1 and 2 using Modbus or DNP 3.0.

2.12.4 Alarm Output

There shall be an alarm contact output programmed to signal internal errors and malfunctions. The alarm contact shall be programmable so that the alarm conditions that activate the output can include additional conditions with the data concentrator, collected data, and the results of logical and mathematical calculations. The alarm contact shall be configurable to operate as a Form A or Form B contact.

2.12.5 EIA-232 Ports

The data concentrator shall have one front panel and 16 rear panel ports using standard DB-9 connectors and MOV protection. Two pins on each port shall be available as a demodulated IRIG-B time synchronization signal. One rear port shall be capable of receiving a demodulated IRIG-B signal. Six rear ports shall have a selectable +5 VDC output on Pin 1. Each rear port shall be capable of operation at 300–9200 bps.

2.12.6 Password Security

The data concentrator shall have a multilevel password system requiring that progression through lower levels to reach higher levels. The passwords shall be user configurable and allow up to 12 characters including case sensitive letters, digits, and special characters including !@#$%^&*()-_=+;:,<.>/?"'\|. There shall be a jumper to allow emergency password disable. This password scheme meets or exceeds all of the requirements of the DOE Password Guide (DOE G 205.3-1).

2.12.7 Protocol Card Slots

There shall be two slots that allow installation of field-installable protocol cards. The data concentrator shall automatically recognize and communicate with the protocol cards.

2.12.8 Database

Each port shall have a separate database that allows data collection and labeling. Manipulation of data within the databases shall be available via label reference or memory address reference. There shall be a programmable user region that allows the data transfer, data scaling and offset, arithmetic operations, Boolean combinations, and data concentration.

2.12.9 Configuration

Configuration of messages and data processing functions shall be through simple message commands and data movement equations that do not require specific knowledge or tools for programming in C or other programming languages. Configuration of messages for data collection with SEL devices shall include automatic parsing and labeling of data.

2.12.10 Outgoing Messages

The data concentrator shall be capable of sending outgoing messages triggered based on collected data, calculated data, time of day, and periodic time functions. Outgoing messages can contain any binary or ASCII character, internal database registers, and automatic CRC checksum calculation.

2.12.11 Incoming Messages

In response to an outgoing message, the data concentrator shall be capable of ignoring the response or parsing as ASCII integer, ASCII floating point, character string, integer string, integer string with XON/XOFF, and flexible parsing. Flexible parsing shall be capable of handling messages that contain numbers that may be replaced with non-numeric text temporarily through a system of decode equations.

2.12.12 Auto-Configuration

The data concentrator shall be capable of automatically communicating with SEL devices to determine communication parameters and features of the connected device.

2.12.13 Interleaved Conversations

The data concentrator shall be capable of simultaneous ASCII, binary, and IRIG-B communications with connected SEL relays over a single communications cable or with the addition of transceivers over a single fiber-optic pair. The collection of status and measurement data and control operations from master devices connected to the data concentrator shall not be interrupted by ASCII engineering conversations with the relay over the same cable.

2.12.14 DNP 3.0

The data concentrator shall be capable of operating as a DNP Level 2 Slave. The data concentrator shall allow configuration of any incoming data or data calculated within the data concentrator to be available through the DNP interface. All control points within the data concentrator shall be available as DNP control points using latch on/latch off, pulse on/pulse off, or trip/close control functions.

2.12.15 Modbus

The data concentrator shall be capable of operating as a Modbus slave simultaneously on as many as three ports. The Modbus slave implementation shall allow direct access to any register within the data concentrator. The Modbus implementation shall allow control of any control point within the data concentrator.

2.12.16 Boolean Equation Processing

The data concentrator shall process Boolean equation statements for the purposes of triggering outgoing messages and control actions and combining collected data for retrieval by master devices.

2.12.17 Configuration Storage

The data concentrator shall store all settings and configuration in nonvolatile memory allowing recovery after prolonged loss of power including failure of the internal battery.

2.12.18 Nonvolatile Storage

There shall be an option for 2MB of flash memory used as nonvolatile storage of incoming and calculated data within the data concentrator. Data stored in the nonvolatile memory shall be available for retrieval after sustained power outage including failure of the internal battery.

2.12.19 Power Supply

The data concentrator shall be capable of operating on a wide range of power supply voltages and shall be available with one of three power supply types: 85–350 VDC or 85–264 VAC, 38–200 VDC or 85–140 VAC, or 20–60 VDC. Units supplied shall be appropriate for the DC voltages listed in the following table:

STATION	VOLTAGE
Substation 1	125 VDC
Substation 2	125 VDC
Sectionalizing Station A	125 VDC
Sectionalizing Station B	125 VDC
Sectionalizing Station C	125 VDC
Sectionalizing Station D	125 VDC
Sectionalizing Station E	48 VDC
Sectionalizing Station F	125 VDC
Sectionalizing Station G	48 VDC
Sectionalizing Station H	125 VDC

2.12.20 Temperature

The data concentrator shall be capable of continuous operation over a temperature range of –40 C to +85C to allow mounting in an outdoor control cubicle or in case of the failure of enclosure heating or cooling. The data concentrator shall be type tested to IEC 60068-2-1: 1990 (Test Ad 16 hr @ –40 C), IEC 60068-2-2: 1974 (Test Bd 16 hr @ +85 C), and IEC 60068-2-30: 1980 (Test Db 12 + 12-hour cycle @ 55 C, 6 cycles).

2.12.21 Environmental Testing

The data concentrator shall be tested to the same standards as protective relays including IEC 60255-21-1, IEC 60255-21-2, IEC 60255-21-3, IEC 60255-22- 1, IEC 60255-22-2, EN 61000-4-2, IEC 60255-22-3, IEC 60255-22-4, EN 61000-4-4, and IEEE C37.90.1.

2.13 SCADA SYSTEM COMMUNICATIONS

The SCADA system shall use the existing EMCS network for communications. The Contractor shall furnish, install, configure, and test the network components described in this specification and shown on the drawings.

2.13.1 VLANS

The Contactor shall configure the proposed switches and the existing network to provide the VLANs as specified in this section. The VLANs shall be port based. The network shall be configured to give traffic from the substation switches to the SCADA severs and the Development server the highest priority. No other traffic on the network shall have this level of priority or higher. Traffic from the remote HMIs to the SCADA server and the development server shall have the next highest level of priority. No other traffic on the network shall have this level of priority or higher with the exception of the substation traffic.

2.13.1.1 Substation VLANs

The Contractors shall configure the master station Ethernet switch for separate virtual LANs to each of the remote ten substation sites (Substations 1 and 2 and Sectionalizing Stations A-H). For each of the ten remote substation sites there shall be three VLANs, one for the SCADA Server, one for the Development Server and one for teleport data. The substation VLANs shall be assigned the highest level of priority and shall have a guaranteed minimum bandwidth of 100 kbps.

2.13.1.2 Remote Operator Station VLANs

The Contractor shall configure the master station Ethernet switch for separate virtual LANs to each of the two remote operator station HMIs (Building 163 and Building 93). The HMI VLANs shall be assigned the second highest level of priority and shall have a guaranteed minimum bandwidth of 10 Mbps.

2.13.2 MEDIA CONVERTERS

The Contractor shall furnish and install multimode to single mode media converters as shown on the drawings. The units shall be Allied Telesyn. AT-MC104XL-10. The units shall be mounted in a chassis provided by others. Each chassis shall include a 120 VAC, 3A power supply provided by others. The contractor shall furnish and install duplex multi-mode jumpers to connect the media converters to the EMCS system switches. The contractor shall furnish one spare each of the media converter and the duplex jumper.

2.13.3 MASTER STATION ETHERNET SWITCH

The Master Station Ethernet switch shall be Allied Telesyn AT-8724XL-10 furnished with one single-mode optical 1000 megabit uplink port, one single-mode optical 100 megabit up-link port and twenty-four 10/100 megabit RJ-45 CAT 5 ports. The units shall be furnished with a redundant power supply.

2.13.4 REMOTE OPERATOR STATION ETHERNET SWITCH

The remote operator station HMIs (buildings 163 and 93) Ethernet switches shall be Allied Telesyn FS705L-10 furnished with one 10/100 RJ-45 CAT 5 uplink port and five 10/100 megabit RJ-45 CAT 5 ports. Each switch shall be furnished with a compatible 100 megabit single mode fiber to RJ-45 CAT 5 media converter Allied Telesyn MC103 XL. The Contractor shall furnish one spare each of the media converter and the switch.

2.13.5 SUBSTATION ETHERNET SWITCHES

Each substation and sectionalizing station Ethernet switch shall be a 6K16V with two 10/100 single mode fiber optic ports and six 10/100 RJ-45 CAT 5 ports and shall be installed with three 10/100 ports connected and properly configured to each data concentrator. One port shall be configured to communicate with the Master Station SCADA Server, one port shall be configured to communicate with the Master Station Development Server and one port shall be for remote teleport communications with relays to obtain oscillographic data and configure relays. The Contractor shall furnish one spare each of the port module and the switch.

The units shall accept the voltage supply as shown in the following table:

STATION	VOLTAGE
Substation 1	125 VDC
Substation 2	125 VDC

Sectionalizing Station A	125 VDC
Sectionalizing Station B	125 VDC
Sectionalizing Station C	125 VDC
Sectionalizing Station D	125 VDC
Sectionalizing Station E	48 VDC
Sectionalizing Station F	125 VDC
Sectionalizing Station G	48 VDC
Sectionalizing Station H	125 VDC

2.14 EXTERNAL MODEMS

The external modems shall be US Robotics USR3453B or equal and shall include the following features:

- ITU V.92/V.90 up to 56 Kbps downloads.
- Data: V.92, V.90, V.34, V.32bis, V.32, V.22bis, V.22, V.23, and V.21.
- ITU V.34 at 33.6 Kbps or 28.8 Kbps.
- V.32 at 19.2 Kbps (21.6 Kbps between Courier modems with ASL).
- ITU V.32bis at 14.4 Kbps.
- HST at 16.8 Kbps.
- Data Error Control; Compression: V.42/V42bis and MNP2-4/5.
- ITU V.27ter at 7200 bps, Group III, TIA/EIA 578.
- Class 1, and TIA/EIA 592 Class 2.0.
- Quick Reference Card.
- Installation CD-ROM.

The Contractor shall furnish 3 meter serial cables and 12 meter RJ 11 phone cords.

2.15 MASTER STATION AND HMI FURNITURE.

The Contractor shall furnish four sets of computer workstation furniture for the master station and the two HMI stations including a dual setup for the both the SCADA Server and Development Server Station and the Historical Servers complete with two chairs; two work surfaces with adequate space for the monitor, mouse, and space for a set of 11inch by 17 inch drawings; two server platforms; and a separate table for the network printer. The two HMI units shall each include a chair, work surface with adequate space for the monitor, mouse, and space for a set of 11inch by 17 inch drawings; and the server platform. All four units shall have integrated power strips with at least 100% spare capacity and shelf space for the SCADA documentation.

The Contractor shall submit color samples for owner approval during shop drawing review. The equipment shall be similar in quality and features to the Mayline E*lan Racking System or HON Director series.

Equipment shall be equal to, or of superior quality to, the following HON Director Series.

Location	Quantity	Part No.	Description
Master Station	2	LANST72TG2S	72” Station Tops (Shelving)
	2	LANST72FS	72” Station Frame
	4	850000	Articulating keyboard Platform with Mouse Tray
	4		Chairs
HMI	2	LANST48TG2S	48” Station Tops (Shelving)
	2	LANST48FS	48” Station Frame
	2	850000	Articulating keyboard Platform with Mouse Tray
	2		Chairs

Spec Attachment 5
POINT COUNT- BID SET

MCAS Cherry Point, NC **21 November 2003**

NOTE: This version of the point count is an abridged version of the point count and includes the points for one SEL 351 relay and one Watt-hour Meter. These points are typical for each relay and each meter.

This workbook lists the points the Contractor shall develop for the SCADA system database. This list is not inclusive of all the points available in the field devices. It is the minimum number of points the Contractor shall create for display, alarm, control, reports, trending, and historical data collection.

The Contractor shall create other points, as required to implement any of the features required in the specification.

This list is based on using the SEL 351 S as the primary field device. Each breaker, with the exception of the tie breakers shall have a SEL 351 S (80 units). Indication and control of the tie breakers shall be accomplished using the auxiliary I/O points on the SEL 351 S. The bus differential relay targets shall also be inputs to the 351S discrete I/O.

This list is formatted to print a separate page for each relay for analog inputs, status inputs, and control outputs. The accumulators inputs for both Substation 1 and 2 are on one page.

Points Summary

Analog	2252
Status	2720
Accumulator	14
Control Outputs	1200
TOTAL	6186

The first data point in each relay is highlighted in grey.
The last data point in each relay is highlighted in yellow.

The circuit names are adapted from the SKM short circuit analysis one-line diagram. The relay numbering (1-80) begins with Substation 1, 2, then A-H reading from left to right across the one-line.

The Contractor shall work with the owner to complete the Analog Alarm Levels table prior to completing the database.

This point count is an attachment to, and therefore part of, the specifications for this project.

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
SUB-1 001		Existing	New				
	SUB1 MAIN PH Bkr 1	(3) BASLER BE1-50/51 B Type 50/51	SEL-351S	12,470V	3000/5A 3000/5 tap	Tap = 5.0 (3,000A) Curve = M(Moderate) Time Dial = 3.4 INST = Disable INST Definite Time = .01 (Std.)	51P1 Tap = 5.0 (3,000A) Curve = U1 (Moderate) Time Dial = 5.18 50P1 Tap = None (Inst.)
	SUB1 MAIN GN	(1) SAME	SEL-351 S		Residual	Tap = 1.0 (600A) Curve = M(Moderate) Time Dial = 6.0 INST = Disable INST Definite Time = .01 (Std.)	51G1 Tap = 1.5 (900A) Curve = U1 (Moderate) Time Dial = 7.5 50G1 Tap = None (Inst.)
	FDR CKT-1 PH Bkr 2	New Circuit	SEL-351 S	12,470 V	1200/5A 1200/5 tap		51P1 Tap = 5.0 (1,200A) Curve = U3 (Very Inverse) Time Dial = 12.2 50P1 Tap = None (Inst.)
	FDR CKT-1 GN	New Circuit	SEL-351 S		Residual		51G1 Tap = 1.5 (360A) Curve = U3 (Very Inverse) Time Dial = 12.25 50G1 Tap = None (Inst.)
	FDR CAPEHART PH Bkr 2	(3) GE IAC53A803A Type 51 Very Inverse Curve	SEL-351 S	12,470V	1200/5A 400/5 tap	Tap = 5.0 (400A) Time Dial = 9.0 INST = Disable	51P1 Tap = 5.2 (416A) Curve = U3 (Very Inverse) Time Dial = 10.0 50P1 Tap = None (Inst.)
	FDR CAPEHART GN	(1) GE IAC53B805A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 3.0 (240A) Time Dial = 9.0 INST = Disable	51G1 Tap = 1.0 (80A) Curve = U3 (Very Inverse) Time Dial = 4.0 50G1 Tap = None (Inst.)
	FDR CAPEHART RECL.	GE ACR11B17A Type 79 - RECLOSURE	SEL-351 S			#1 = INST #2 = 16 SEC #3 = 10 SEC	#1 = INST #2 = 16 SEC #3 = 10 SEC
	FDR CKT-2 PH Bkr 3	New Circuit	SEL-351 S	12,470 V	1200/5A 1200/5 tap		51P1 Tap = 5.0 (1,200A) Curve = U3 (Very Inverse) Time Dial = 12.2 50P1 Tap = None (Inst.)
	FDR CKT-2 GN	New Circuit	SEL-351 S		Residual		51G1 Tap = 1.5 (360A) Curve = U3 (Very Inverse) Time Dial = 12.25 50G1 Tap = None (Inst.)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
SUB-1 001		Existing	New				
	Z FDR PH Bkr 4	(3) GE IAC53A803A Type 51 Very Inverse Curve	SEL-351 S	12,470V	1200/5A 800/5 tap	Tap = 6.0 (480A) Time Dial = 9.0 INST = Disable	51P1 Tap = 4.5 (720A) Curve = U3 (Very Inverse) Time Dial = 9.5 50P1 Tap = None (Inst.)
	Z FDR GN	(1) GE IAC53B805A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 3.0 (240A) Time Dial = 9.0 INST = Disable	51G1 Tap = 0.5 (80 A) Curve = U3 (Very Inverse) Time Dial = 4 50G1 Tap = None (Inst.)
	Z FDR RECL	GE ACR11B17A Type 79 - RECLOSURE	SEL-351 S			#1 = INST #2 = 10 SEC #3 = 17 SEC	#1 = INST #2 = 10 SEC #3 = 17 SEC
	SPARE PH Bkr 5	New Circuit	SEL-351 S	12,470 V	1200/5A 1200/5 tap		51P1 Tap = 5.0 (1,200A) Curve = U3 (Very Inverse) Time Dial = 12.2 50P1 Tap = None (Inst.)
	SPARE GN	New Circuit	SEL-351 S		Residual		51G1 Tap = 1.5 (360A) Curve = U3 (Very Inverse) Time Dial = 12.25 50G1 Tap = None (Inst.)
	SUB1 MAIN DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		3000/5A 3000/5 tap	87L = 100V 87H = 2A	87L = 100V 87H = 2A

Bus Name/ID SUB-2 002	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
		Existing	New				
	SUB2 MAIN PH Bkr 14	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	3000/5A 3000/5 tap	Tap = 2.5 (1500A) Time Dial = 7.0 INST = Disabled	51P1 Tap = 2.5 (1,500A) Curve = U3 (Very Inverse) Time Dial = 6.9 50P1 Tap = None (Inst.)
	SUB2 MAIN GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.0 (600A) Time Dial = 10.0 INST = Disabled	51G1 Tap = 1.1 (660A) Curve = U2 (Inverse) Time Dial = 6 50G1 Tap = None (None
	SUB2 MAIN DIFF	(3) PVD21B1A Type 87 DIFFERENTIAL	____		3000/5A 3000/5 tap	87L = 100V 87H = 2A	N/C
	FDR CKT-3 PH Bkr 34	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 1200/5 tap	LTPU = 5.0 (1200A) Time Dial = 40.0 INST = Disable	51P1 Tap = 5.0 (1,200A) Curve = U3 (Very Inverse) Time Dial = 6.58 50P1 Tap = None (Inst.)
	FDR CKT-3 GN	(1) SAME	SEL-351 S		Residual	LTPU = 1.5 (360A) Time Dial = 50.0 INST = Disable	51G1 Tap = 2 .0 (480A) Curve = U3 (Very Inverse) Time Dial = 8.9 50G1 Tap = None (Non e
	FDR CKT-4 PH Bkr 44	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 1200/5 tap	LTPU = 5.0 (1200A) Time Dial = 40.0 INST = Disable	51P1 Tap = 5.0 (1,200A) Curve = U3 (Very Inverse) Time Dial = 6.58 50P1 Tap = None (Inst.)
	FDR CKT-4 GN	(1) SAME	SEL-351 S		Residual	LTPU = 1.5 (360A) Time Dial = 50.0 INST = Disable	51G1 Tap = 2 .0 (480A) Curve = U3 (Very Inverse) Time Dial = 8.9 50G1 Tap = None (None

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
H STATION 005		Existing	New				
	FDR CKT1 MAIN PH (Does Not Coordinate with dist feeder ckts during temporary transfers but coordinates with transfer bus)		SEL-351 S	12,470V	1200/5A 1200/5 tap		51P1 Tap = 4.0 (960A) Curve = U2 (Inverse) Time Dial = 1.03 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir) 51P2 Tap = 3.3 (792A) Curve = U3 (Very Inverse) Time Dial = 11.3 50P2 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) 51P3 Tap = 1.33 (320A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P3 Tap = None (Inst.) 51P3TC = 32PR (Reverse Dir)
	FDR CKT 1 MAIN GN (Does Not Coordinate with dist feeder ckts during temporary transfers but coordinates with transfer bus)		SEL-351 S		Residual		51G1 Tap = 0.8 (192A) Curve = U3 (Very Inverse) Time Dial = 0.7 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir) 51G2 Tap = 1.13 (270A) Curve = U3 (Very Inverse) Time Dial = 9.3 50G2 Tap = None (None) 51G2TC = 32GR (Reverse Dir) 51G3 Tap = 0.5 (120A) Curve = U3 (Very Inverse) Time Dial = 9 50G3 Tap = None (None) 51G3TC = 32GR (Reverse Dir)
	BUS DIFF W		SEL-587Z		1200/5A 1200/5 tap		87L = 75V 87H = 2A

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
H STATION 005		Existing	New				
	FDR CKT 2 MAIN PH (Does Not Coordinate with dist feeder ckts during temporary transfers but coordinates with transfer bus)		SEL-351 S	12,470V	1200/5A 1200/5 tap		51P1 Tap = 4.0 (960A) Curve = U2 (Inverse) Time Dial = 1.03 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir) 51P2 Tap = 3.3 (792A) Curve = U3 (Very Inverse) Time Dial = 11.3 50P2 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) 51P3 Tap = 1.33 (320A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P3 Tap = None (Inst.) 51P3TC = 32PR (Reverse Dir)
	FDR CKT 2 MAIN GN (Does Not Coordinate with dist feeder ckts during temporary transfers but coordinates with transfer bus)		SEL-351 S		Residual		51G1 Tap = 0.8 (192A) Curve = U3 (Very Inverse) Time Dial = 0.7 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir) 51G2 Tap = 1.13 (270A) Curve = U3 (Very Inverse) Time Dial = 9.3 50G2 Tap = None (None) 51G2TC = 32GR (Reverse Dir) 51G3 Tap = 0.5 (120A) Curve = U3 (Very Inverse) Time Dial = 9 50G3 Tap = None (None) 51G3TC = 32GR (Reverse Dir)
	BUS DIFF E		SEL-587Z		1200/5A 1200/5 tap		87AP1 = 75V 87BP1 = 75V 87CP1 = 75V
	FDR CKT 1 PH		SEL-351 S	12,470V	1200/5A 900/5 tap		51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 11.3 50P1 Tap = None (Inst.)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
H STATION 005		Existing	New				
	FDR CKT 1 GN		SEL-351 S		Residual		51G1 Tap = 1.5 (270A) Curve = U3 (Very Inverse) Time Dial = 9.3 50G1 Tap = None (None)
	FDR CKT 2 PH		SEL-351 S	12,470V	1200/5A 900/5 tap		51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 11.3 50P1 Tap = None (Inst.)
	FDR CKT 2 GN		SEL-351 S		Residual		51G1 Tap = 1.5 (270A) Curve = U3 (Very Inverse) Time Dial = 9.3 50G1 Tap = None (None)
	FDR MOQ PH		SEL-351 S	12,470V	1200/5A 400/5 tap		51P1 Tap = 4.0 (320A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P1 Tap = None (Inst.)
	FDR MOQ GN		SEL-351 S		Residual		51G1 Tap = 1.5 (120A) Curve = U3 (Very Inverse) Time Dial = 9 50G1 Tap = None (None)
	FDR MOQ LP PH		SEL-351 S	12,470V	1200/5A 400/5 tap		51P1 Tap = 4.0 (320A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P1 Tap = None (Inst.)
	FDR MOQ LP GN		SEL-351 S		Residual		51G1 Tap = 1.5 (120A) Curve = U3 (Very Inverse) Time Dial = 9 50G1 Tap = None (None)
	BUS DIFFS E-W		SEL-587Z		1200/5A 1200/5 tap		87AP1 = 75V 87BP1 = 75V 87CP1 = 75V

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
A STATION 100		Existing	New				
	A MAIN BLK PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	Tap = 4.0 (960A) Time Dial = 7 INST = NONE	51P1 Tap = None Curve = N/A Time Dial = N/A 50P1 Tap = None (Inst.) 51P1TC = N/A (Forward Dir) (No Overcurrent Settings Used)
	A MAIN BLK GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 0.7 (168A) Time Dial = 10 INST = NONE	51G1 Tap = None Curve = N/A Time Dial = N/A 50G1 Tap = None (None) 51G1TC = N/A (No Overcurrent Settings Used)
	A MAIN WHT PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	Tap = 4.0 (960A) Time Dial = 7 INST = NONE	51P1 Tap = None Curve = N/A Time Dial = N/A 50P1 Tap = None (Inst.) 51P1TC = N/A (Forward Dir) (No Overcurrent Settings Used)
	A MAIN WHT GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 0.7 (168A) Time Dial = 10 INST = NONE	51G1 Tap = None Curve = N/A Time Dial = N/A 50G1 Tap = None (None) 51G1TC = N/A (No Overcurrent Settings Used)
	A MAIN DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200/5A	87L = 75V 87H = 2A	N/C
	FDR A-B BLK PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	LTPU = 5.25 (630A) Time Dial = 31.0 INST = Disable	51P1 Tap = 5.0 (600A) Curve = U3 (Very Inverse) Time Dial = 6.5 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	FDR A-B BLK GN	(1) SAME	SEL-351 S		Residual	LTPU = 1.2 (144A) Time Dial = 25.0 INST = Disable	51G1 Tap = 1.5 (180A) Curve = U3 (Very Inverse) Time Dial = 3.2 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR A-B WHT PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	LTPU = 5.25 (630A) Time Dial = 31.0 INST = Disable	51P1 Tap = 5.0 (600A) Curve = U3 (Very Inverse) Time Dial = 6.5 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
A STATION 100		Existing	New				
	FDR A-B WHT GN	(1) SAME	SEL-351 S		Residual	LTPU = 1.2 (144A) Time Dial = 25.0 INST = Disable	51G1 Tap = 1.5 (180A) Curve = U3 (Very Inverse) Time Dial = 3.2 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR A-1 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR A-1 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR A-2 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR A-2 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR A-3 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR A-3 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR A-4 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR A-4 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
A STATION 100		Existing	New				
	FDR A-5 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR A-5 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	LTPU = 5.25 (630A) Time Dial = 31.0 INST = Disable	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR A-6 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR A-6 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
B STATION 200		Existing	New				
	B MAIN BLK PH (Does Not Coordinate at higher faults during temporary transfers)	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	Tap = 5.25 (630A) Time Dial = 10 INST = NONE	51P1 Tap = 5.0 (600A) Curve = U4 (Ext Inverse) Time Dial = 0.8 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir)
	B MAIN BLK GN (Does Not Coordinate at higher faults during temporary transfers)	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 1.2 (144A) Time Dial = 10 INST = NONE	51G1 Tap = 0.7 (84A) Curve = U4 (Ext Inverse) Time Dial = 0.5 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	B MAIN BLK DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200/5A	87L = 75V 87H = 2A	N/C
	B MAIN WHT PH (Does Not Coordinate at higher faults during temporary transfers)	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	Tap = 5.25 (630A) Time Dial = 10 INST = NONE	51P1 Tap =5.0 (600A) Curve = U4 (Ext Inverse) Time Dial = 0.8 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir)
	B MAIN WHT GN (Does Not Coordinate at higher faults during temporary transfers)	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 1.2 (144A) Time Dial = 10 INST = NONE	51G1 Tap = 0.7 (84A) Curve = U4 (Ext Inverse) Time Dial = 0.5 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR B-C TIE PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	LTPU = 5.0 (600A) Time Dial = 14.0 INST = Disable	51P1 Tap = 5.0 (600A) Curve = U3 (Very Inverse) Time Dial = 3.7 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	FDR B-C TIE GN	(1) SAME	SEL-351 S		Residual	LTPU = 1.0 (120A) Time Dial = 4.0 INST = Disable+H397	51G1 Tap = 1.5 (180A) Curve = U4 (Ext Inverse) Time Dial = 0.5 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR B-4 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
B STATION 200		Existing	New				
	FDR B-4 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR B-5 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High)= 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR B-5 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR B-6 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High)= 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR B-6 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR B-7 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High)= 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR B-7 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR B-10 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High)= 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR B-10 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
B STATION 200		Existing	New				
	FDR B-11 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High)= 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR B-11 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)
	FDR B-12 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	200/5A	Tap = 6.0 (240A) Time Dial = 2.0 INST (High)= 84.0 (3360A)	51P1 Tap = 6.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 84 (3360A) (Inst.)
	FDR B-12 GN	(1) GE IFC51B2A Type 50/51 Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.50 INST (Low) = 10.0 (400A)	51G1 Tap = 1.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 9.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
C STATION 300		Existing	New				
	C MAIN BLK PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	Tap = 3.0 (360A) Time Dial = 10 INST = NONE	51P1 Tap =3.5 (420A) Curve = U3 (Very Inverse) Time Dial = 4.2 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir)
	C MAIN BLK GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 1.2 (144A) Time Dial = 10 INST = NONE	51G1 Tap = 1 (120A) Curve = U4 (Ext Inverse) Time Dial = 0.6 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	C MAIN WHT PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	Tap = 3.0 (360A) Time Dial = 10 INST = NONE	51P1 Tap =3.5 (420A) Curve = U3 (Very Inverse) Time Dial = 4.2 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir)
	C MAIN WHT GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 1.2 (144A) Time Dial = 10 INST = NONE	51G1 Tap = 1 (120A) Curve = U4 (Ext Inverse) Time Dial = 0.6 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	C MAIN DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200/5A	87L = 75V 87H = 2A	N/C
	FDR C-B TIE PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 600/5 Tap	LTPU = 5.0 (600A) Time Dial = 14.0 INST = Disable	51P1 Tap = 5.0 (600A) Curve = U4 (Ext Inverse) Time Dial = 2.1 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	FDR C-B TIE GN	(1) SAME	SEL-351 S		Residual	LTPU = 1.0 (120A) Time Dial = 4.0 INST = Disable+H468	51G1 Tap = 1.25 (150A) Curve = U3 (Very Inverse) Time Dial = 0.63 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR C-7 PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	LTPU = 2.0 (240A) Time Dial = 9.0 INST (Low) = 14 (3360A)	51P1 Tap =4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
C STATION 300		Existing	New				
	FDR C-7 GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1.0 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR C-8 PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	LTPU = 2.0 (240A) Time Dial = 9.0 INST (Low) = 14 (3360A)	51P1 Tap =4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR C-8 GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1.0 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR C-9 PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	LTPU = 2.0 (240A) Time Dial = 9.0 INST (Low) = 14 (3360A)	51P1 Tap =4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR C-9 GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1.0 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR BLADE PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	LTPU = 2.0 (240A) Time Dial = 9.0 INST (Low) = 14 (3360A)	51P1 Tap =4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR BLADE GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1.0 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR SPAR PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	LTPU = 2.0 (240A) Time Dial = 9.0 INST (Low) = 14 (3360A)	51P1 Tap =4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR SPARE GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1.0 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
C STATION 300		Existing	New				
	FDR OLD-Z PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	LTPU = 2.0 (240A) Time Dial = 9.0 INST (Low) = 14 (3360A)	51P1 Tap =4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR OLD-Z GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1.0 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
D STATION 400		Existing	New				
	D MAIN BLK PH	(3) GE IBC53M1A Type 67 (REV 51) Very Inverse Curve	SEL-351 S	12,470V	1200/5A	Tap = 4.0 (960A) Time Dial = 6 INST = NONE	51P1 Tap = None Curve = N/A Time Dial = N/A 50P1 Tap = None (Inst.) 51P1TC = N/A (Forward Dir) (No Overcurrent Settings Used)
	D MAIN BLK GN	(1) GE IBCG53M1A Type 67 (REV 51) Very Inverse Curve	SEL-351 S		Residual	Tap = .70 (168A) Time Dial = 7 INST = NONE	51G1 Tap = None Curve = N/A Time Dial = N/A 50G1 Tap = None (None) 51G1TC = N/A (No Overcurrent Settings Used)
	D MAIN WHT PH	(3) GE IBC53M1A Type 67 (REV 51) Very Inverse Curve	SEL-351 S	12,470V	1200A 5A	Tap = 4.0 (960A) Time Dial = 6 INST = NONE	51P1 Tap = None Curve = N/A Time Dial = N/A 50P1 Tap = None (Inst.) 51P1TC = N/A (Forward Dir) (No Overcurrent Settings Used)
	D MAIN WHT GN	(1) GE IBCG53M1A Type 67 (REV 51) Very Inverse Curve	SEL-351 S		Residual	Tap = .70 (168A) Time Dial = 7 INST = NONE	51G1 Tap = None Curve = N/A Time Dial = N/A 50G1 Tap = None (None) 51G1TC = N/A (No Overcurrent Settings Used)
	D MAIN WHT DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200A 5A	87L = 75V 87H = 2A	N/C
	FDR D-C BLK PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	300/5A	LTPU = 6.75 (405A) Time Dial = 22.0 INST = Disable	51P1 Tap = 6.5 (390A) Curve = U4 (Ext Inverse) Time Dial = 10.3 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	FDR D-C BLK GN	(1) SAME	SEL-351 S		Residual	LTPU = 2.5 (150A) Time Dial = 25.0 INST = Disable	51G1 Tap = 2.5 (150A) Curve = U3 (Very Inverse) Time Dial = 3.68 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR D-C WHT PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	300/5A	LTPU = 6.75 (405A) Time Dial = 22.0 INST = Disable	51P1 Tap = 6.5 (390A) Curve = U4 (Ext Inverse) Time Dial = 10.3 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
D STATION 400		Existing	New				
	FDR D-C WHT GN	(1) SAME	SEL-351 S		Residual	LTPU = 2.5 (150A) Time Dial = 25.0 INST = Disable	51G1 Tap = 2.5 (150A) Curve = U3 (Very Inverse) Time Dial = 3.68 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR D-9 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	Tap = 5.0 (300A) Time Dial = 3.0 INST (High) = 55.0 (3300A)	51P1 Tap = 5.2 (312A) Curve = U3 (Very Inverse) Time Dial = 2.0 50P1 Tap = 78 (4680A) (Inst.)
	FDR D-9 GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.0 (60A) Time Dial = 0.75 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR D-10 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	Tap = 5.0 (300A) Time Dial = 3.0 INST (High)= 55.0 (3300A)	51P1 Tap = 5.2 (312A) Curve = U3 (Very Inverse) Time Dial = 2.0 50P1 Tap = 78 (4680A) (Inst.)
	FDR D-10 GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.0 (60A) Time Dial = 0.75 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR D-13 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	Tap = 5.0 (300A) Time Dial = 3.0 INST (High)= 55.0 (3300A)	51P1 Tap = 5.2 (312A) Curve = U3 (Very Inverse) Time Dial = 2.0 50P1 Tap = 78 (4680A) (Inst.)
	FDR D-13 GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.0 (60A) Time Dial = 0.75 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR D-14 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A 300/5 Tap	Tap = 5.0 (300A) Time Dial = 3.0 INST (High)= 55.0 (3300A)	51P1 Tap = 5.2 (312A) Curve = U3 (Very Inverse) Time Dial = 2.0 50P1 Tap = 78 (4680A) (Inst.)
	FDR D-14 GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.0 (60A) Time Dial = 0.75 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
D STATION 400		Existing	New				
	FDR D-17 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S		600/5A 300/5 Tap	Tap = 5.0 (300A) Time Dial = 3.0 INST (High)= 55.0 (3300A)	51P1 Tap = 5.2 (312A) Curve = U3 (Very Inverse) Time Dial = 2.0 50P1 Tap = 78 (4680A) (Inst.)
	FDR D-17 GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.0 (60A) Time Dial = 0.75 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR D-18 PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S		600/5A 300/5 Tap	Tap = 5.0 (300A) Time Dial = 3.0 INST (High)= 55.0 (3300A)	51P1 Tap = 5.2 (312A) Curve = U3 (Very Inverse) Time Dial = 2.0 50P1 Tap = 78 (4680A) (Inst.)
	FDR D-18 GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.0 (60A) Time Dial = 0.75 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
E STATION 500		Existing	New				
	E MAIN CKT-1 PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	Tap = 2.0 (480A) Time Dial = 10 INST = NONE	51P1 Tap = 4.0 (720A) Curve = U3 (Very Inverse) Time Dial = 4.38 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir) 51P2 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 8.65 50P2 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) (Relay Failure Wh E-A & Tie E-F Bkrs) 51P3 Tap = 1.33 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P3 Tap = 18.67 (3360A) (Inst.) 51P3TC = 32PR (Reverse Dir) 67P3TC = 32PR (Reverse Dir) (Relay Failure Fdr Bkrs)
	E MAIN CKT-1 GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 0.50 (120A) Time Dial = 10 INST = NONE	51G1 Tap = 0.8 (144A) Curve = U3 (Very Inverse) Time Dial = 3.8 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir) 51G2 Tap = 1.0 (180A) Curve = U3 (Very Inverse) Time Dial = 6.3 50G2 Tap = None (None) 51G2TC = 32GR (Reverse Dir) (Relay Failure Wh E-A & Tie E-F Bkrs) 51G3 Tap = 0.33 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G3 Tap = 2.0 (360A) (Inst) 51G3TC = 32GR (Reverse Dir) 67G3TC = 32GR (Reverse Dir) (Relay Failure Fdr Bkrs)
	E MAIN CKT-1 DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200A 5A	87L = 75V 87H = 2A	N/C

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
E STATION 500		Existing	New				
	E MAIN CKT-2 PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	Tap = 4.0 (960A) Time Dial = 10 INST = NONE	51P1 Tap = 4.0 (600A) Curve = U3 (Very Inverse) Time Dial = 4.38 50P1 Tap = None (Inst.) 51P1TC = 32PF (Forward Dir) 51P2 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 8.65 50P2 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) (Relay Failure Blk E-A Bkr) 51P3 Tap = 1.33 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P3 Tap = 18.67 (3360A) (Inst.) 51P3TC = 32PR (Reverse Dir) 67P3TC = 32PR (Reverse Dir) (Relay Failure Fdr Bkrs)
	E MAIN CKT-2 GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 1.0 (240A) Time Dial = 10 INST = NONE	51G1 Tap = 0.8 (144A) Curve = U3 (Very Inverse) Time Dial = 3.8 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir) 51G2 Tap = 1.0 (180A) Curve = U3 (Very Inverse) Time Dial = 6.3 50G2 Tap = None (None) 51G2TC = 32GR (Reverse Dir) (Relay Failure Blk E-A Bkr) 51G3 Tap = 0.33 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G3 Tap = 2.0 (360A) (Inst) 51G3TC = 32GR (Reverse Dir) 67G3TC = 32GR (Reverse Dir) (Relay Failure Fdr Bkrs)
	E MAIN CKT-2 DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	SEL-351 S		1200/5A	87L = 75V 87H = 2A	N/C

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
E STATION 500		Existing	New				
	BLK FDR E-A P H	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	LTPU = 4.0 (960A) Time Dial = 34.0 INST = Disable	51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 8.65 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	BLK FDR E-A GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.7 (168A) Time Dial = 45.0 INST = Disable	51G1 Tap = 1.0 (180A) Curve = U3 (Very Inverse) Time Dial = 6.3 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	WHT FDR E-A PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	LTPU = 4.0 (960A) Time Dial = 34.0 INST = Disable	51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 8.65 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	WHT FDR E-A GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.7 (168A) Time Dial = 45.0 INST = Disable	51G1 Tap = 1.0 (180A) Curve = U3 (Very Inverse) Time Dial = 6.3 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR E-F TIE PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	LTPU = 4.5 (1080A) Time Dial = 30.0 INST = Disable	51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 8.65 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	FDR E-F TIE GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.7 (168A) Time Dial = 45.0 INST = Disable	51G1 Tap = 1.0 (180A) Curve = U3 (Very Inverse) Time Dial = 6.3 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR E-15 PH	(3) GE IAC51B806A Type 50/51 Inverse Curve	SEL-351 S	12,470V	1200/5A 300/5 Tap	Tap = 6.0 (240A) Time Dial = 1.0 INST (High) = 84.0 (3360A)	51P1 Tap = 4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR E-15 GN	(1) GE IAC53B811A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.5 INST (Low) = 10.0 (400A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
E STATION 500		Existing	New				
	FDR E-16 PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	1200/5A 300/5 Tap	Tap = 2.0 (240A) Time Dial = 10 INST (High) = 14.0 (3360A)	51P1 Tap = 4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR E-16 GN	(1) SAME	SEL-351 S		Residual	Tap = 0.5 (60A) Time Dial = 1 INST (Low) = 6.6 (396A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR E SPARE 1 PH		SEL-351 S	12,470V	1200/5A 300/5 Tap		51P1 Tap = 4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR E SPARE 1 GN		SEL-351 S		Residual		51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)
	FDR E SPARE 2 PH	(3) GE IAC51B806A Type 50/51 Inverse Curve	SEL-351 S	12,470V	1200/5A 300/5 Tap	Tap = 6.0 (240A) Time Dial = 2.0 INST (High) = 84.0 (3360A)	51P1 Tap = 4.0 (240A) Curve = U3 (Very Inverse) Time Dial = 1.5 50P1 Tap = 56 (3360A) (Inst.)
	FDR E SPARE 2 GN	(1) GE IAC53B811A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 1.5 (60A) Time Dial = 0.5 INST (Low) = 10.0 (400A)	51G1 Tap = 1.0 (60A) Curve = U5 (Short Time Inv.) Time Dial = 1.5 50G1 Tap = 6.0 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
F STATION 600		Existing	New				
	F MAIN CKT-3 PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 1200/5 Tap	Tap = 4.0 (960A) Time Dial = 10 INST = NONE	51P1 Tap = None Curve = N/A Time Dial = N/A 50P1 Tap = None (Inst.) 51P1TC = N/A (Forward Dir) 51P2 Tap = 3.3 (792A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P1 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) (Relay Failure Wh F-D & Tie F-E Bkrs) 51P3 Tap = 1.73 (415A) Curve = U3 (Very Inverse) Time Dial = 5.0 50P3 Tap = 25.00 (6000A) (Inst.) 51P3TC = 32PR (Reverse Dir) 67P3TC = 32PR (Reverse Dir) (Relay Failure Fdr Bkrs)
	F MAIN CKT-3 GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 1.5 (360A) Time Dial = 10 INST = NONE	51G1 Tap = None Curve = N/A- Time Dial = N/A- 50G1 Tap = None (None) 51G1TC = N/A (Forward Dir) 51G2 Tap = 1.12 (269A) Curve = U3 (Very Inverse) Time Dial = 6.59 50G2 Tap = None (None) 51G2TC = 32GR (Reverse Dir) (Relay Failure Wh F-D & Tie F-E Bkrs) 51G3 Tap = 0.26 (62A) Curve = U5 (Short Time Inv.) Time Dial = 6.8 50G3 Tap = 1.5 (360A) (Inst) 51G3TC = 32GR (Reverse Dir) 67G3TC = 32GR (Reverse Dir) (Relay Failure Fdr Bkrs)
	F MAIN CKT-3 DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200A 5A	87L = 75V 87H = 2A	N/C

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
F STATION 600		Existing	New				
	F MAIN CKT-4 PH	(3) GE IBC77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S	12,470V	1200/5A 1200/5 Tap	Tap = 4.0 (960A) Time Dial = 10 INST = NONE	51P1 Tap = None Curve = N/A Time Dial = N/A 50P1 Tap = None (Inst.) 51P1TC = N/A (Forward Dir) 51P2 Tap = 3.3 (792A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P1 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) (Relay Failure Blk Wh F-D Bkr) 51P3 Tap = 1.73 (415A) Curve = U3 (Very Inverse) Time Dial = 5.0 50P3 Tap = 25.00 (6000A) (Inst.) 51P3TC = 32PR (Reverse Dir) 67P3TC = 32PR (Reverse Dir) (Relay Failure Fdr Bkrs) 51P4 Tap = 2.5 (600A) Curve = U3 (Very Inverse) Time Dial = 4.4 50P1 Tap = 25 (6000A) (Inst.) 51P3TC = 32PR (Reverse Dir) 67P3TC = 32PR (Reverse Dir) (Relay Failure Z Fdr Bkr)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
F STATION 600		Existing	New				
	F MAIN CKT-4 GN	(1) GE IBCG77M1A Type 67 (REV 51) Ext.Inv.Curve	SEL-351 S		Residual	Tap = 1.5 (360A) Time Dial = 10 INST = NONE	51G1 Tap = None Curve = N/A- Time Dial = N/A- 50G1 Tap = None (None) 51G1TC = N/A (Forward Dir) 51G2 Tap = 1.12 (269A) Curve = U3 (Very Inverse) Time Dial = 6.59 50G2 Tap = None (None) 51G2TC = 32GR (Reverse Dir) (Relay Failure Blk Wh F-D Bkr) 51G3 Tap = 0.26 (62A) Curve = U5 (Short Time Inv.) Time Dial = 6.8 50G3 Tap = 1.5 (360A) (Inst) 51G3TC = 32GR (Reverse Dir) 67G3TC = 32GR (Reverse Dir) (Relay Failure Fdr Bkrs)
	F MAIN CKT-4 DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	SEL-351 S		1200A 5A	87L = 75V 87H = 2A	N/C
	FDR F-D BLK PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	LTPU = 4.0 (960A) Time Dial = 34.0 INST = Disable	51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	FDR F-D BLK GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.7 (168A) Time Dial = 45.0 INST = Disable	51G1 Tap = 1.5 (270A) Curve = U3 (Very Inverse) Time Dial = 6.59 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR F-D WHT PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	LTPU = 4.0 (960A) Time Dial = 34.0 INST = Disable	51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
F STATION 600		Existing	New				
	FDR F-D WHT GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.7 (168A) Time Dial = 45.0 INST = Disable	51G1 Tap = 1.5 (270A) Curve = U3 (Very Inverse) Time Dial = 6.59 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	FDR F-E TIE PH	(3) BASLER BE1-51 Type 50/51 B6 -Very Inverse Curve	SEL-351 S	12,470V	1200/5A 900/5 Tap	LTPU = 4.5 (1080A) Time Dial = 30.0 INST = Disable	51P1 Tap = 4.4 (792A) Curve = U3 (Very Inverse) Time Dial = 6.2 50P1 Tap = None (Inst.) 51P1TC = 32GF (Forward Dir)
	FDR F-E TIE GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.7 (168A) Time Dial = 45.0 INST = Disable	51G1 Tap = 1.5 (270A) Curve = U3 (Very Inverse) Time Dial = 6.59 50G1 Tap = None (None) 51G1TC = 32GF (Forward Dir)
	Z FDR PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 600/5 Tap	LTPU = 2.5 (600A) Time Dial = 20.0 INST (Low) = 10 (6000A)	51P1 Tap = 5 (600A) Curve = U3 (Very Inverse) Time Dial = 4.4 50P1 Tap = 50 (6000A) (Inst.)
	Z FDR GND	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (120A) Time Dial = 10.0 INST (Low) = 6.6 (792A)	51G1 Tap = 0.5 (60A) Curve = U5 (Short Time Inv.) Time Dial = 6.9 50G1 Tap = 6.0 (360A) (Inst)
	FDR F-19A PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 400/5 Tap	LTPU = 3.0 (960A) Time Dial = 20.0 INST (Low) = 10 (3600A)	51P1 Tap = 5.2 (416A) Curve = U3 (Very Inverse) Time Dial = 5.0 50P1 Tap = 75 (6000A) (Inst.)
	FDR F-19A GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1 INST (Low) = 6.6 (396A)	51G1 Tap = 0.8 (64A) Curve = U5 (Short Time Inv.) Time Dial = 6.8 50G1 Tap = 4.5 (360A) (Inst)
	FDR F-19B PH (SPARE)	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 400/5 Tap	LTPU = 3.0 (960A) Time Dial = 20.0 INST (Low) = 10 (3600A)	51P1 Tap = 5.2 (416A) Curve = U3 (Very Inverse) Time Dial = 5.0 50P1 Tap = 75 (6000A) (Inst.)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
F STATION 600		Existing	New				
	FDR F-19B GN (SPARE)	(1) SAME	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1 INST (Low) = 6.6 (396A)	51G1 Tap = 0.8 (64A) Curve = U5 (Short Time Inv.) Time Dial = 6.8 50G1 Tap = 4.5 (360A) (Inst)
	FDR F-20 PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 400/5 Tap	LTPU = 3.0 (960A) Time Dial = 20.0 INST (Low) = 10 (3600A)	51P1 Tap = 5.2 (416A) Curve = U3 (Very Inverse) Time Dial = 5.0 50P1 Tap = 75 (6000A) (Inst.)
	FDR F-20 GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1 INST (Low) = 6.6 (396A)	51G1 Tap = 0.8 (64A) Curve = U5 (Short Time Inv.) Time Dial = 6.8 50G1 Tap = 4.5 (360A) (Inst)
	FDR F-21 PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 400/5 Tap	LTPU = 3.0 (960A) Time Dial = 20.0 INST (Low) = 10 (3600A)	51P1 Tap = 5.2 (416A) Curve = U3 (Very Inverse) Time Dial = 5.0 50P1 Tap = 75 (6000A) (Inst.)
	FDR F-21 GN	(1) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1 INST (Low) = 6.6 (396A)	51G1 Tap = 0.8 (64A) Curve = U5 (Short Time Inv.) Time Dial = 6.8 50G1 Tap = 4.5 (360A) (Inst)
	FDR F-22 PH	(3) BASLER BE1-51A Type 50/51 W6-Very Inverse Curve	SEL-351 S	12,470V	600/5A 400/5 Tap	LTPU = 3.0 (960A) Time Dial = 20.0 INST (Low) = 10 (3600A)	51P1 Tap = 5.2 (416A) Curve = U3 (Very Inverse) Time Dial = 5.0 50P1 Tap = 75 (6000A) (Inst.)
	FDR F-22 GN	(1) SAME	SEL-351 S		Residual	LTPU = 0.5 (60A) Time Dial = 1 INST (Low) = 6.6 (396A)	51G1 Tap = 0.8 (64A) Curve = U5 (Short Time Inv.) Time Dial = 6.8 50G1 Tap = 4.5 (360A) (Inst)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
G STATION 700		Existing	New				
	G MAIN MOQ LP PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	1200/5A	Tap = 2.0 (480A) Time Dial = 5.0 INST = Disabled	51P1 Tap = NONE Curve = - Time Dial = - 50P1 Tap = NONE (Inst.) 51P1TC = 32PF (Forward Dir) 51P2 Tap = 1.35 (324A) Curve = U3 (Very Inverse) Time Dial = 3.1 50P1 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) (Relay Failure Fdr Bkrs)
	G MAIN MOQ LP GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 0.5 (120A) Time Dial = 4.0 INST = Disabled	51G1 Tap = NONE Curve = - Time Dial = - 50G1 Tap = NONE (None) 51G1TC = 32GF (Forward Dir) 51G2 Tap = 0.5 (120 A) Curve = U5 (Short Time Inv.) Time Dial = 6.7 50G2 Tap = None (Inst) 51G2TC = 32GR (Reverse Dir) (Relay Failure Fdr Bkrs)
	G MAIN MOQ LP DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200/5A	87L = 75V 87H = 2A	N/C
	G MAIN MOQ PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	1200/5A	Tap = 2.0 (480A) Time Dial = 5.0 INST = Disabled	51P1 Tap = NONE Curve = - Time Dial = - 50P1 Tap = NONE (Inst.) 51P1TC = 32PF (Forward Dir) 51P2 Tap = 1.35 (324A) Curve = U3 (Very Inverse) Time Dial = 3.1 50P1 Tap = None (Inst.) 51P2TC = 32PR (Reverse Dir) (Relay Failure Fdr Bkrs)

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
G STATION 700		Existing	New				
	G MAIN MOQ GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 0.5 (120A) Time Dial = 4.0 INST = Disabled	51G1 Tap = NONE Curve = - Time Dial = - 50G1 Tap = NONE (None) 51G1TC = 32GF (Forward Dir) 51G2 Tap = 0.5 (120 A) Curve = U5 (Short Time Inv.) Time Dial = 6.7 50G2 Tap = None (Inst) 51G2TC = 32GR (Reverse Dir) (Relay Failure Fdr Bkrs)
	G MAIN MOQ DIFF	(3) GE PVD21B1A Type 87 DIFFERENTIAL	____		1200/5A	87L = 75V 87H = 2A	87L = 75V 87H = 2A
	FDR MOQ LP PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A	Tap = 3.0 (360A) Time Dial = 1.0 INST = Disabled	51P1 Tap = 2.7 (324A) Curve = U3 (Very Inverse) Time Dial = 3.1 50P1 Tap = None (Inst.)
	FDR MOQ LP GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 0.5 (60A) Time Dial = 0.5 INST = Disabled	51G1 Tap = 1.0 (120 A) Curve = U5 (Short Time Inv.) Time Dial = 6.7 50G1 Tap = None (Inst)
	FDR MOQ LP RECL	BASLER BE1-79M Type 79 – RECLOSURE	SEL-351 S		Same CT	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec
	FDR SPARE PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A	Tap = 3.0 (360A) Time Dial = 1.0 INST = Disabled	51P1 Tap = 2.7 (324A) Curve = U3 (Very Inverse) Time Dial = 3.1 50P1 Tap = None (Inst.)
	FDR SPARE GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 0.5 (60A) Time Dial = 0.5 INST = Disabled	51G1 Tap = 1.0 (120 A) Curve = U5 (Short Time Inv.) Time Dial = 6.7 50G1 Tap = None (Inst)
	FDR SPARE RECL	BASLER BE1-79M Type 79 – RECLOSURE	SEL-351 S		Same CT	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec

Bus Name/ID	Device Name/Type	Relay Description		Bus Voltage	CT Ratio	Existing Settings	Proposed Settings
G STATION 700		Existing	New				
	FDR IND PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A	Tap = 3.0 (360A) Time Dial = 1.0 INST = Disabled	51P1 Tap = 2.7 (324A) Curve = U3 (Very Inverse) Time Dial = 3.1 50P1 Tap = None (Inst.)
	FDR IND GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 0.5 (60A) Time Dial = 0.5 INST = Disabled	51G1 Tap = 1.0 (120 A) Curve = U5 (Short Time Inv.) Time Dial = 6.7 50G1 Tap = None (Inst)
	FDR IND RECL	BASLER BE1-79M Type 79 – RECLOSURE	SEL-351 S		Same CT	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec
	FDR MOQ PH	(3) GE IFC53B1A Type 50/51 Very Inverse Curve	SEL-351 S	12,470V	600/5A	Tap = 3.0 (360A) Time Dial = 1.0 INST = Disabled	51P1 Tap = 2.7 (324A) Curve = U3 (Very Inverse) Time Dial = 3.1 50P1 Tap = None (Inst.)
	FDR MOQ GN	(1) GE IFC53B2A Type 50/51 Very Inverse Curve	SEL-351 S		Residual	Tap = 0.5 (60A) Time Dial = 0.5 INST = Disabled	51G1 Tap = 1.0 (120 A) Curve = U5 (Short Time Inv.) Time Dial = 6.7 50G1 Tap = None (Inst)
	FDR MOQ RECL	BASLER BE1-79M Type 79 – RECLOSURE	SEL-351 S		Same CT	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec	#1 = 15 Sec #2 = 15 Sec #3 = 15 Sec
	FDR G-23 PH		SEL-351 S	12,470V	600/5A		51P1 Tap = 2.7 (324A) Curve = U3 (Very Inverse) Time Dial = 3.1 50P1 Tap = None (Inst.)
	FDR G-23 GN		SEL-351 S		Residual		51G1 Tap = 1.0 (120 A) Curve = U5 (Short Time Inv.) Time Dial = 6.7 50G1 Tap = None (Inst)

SECTION 16050N

BASIC ELECTRICAL MATERIALS AND METHODS
07/03

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 709	(2001) Laminated Thermosetting Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 100	(2000) Dictionary of Electrical and Electronics Terms (IEEE)
IEEE C2	(2002) National Electrical Safety Code (IEEE)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C57.12.28	(1999) Pad-Mounted Equipment - Enclosure Integrity
NEMA ICS 6	(1993; R 2001) Industrial Control and Systems Enclosures

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

TIA/EIA-606-A	(2002) Administration Standard for the Telecommunications Infrastructure (ANSI/TIA/EIA-606-A)

1.2 RELATED REQUIREMENTS

This section applies to certain sections of Division 2, "Site Construction,". This section applies to all sections of Division 16, "Electrical," of this project specification unless specified otherwise in the individual sections.

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and

electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE Std 100.

b. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.

c. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.4 ELECTRICAL CHARACTERISTICS

Electrical characteristics for this project shall be 12.47 kV primary, three phase, four wire, 60 Hz, and 120 volts secondary. Final connections to the power distribution system at the existing substations shall be made by the Contractor as directed by the Contracting Officer.

1.5 SUBMITTALS

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

Submittals required in the sections which refer to this section must also conform to the following additional requirements. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable federal, military, industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

1.5.1 Manufacturer's Catalog Data

Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.

1.5.2 Drawings

Submit drawings a minimum of 14 by 20 inches in size using a minimum scale

of 1/8 inch per foot. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

1.5.3 Instructions

Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit printed copies of those instructions prior to installation. Installation of the item shall not proceed until manufacturer's instructions are received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.

1.5.4 Certificates

Submit manufacturer's certifications as required for products, materials, finishes, and equipment as specified in the technical sections. Certificates from material suppliers are not acceptable. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.

1.5.4.1 Reference Standard Compliance

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.

1.5.4.2 Independent Testing Organization Certificate

In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.5 Operation and Maintenance Manuals

Comply with the requirements of Section 01781, "Operation and Maintenance Data" and the technical sections.

1.5.5.1 Operating Instructions

Submit text of posted operating instructions for each system and principal item of equipment as specified in the technical sections.

1.6 QUALITY ASSURANCE

1.6.1 Material and Equipment Qualifications

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

1.6.2 Regulatory Requirements

Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.

1.6.3 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.6.4 Service Support

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

1.6.5 Manufacturer's Nameplate

Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.6.6 Modification of References

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer.

1.6.7 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

1.7 POSTED OPERATING INSTRUCTIONS

Provide for each system and principal item of equipment as specified in the technical sections for use by operation and maintenance personnel. The operating instructions shall include the following:

a. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

b. Start up, proper adjustment, operating, lubrication, and shutdown procedures.

c. Safety precautions.

d. The procedure in the event of equipment failure.

e. Other items of instruction as recommended by the manufacturer of each system or item of equipment.

Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.8 NAMEPLATES

ASTM D 709. Provide laminated plastic nameplates for each panelboard, equipment enclosure, relay, switch, and device; as specified in the technical sections or as indicated on the drawings. Each nameplate inscription shall identify the function and, when applicable, the position. Nameplates shall be melamine plastic, 0.125 inch thick, white with black center core. Surface shall be matte finish. Corners shall be square. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style.

1.9 WARNING SIGNS

Provide warning signs for the enclosures of electrical equipment including substations, pad-mounted transformers, pad-mounted switches, generators, and switchgear having a nominal rating exceeding 600 volts.

a. When the enclosure integrity of such equipment is specified to be in accordance with NEMA C57.12.28, such as for pad-mounted transformers, provide self-adhesive warning signs on the outside of the high voltage compartment door(s). Sign shall be a decal and shall have nominal dimensions of 7 by 10 inches with the legend "DANGER HIGH VOLTAGE" printed in two lines of nominal 2 inch high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background. Decal shall be Panduit No. PPSO710D72 or approved equal.

b. When such equipment is guarded by a fence, mount signs on the fence. Provide metal signs having nominal dimensions of 14 by 10 inches with the legend "DANGER HIGH VOLTAGE KEEP OUT" printed in three lines of nominal 3 inch high white letters on a red and black field.

1.10 CABLE TAGS IN MANHOLES, HANDHOLES, AND VAULTS

Provide tags for each power and telecommunications cable or wire located in manholes, handholes, and vaults. Tag new wire and cable provided under this contract and existing wire and cable which are indicated to have splices and terminations provided by this contract.The first position on the power cable tag shall denote the voltage. The second through sixth positions on the tag shall identify the circuit. The next to last position shall denote the phase of the circuit and shall include the Greek "phi" symbol. The last position shall denote the cable size. As an example, a tag could have the following designation: "11.5 NAS 1-8(Phase A)500," denoting that the tagged cable is on the 11.5kV system circuit number NAS 1-8, underground, Phase A, sized at 500 kcmil. The labeling of telecommunications cable tags shall comply with TIA/EIA-606-A. The tags shall be polyethylene. Do not provide handwritten letters.

1.10.1 Polyethylene Cable Tags

Provide tags of polyethylene that have an average tensile strength of 3250 pounds per square inch; and that are 0.08 inch thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 170 degrees F. Provide 0.05 inch (minimum) thick black polyethylene tag holder. Provide a one-piece nylon, self-locking tie at each end of the cable tag. Ties shall have a minimum loop tensile strength of 175 pounds. The cable tags shall have black block letters, numbers, and symbols one inch high on a yellow background. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tags' orientation.

1.11 ELECTRICAL REQUIREMENTS

Electrical installations shall conform to IEEE C2, NFPA 70, and requirements specified herein.

1.11.1 New Work

Provide electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, integral disconnects, and other devices functioning to control mechanical equipment, as well as control wiring and conduit for circuits rated 100 volts or less, to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors shall not be permitted. The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, and the electrical power circuits shall be provided under Division 16, except internal wiring for components of packaged equipment shall be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide any required changes to the electrical service as may be necessary and related work as a part of the work for the section specifying that motor or equipment.

1.11.2 Modifications to Existing Systems

Where existing mechanical systems and motor-operated equipment require modifications, provide electrical components under Division 16.

1.12 INSTRUCTION TO GOVERNMENT PERSONNEL

Where specified in the technical sections, furnish the services of competent instructors to give full instruction to designated Government personnel in the adjustment, operation, and maintenance of the specified systems and equipment, including pertinent safety requirements as required. Instructors shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of man-days (8 hours per day) of instruction furnished shall be as specified in the individual section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PAINTING OF EQUIPMENT

3.1.1 Factory Applied

Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test and the additional requirements specified in the technical sections.

3.1.2 Field Applied

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in the section specifying the associated electrical equipment.

3.2 NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

3.3 WARNING SIGN MOUNTING

Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.4 CABLE TAG INSTALLATION

Install cable tags in each manhole, handhole, and vault as specified, including each splice. Install cable tags over the fireproofing, if any, and locate the tags so that they are clearly visible without disturbing any cabling or wiring in the manholes, handholes, and vaults.

-- End of Section --

SECTION 16302N

UNDERGROUND TRANSMISSION AND DISTRIBUTION
06/03

PART 1 GENERAL

1.1 REFERENCES

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

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC CS6	(1987; R 1989) Ethylene Propylene Rubber Insulated Shielded Power Cable Rated 5 Through 69 kV

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C2	(1997) National Electrical Safety Code
ANSI C119.1	(1986; R 1997) Electric Connectors - Sealed Insulated Underground Connector Systems Rated 600 Volts

ASTM INTERNATIONAL (ASTM)

ASTM B 1	(1995) Hard-Drawn Copper Wire
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM C 260	(2000) Air-Entraining Admixtures for Concrete

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE Std 48	(1996) High-Voltage Alternating-Current Cable Terminations
IEEE Std 404	(1993) Cable Joints for Use with Extruded Dielectric Cable Rated 5000-138 000 V and Cable Joints for Use with Laminated Dielectric Cable Rated 2500-500,000 V

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA RN 1	(1998) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit

NEMA TC 2	(1998) Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA TC 3	(1999) PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA WC 8	(1993) Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(1991) Electrical Power Distribution Equipment and Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code
NFPA 70B	(1998) Electrical Equipment Maintenance

UNDERWRITERS LABORATORIES (UL)

UL 6	(1997) Rigid Metal Conduit
UL 83	(1998) Thermoplastic-Insulated Wires and Cables
UL 467	(1993; R 2001) Grounding and Bonding Equipment
UL 486A	(1997; R 1998) Wire Connectors and Soldering Lugs for Use With Copper Conductors
UL 510	(1994; R 1998) Chloride, Polyethylene, and Rubber Insulating Tape
UL 514A	(1996; R 1998) Metallic Outlet Boxes
UL 514B	(1997; R 1998) Fittings for Cable and Conduit
UL 854	(1996; Bul. 1997 R 1998) Service-Entrance Cables

1.2 RELATED REQUIREMENTS

Section 16050N, "Basic Electrical Materials and Methods" applies to this section with additions and modifications specified herein.

1.3 DEFINITIONS

a. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

b. In the text of this section, "medium voltage cable splices," and "medium voltage cable joints" are used interchangeably and have the same meaning.

1.4 SUBMITTALS

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

SD-03 Product Data

Medium voltage cable; G

Medium voltage cable joints; G

Medium voltage cable terminations; G

Live end caps; G

600 volt wires and cables

SD-06 Test Reports

Acceptance checks and tests; G

Identify each cable for 600-volt, and medium voltage cable tests. When testing grounding electrodes and systems, identify each electrode and system for each test, as well as the resistance and soil conditions at the time the measurement were made.

SD-07 Certificates

Cable splicer/terminator; G

Cable splicer qualifications; G

Thirty calendar days before making splices or terminations, submit names of the cable splicers to be employed, together with proof that splicer has at least 3 years experience in splicing the type and rating of cables specified. Submit certification for each splicer by the cable joint kit manufacturer in the use of manufacturer's kits.

SD-08 Manufacturer's Instructions

Ground megger

"UL listed" kit

Termination kit

Medium-voltage joints

SD-09 Manufacturer's Field Reports

Medium voltage cable tests; G

1.5 QUALITY ASSURANCE

Each cable splicer may be required to make an approved dummy splice in the presence of the Contracting Officer in accordance with cable manufacturer's instructions. The Contractor shall furnish the material for dummy splices.

1.5.1 Cable Splicer Qualifications

a. In order to establish the cable workman's competency, the Contractor shall be required to submit the following within 30 calendar days prior to commencement of the splice/termination:

(1) Documentation to verify that the individual has completed a splice/termination of the type to be installed under this contract. The test splice-termination shall be performed at the job site for this contract under the supervision of the cable accessory manufacturer or his representative and witnessed by the Government.

(2) Documentation that said splice/termination has undergone and passed the following tests by the splice-termination manufacturer or an independent testing laboratory.

	Minimum Value		
TEST	5 kV	15 kV	35 kV
Discharge Ext. Value with 3 pC or less	13 kV	20 kV	35 kV
AC withstand, 1 minute	35 kV	50 kV	75 kV
DC withstand, 15 minutes	65 kV	70 kV	100 kV

These results shall be attached for review

(3) A statement of the number of years in which the individual has been splicing/terminating medium voltage cable.

b. Criteria for waiver: Items a.1 and a.2 above may be waived on subsequent jobs provided the following criteria is satisfied:

(1) Documentation of prior completion of items a.1 and a.2 be submitted.

(2) A list of the last three jobs where the specific splices/terminations were installed within the past 12 consecutive months. The tabulation shall include splice/termination manufacturer, catalog number, and the number of splice/terminations installed.

c. Requalifications: Requalification to items a.1 and a.2 in above paragraph may be required if the splice installer can not demonstrate a prior history of splice/termination installation during the previous 12 consecutive months. The contractor shall furnish the material for splices and terminations.

1.5.2 Test Instrument and Procedure

Submit for use of ground megger with proposed method indicated.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Conduit

2.1.1.1 Rigid Metal Conduit

UL 6, galvanized steel, threaded type.

2.1.1.2 Rigid Metal Conduit, PVC Coated

UL 6, galvanized steel, threaded type, coated with a polyvinyl chloride (PVC) sheath bonded to the galvanized exterior surface, nominal 40 mils thick, conforming to NEMA RN 1, Type A40, except that hardness shall be nominal 85 Shore A durometer, dielectric strength shall be minimum 400 volts per mil at 60 Hz, tensile strength shall be minimum 3500 psi, and aging shall be minimum 1000 hours in an Atlas Weatherometer.

2.1.1.3 Plastic Conduit for Direct Burial

NEMA TC 2, EPC-40-PVC as indicated on the drawings.

2.1.2 Fittings

2.1.2.1 Metal Fittings

UL 514B, threaded type.

2.1.2.2 PVC Conduit Fittings

NEMA TC 3.

2.1.2.3 Outlet Boxes for Steel Conduit

Outlet boxes for use with rigid or flexible steel conduit shall be cast-metal cadmium or zinc-coated if of ferrous metal with gasketed closures and shall conform to UL 514A.

2.1.3 Conductors Rated 600 Volts and Less

Conductor and conduit sizes indicated are for copper conductors unless otherwise noted. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout the cable length. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

2.1.3.1 600 Volt Wires and Cables

Service entrance and direct buried conductors shall conform to UL 854, Type USE. Conductors in conduit other than service entrance shall conform to UL 83, Type THWN. Conductor size and number of conductors in each cable shall be as indicated. Conductors shall be color coded. Conductor identification shall be provided within each enclosure where a tap, splice, or termination is made. Conductor identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, or heat shrink type sleeves. Control circuit terminations shall be properly identified. Conductors No. 10 AWG and smaller shall be solid copper. Conductors No. 8 AWG and larger shall be stranded copper. All conductors shall be copper. Conductors No. 6 AWG and smaller shall be copper. Conductors No. 4 AWG and larger shall be copper.

a. Colors for coding conductors shall be:

208-VOLT SYSTEM	480-VOLT SYSTEM
Neutral - White	Neutral - White
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Grounding conductor - Green	Grounding conductor - Green

2.1.4 600 Volt Wire Connector and Terminals

Shall provide a uniform compression over the entire contact surface. Solderless terminal lugs shall be used on stranded conductors.

a. For use with copper conductors: UL 486A.

2.1.5 600 Volt Splices

Provide splices with a compression connector on the conductor and by insulating and waterproofing using one of the following methods which are suitable for continuous submersion in water and comply ANSI C119.1.

a. Provide cast-type splice insulation by means of molded casting process employing a thermosetting epoxy resin insulating material applied by a gravity poured method or by a pressure injected method. Provide component materials of the resin insulation in a packaged form ready for convenient mixing without removing from

the package.

b. Gravity poured method shall employ materials and equipment contained in an approved commercial splicing kit which includes a mold suitable for the cables to be spliced. When the mold is in place around the joined conductors, prepare the resin mix and pour into the mold.

c. Provide heavy wall heat shrinkable splice insulation by means of a thermoplastic adhesive sealant material which shall be applied by a clean burning propane gas torch.

d. Provide a cold-shrink rubber splice which consists of EPDM rubber tube which has been factory stretched onto a spiraled core which is removed during splice installation. The installation shall not require heat or flame, or any additional materials such as covering or adhesive. It shall be designed for use with inline compression type connectors, or indoor, outdoor, direct-burial or submerged locations.

2.1.6 Medium Voltage Cable

Cable (conductor) sizes are designated by American Wire Gauge (AWG) and Thousand Circular Mils (Kcmil). Conductor and conduit sizes indicated are for copper conductors unless otherwise noted. Insulated conductors shall have the date of manufacture and other identification imprinted on the outer surface of each cable at regular intervals throughout cable length. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be accepted.

Cable for 12.47 kV underground distribution system shall be ozone resistant ethylene-propylene-rubber-insulated (EPR) cable conforming to NEMA WC 8, as applicable, and AEIC CS6. Cable shall be single conductor, employing concentric, Class B stranded copper conductors. Cable shall have conductor and insulation shielding. Insulation shielding shall be metal tape type consisting of a concentric serving of tape according to NEMA WC 8. Cable shall be rated 15 kV with insulation and jacket thickness of 133% and 220 mils, respectively. Cable shall have a polyvinyl chloride jacket.

2.1.7 Medium Voltage Cable Terminations

IEEE Std 48 Class 1. Provide terminations including stress control terminator, ground clamp, connectors, and lugs. Terminator shall be the product of one manufacturer, suitable for the type and materials of the cable terminated. Furnish components in the form of a "UL listed" kit, including complete instructions which shall be followed for assembly and installation. Provide terminator as specified herein for terminating single conductor, solid insulated, nonmetallic jacketed type cables for service voltage up to 35 KV indoor and outdoor. Do not use separate parts of copper or copper alloy in contact with aluminum alloy parts in the construction or installation of the terminator.

2.1.7.1 Indoor Terminations/Terminations Within Equipment Enclosures

Indoor terminator shall be cold-shrink type.

a. Cold-Shrink Type:

Terminator shall be a one-piece design, where high-dielectric constant (capacitive) stress control is integrated within a skirted insulator made of silicone rubber, munsel gray in color. Termination shall not require heat or flame for installation. Termination kit shall contain all necessary materials (except for the lugs). Termination shall be designed for installation in low or highly contaminated indoor and outdoor locations and shall be rated for continuous operation at 90 degree C, with an emergency overload temperature rating of 130 degree C.

2.1.7.2 Outdoor Terminations

Outdoor terminator shall be cold shrink type.

a. Cold-Shrink Type:

Terminator shall be a one-piece design, where high-dielectric constant (capacitive) stress control is integrated within a skirted insulator made of silicone rubber, munsel gray in color. Termination shall not require heat or flame for installation. Termination kit shall contain all necessary materials (except for the lugs). Termination shall be designed for installation in low or highly contaminated indoor and outdoor locations and shall be rated for continuous operation at 90 degree C, with an emergency overload temperature rating of 130 degree C.

2.1.8 Medium Voltage Cable Joints

Provide joints (splices) in accordance with IEEE Std 404 suitable for the rated voltage, insulation level, and insulation type of the cable. Upon request, supply manufacturer's design qualification test report in accordance with IEEE Std 404. Connectors for joint shall be tin-plated electrolytic copper, having ends tapered and having center stops to equalize cable insertion. Connectors shall be rated for voltage of 35 kV minimum.

a. Watertight taped-type joint: Consists of an approved connector, self-fusing or self-bonding insulating tape, self-fusing semiconducting tape, tinned copper shielding tape or braid, and plastic tape.

2.1.9 Live End Caps

Provide live end caps using a "kit" including a heat-shrinkable tube and a high dielectric strength, polymeric plug overlapping the conductor. End cap shall conform to applicable portions of IEEE Std 48.

2.1.10 Tape

2.1.10.1 Insulating Tape

UL 510, plastic insulating tape, capable of performing in a continuous

temperature environment of 80 degrees C.

2.1.10.2 Buried Warning and Identification Tape

Provide detectable aluminum foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried cable and conduit. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 2 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED ELECTRIC CABLE BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.1.11 Pull Rope

Shall be plastic having a minimum tensile strength of 200 pounds. Leave a minimum of 24 inches of slack at each end of the pull wires.

2.1.12 Grounding and Bonding Equipment

UL 467. Ground rods shall be copper clad steel with diameter adequate to permit driving to full length of the rod, but not less than 3/4 inch in diameter and 10 feet long unless otherwise indicated.

2.1.13 Cable Tags

Provide as specified in Section 16050N, "Basic Electrical Materials and Methods".

2.2 SOURCE QUALITY CONTROL

2.2.1 Medium Voltage Cable Tests

Results of AEIC C5 and AEIC CS6 qualification and production tests as applicable for each type of medium voltage cable.

PART 3 EXECUTION

3.1 INSTALLATION

NFPA 70 and ANSI C2.

3.1.1 Contractor Damage

The Contractor shall promptly repair any indicated utility lines or systems damaged by Contractor operations. Damage to lines or systems not indicated, which are caused by Contractor operations, shall be treated as "Changes" under the terms of the General Provisions of the contract. If the Contractor is advised in writing of the location of a nonindicated line or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In any event, the Contractor shall immediately notify the Contracting Officer of any such damage.

3.1.2 Concrete

Concrete work for electrical requirements shall be 3000 psi minimum ultimate 28-day compressive strength with one inch minimum aggregate conforming to the requirements of Section 03300N, "Cast-In-Place Concrete".

Shall be composed of fine aggregate, coarse aggregate, portland cement, and water so proportioned and mixed as to produce a plastic, workable mixture. Fine aggregate shall be of hard, dense, durable, clean, and uncoated sand. The coarse aggregate shall be reasonably well graded from 3/16 to one inch. The fine and coarse aggregates shall be free from injurious amounts of dirt, vegetable matter, soft fragments or other deleterious substances. Water shall be fresh, clean, and free from salts, alkali, organic matter, and other impurities. Concrete shall have a compressive strength of 3000 psi at the age of 28 days. Slump shall not exceed 3 inches. Retempering of concrete will not be permitted. Exposed, unformed concrete surfaces shall be given a smooth, wood float finish. Concrete shall be cured for a period of not less than 7 days, and concrete made with high early strength portland cement shall be repaired by patching honeycombed or otherwise defective areas with cement mortar as directed by the Contracting Officer. Air entrain concrete exposed to weather using and air-entraining admixture conforming to ASTM C 260. Air content shall be between 4 and 6 percent.

3.1.3 Direct Burial System

No direct earth burial installations will be used on this project unless specifically stated or shown on the drawings.

3.1.3.1 Cutting Cable

Tape cable ends immediately after cutting to prevent moisture from entering the cable. Varnish the tape when cable is not expected to be connected for at least 72 hours.

3.1.3.2 Restoration

Replace sod which has been removed, as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, pad construction, and other work to original condition and maintain until final acceptance. Provide necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging or mulching.

3.1.3.3 Crossing Cables

Separate cables crossing other cables or metal piping from each other by not less than 3 inches of well tamped earth.

3.1.3.4 Splicing

Provide cables in one piece without splices between connections except where the distance exceeds the lengths in which cables are manufactured.

3.1.3.5 Bends

Bends in cables shall have an inner radius not less than those specified in NFPA 70 for the type of cable specified.

3.1.3.6 Horizontal Slack

Leave approximately 3 feet of horizontal slack in the ground on each end of cable runs, on each side of connection boxes, and at points where connections are brought above ground. Where cable is brought above ground, leave additional slack to make necessary connections.

3.1.3.7 Cable End Seal

Ends of cable shall be taped immediately after cutting to prevent moisture from entering the cable. Where the cable is not expected to be connected for at least 72 hours, the tape shall also be varnished.

3.1.4 Underground Conduit/Duct Without Concrete Encasement

All cable to be installed in this project will be installed within conduit unless noted otherwise. Type of conduit shall be EPC-40-PVC as shown on the conduit drawings.

3.1.4.1 Conduit Installation

Top of the conduit shall be not less than 36 inches below grade, and shall have a minimum slope of 3 inches in each 100 feet away from buildings and toward manholes and other necessary drainage points. Run conduit in straight lines except where a change of direction is necessary. As each conduit run is completed, for conduit sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. For conduit sizes less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. Provide not less than 3 inches clearance from the conduit to each side of the trench. A minimum clearance of 2 1/2 inches shall be provided between adjacent conduits. Grade bottom of trench smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches, fill and tamp level with original bottom with sand or earth free from particles, that would be retained on a 1/4 inch sieve. Install polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded yellow for Electric utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil. Install warning tape in accordance with manufacturer's recommendations except as modified herein. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.1.4.2 Encasement Under Roads and Structures

Under roads, paved areas, and railroad tracks, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3 inch concrete cover around ducts. Concrete encasement shall extend at least 5 feet beyond the edges of paved areas and roads, and 12 feet beyond the rails on each side of railroad tracks. Conduits to be installed under existing paved areas which are not to be disturbed, and under roads and railroad tracks, shall be zinc-coated, rigid steel, jacked into place.

3.1.4.3 Multiple Conduits

Separate multiple conduits by a minimum distance of 2 1/2 inches, except that light and power conduits shall be separated from control, signal, and telephone conduits by a minimum distance of 3 inches. Stagger the joints of the conduits by rows and layers to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

3.1.5 Underground Duct with Concrete Encasement

Construct underground duct lines of individual conduits encased in concrete. Except where rigid galvanized steel conduit is indicated or specified, the conduit shall be EPC-40-PVC. Do not mix different kinds of conduit in any one duct bank. Ducts shall not be smaller than 5 inches in diameter unless otherwise indicated. Concrete encasement surrounding the bank shall be rectangular in cross-section and shall provide at least 3 inches of concrete cover for ducts. Separate conduits by a minimum concrete thickness of 2 inches, except separate light and power conduits from control, signal, and telephone conduits by a minimum concrete thickness of 3 inches. Provide polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inch minimum width, color coded yellow for Electric utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil. Install warning tape in accordance with manufacturer's recommendations except as modified herein. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.1.5.1 Depth of Encasement

Top of the concrete encasement shall not be less than 36 inches below grade.

3.1.5.2 Slope of Encasement

Duct banks shall have a continuous slope downward toward underground structures and away from buildings with a minimum pitch of 3 inches in 100 feet. Except at conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 feet; sweep bends may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 18 inches for use with conduits of less than 3 inches in diameter and a minimum radius of 36 inches for ducts of 3 inches in diameter and larger. Excavate trenches along straight lines from structure to structure before ducts are laid or structure constructed so the elevation can be adjusted, if necessary, to avoid unseen obstruction.

3.1.5.3 Conduits

Terminate conduits in end-bells where duct lines enter underground structures. Stagger conduit joints by rows and layers to strengthen the duct bank. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in duct bank. Install spacers per manufacture's instructions, but provide a minimum of two spacer assemblies per 10 feet of duct bank. Before pouring concrete, anchor duct bank assemblies to prevent the assemblies from floating during concrete pouring. Anchoring shall be done by driving reinforcing rods adjacent to every other duct spacer assembly and attaching the rod to the spacer assembly.

3.1.5.4 Test Mandrel

As each section of a duct line is completed from structure to structure, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the diameter of the conduit through each conduit. After which, draw a stiff bristle brush through the conduit, until conduit is clear of particles of earth, sand, and gravel; then immediately install end plugs.

3.1.5.5 Conduit Plugs and Pull Rope

New conduit indicated as being unused or empty shall be provided with plugs on each end. Plugs shall contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.1.5.6 Connections to Manholes

Duct bank envelopes connecting to underground structures shall be flared to have enlarged cross-section at the manhole entrance to provide additional shear strength. Dimensions of the flared cross-section shall be larger than the corresponding manhole opening dimensions by no less than 12 inches in each direction. Perimeter of the duct bank opening in the underground structure shall be flared toward the inside or keyed to provide a positive interlock between the duct bank and the wall of the structure. Use vibrators when this portion of the encasement is poured to assure a seal between the envelope and the wall of the structure.

3.1.5.7 Connections to Existing Manholes

For duct bank connections to existing structures, core drill the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and extend into the duct bank envelope. Chip the perimeter surface of the duct bank opening to form a key or flared surface, providing a positive connection with the duct bank envelope.

3.1.5.8 Connections to Existing Concrete Pads

For duct bank connections to concrete pads, break an opening in the pad out to the dimensions required and preserve steel in pad. Cut the steel and extend into the duct bank envelope. Chip out the opening in the pad to form a key for the duct bank envelope.

3.1.5.9 Connections to Existing Ducts

Where connections to existing duct banks are indicated, excavate the banks to the maximum depth necessary. Cut off the banks and remove loose concrete from the conduits before new concrete-encased ducts are installed. Provide a reinforced concrete collar, poured monolithically with the new duct bank, to take the shear at the joint of the duct banks. Remove existing cables which constitute interference with the work. Abandon in place those no longer used ducts and cables which do not interfere with the work unless noted otherwise on drawings.

3.1.5.10 Partially Completed Duct Banks

During construction wherever a construction joint is necessary in a duct bank, prevent debris such as mud and dirt from entering ducts by providing suitable conduit plugs. Fit concrete envelope of a partially completed duct bank with reinforcing steel extending a minimum of 2 feet back into the envelope and a minimum of 2 feet beyond the end of the envelope. Provide one No. 4 bar in each corner, 3 inches from the edge of the envelope. Secure corner bars with two No. 3 ties, spaced approximately one foot apart. Restrain reinforcing assembly from moving during concrete pouring.

3.1.5.11 Removal of Ducts

Where duct lines are removed from existing underground structures, close the openings to waterproof the structure. Chip out the wall opening to provide a key for the new section of wall.

3.1.6 Substation Cable Trench

A precast cable trench system shall be used as the backbone of the cable duct system within Station 1. This system is shown in the conduit and cable plan drawings is made of precast fiber reinforced concrete in 20" x 16" x 48" sections. Each section shall be one piece with an open bottom and a removable cover. It shall be designed to support at least 200 lbs per square foot of live load. It shall be installed as shown on the drawings with at least one drain installed and a ground bond running the

entire length of the trench bonded to the ground grid approximately every 20 feet. This trench shall be supplied by Concast incorporated or an approved equivalent.

3.1.7 Conduit Protection at Concrete Penetrations

Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations shall be PVC coated and shall extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.1.8 Buried Warning and Identification Tape

Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

3.1.9 Cable Pulling

Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct runs. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnups into switches, transformers, switchgear, switchboards, and other enclosures. Cable with tape or wire shield shall have a bending radius not less than 12 times the overall diameter of the completed cable. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

3.1.9.1 Cable Lubricants

Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables. Lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.

3.1.9.2 Cable Pulling Tensions

Tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer. Monitor pulling tension during cable installation to ensure maximum pulling tension is not exceeded.

3.1.9.3 Secondary Cable Runs, 600 Volts and Less

Provide insulated copper equipment grounding conductor, sized as required by the rating of the overcurrent device supplying the phase conductors.

3.1.9.4 Cables in Manholes

Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators at a maximum of 18 inches. Support cable splices in underground structures by racks on each side of

the splice. Locate splices to prevent cyclic bending in the spliced sheath. Install cables at middle and bottom of cable racks, leaving top space open for future cables, except as otherwise indicated for existing installations. Provide one spare three-insulator rack arm for each cable rack in each underground structure. In existing manholes, handholes and vaults where new ducts are to be terminated or where new cables are to be installed, modify the existing installation of cables, cable supports and grounding as required for a uniform installation with cables carefully arranged and supported in the same manner as specified for new cable. Provide the necessary cable racks in each underground structure through which cable is run.

3.1.9.5 Cable Tags in Manholes and Handholes

Provide cable markers (or tags) as specified in Section 16050N, "Basic Electrical Materials and Methods."

3.1.9.6 Conductors Installed in Parallel

Conductors shall be grouped such that each conduit of a parallel run contains 1 Phase A conductor, 1 Phase B conductor, 1 Phase C conductor, and 1 neutral conductor.

3.1.10 600 Volt Cable Splicing and Terminating

Protect terminations of insulated power and lighting cables from accidental contact, deterioration of coverings and moisture by providing terminating devices and materials. Install terminations of insulated power and lighting cables and cable joints in accordance with the manufacturer's requirements. Make terminations with materials and methods as indicated or specified herein or as designated by the written instructions of the cable manufacturer and termination kit manufacturer.

Provide splices and terminations to protect 600 volts insulated power and lighting cables from accidental contact, deterioration of coverings and moisture. Make terminations and splices with materials and methods as indicated or specified herein and as designated by the written instructions of the manufacturer. Do not allow the cables to be moved until after the splicing material has completely set. Make splices in underground distribution systems only in accessible locations such as manholes and handholes.

3.1.10.1 Splices for 600 Volt Class Cables

Splices in underground distribution systems shall made only in accessible locations such as manholes and handholes, with a compression connector on the conductor and by insulating and waterproofing by one of the following methods suitable for continuous submersion in water and comply with ANSI C119.1.

a. Provide a cold-shrink rubber splice which consists of EPDM rubber tube which has been factory stretched onto a spiraled core which is removed during splice installation. The installation shall not require heat or flame, or any additional materials such as

coverings or adhesive. It shall be designed for use with inline compression type connectors, or indoor, outdoor, direct-burial or submerged locations.

b. Where aluminum conductors are provided, use particular care in making up joints and terminations. Remove surface oxides by cleaning with a wire brush or emery cloth. Provide joint compound on conductors, and UL listed solid aluminum connectors for connecting aluminum to aluminum. When connecting aluminum to copper, provide connectors specifically designed for connecting aluminum to copper.

3.1.11 Medium Voltage Cable Terminations

Provide terminating devices and materials to protect medium voltage cable terminations from accidental contact, deterioration of coverings, and moisture. Make terminations by using materials and methods specified herein and as designated by the written instruction of the cable manufacturer and termination kit manufacturer. Termination for high-voltage cables shall be rated, and be capable of withstanding test voltages, in accordance with IEEE Std 48. Terminations of single- and multiconductor cables shall include the securing and sealing of the sheath and insulation of the cable conductors, stress relief and grounding of cable shields of shielded cable, and grounding of neutral conductors, metallic sheaths, and armor. Adequately support cables and cable terminations to avoid any excessive strain on the termination and the conductor connection.

3.1.12 Medium Voltage Cable Joints

Provide power cable joints (splices) suitable for continuous immersion in water and direct burial. Make joints only in accessible locations in manholes or handholes by using materials and methods specified herein and as designated by the written instructions of the cable manufacturer and the joint kit manufacturer. Size connectors properly for the cable being connected and crimp using a full circle compression tool.

Make medium-voltage joints by using a kit of one manufacturer and with written approval of the manufacturer of the cable which is to be spliced. Provide the Contracting Officer with a copy of the manufacturer's instructions before jointing is started. Upon request, supply manufacturer's design qualification test report in accordance with IEEE Std 404. Joint design shall have been proof tested in accordance with IEEE Std 404. Connectors for joint shall be tin-plated electrolytic copper, having ends tapered and having center stops to equalize cable insertion.

(1) Watertight taped-type joint: Consists of an approved connector, self-fusing tape (splicing compound), self-bonding semiconducting tape, tinned copper shielding tape or braid, and plastic tape.

3.1.12.1 Joints in Shielded Cables

Cover the joined area with metallic tape, or material like the original cable shield and connect it to the cable shield on each side of the splice. Ground ends of insulated sections terminating in potheads at the pothead terminal only. Provide a bare copper ground connection brought out in a watertight manner and grounded to a ground rod as part of the splice installation. Ground conductors, connections, and rods shall be as specified elsewhere in this section. Wire shall be trained to the sides of the enclosure to prevent interference with the working area.

3.1.13 Cable End Caps

Cable ends shall be sealed at all times with coated heat shrinkable end caps. Cables ends shall be sealed when the cable is delivered to the job site, while the cable is stored and during installation of the cable. The caps shall remain in place until the cable is spliced or terminated. Sealing compounds and tape are not acceptable substitutes for heat shrinkable end caps. Cable which is not sealed in the specified manner at all times will be rejected.

3.1.12 Live End Caps

Provide live end caps for single conductor medium voltage cables where indicated.

3.1.13 Fireproofing of Cables in Manholes, Handholes and Vaults

Fireproof (arc proof) wire and cables which will carry current at 2200 volts or more in manholes, handholes, and vaults.

3.1.13.1 Fireproofing Tape

Tightly wrap strips of fireproofing tape around each cable spirally in half-lapped wrapping. Install tape in accordance with manufacturer's instructions.

3.1.14 Grounding Systems

Noncurrent-carrying metallic parts associated with electrical equipment shall have a maximum resistance to solid earth ground not exceeding the following values:

Main substations, distribution substations, switching stations, primary distribution stations enclosed by fences:

500 kVA or less:	5 ohms
500 kVA to 1000 kVA:	5 ohms
1000 kVA or over:	3 ohms

Ground in manholes, handholes, and vaults: 5 ohms

Grounding other metal enclosures of primary voltage electrical and electrically-operated equipment: 5 ohms

Grounded secondary distribution system neutral and noncurrent-carrying metal parts associated with distribution systems and grounds not otherwise covered: 5 ohms

When work in addition to that indicated or specified is directed in order to obtain the specified ground resistance, the provisions of the contract covering "Changes" shall apply.

3.1.14.1 Grounding Electrodes

Provide cone pointed driven ground rods driven full depth plus 6 inches, installed to provide an earth ground of the appropriate value for the particular equipment being grounded.

3.1.14.2 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible, excepting specifically those connections for which access for periodic testing is required, by exothermic weld.

a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

3.1.14.3 Grounding Conductors

Grounding conductors shall be stranded-bare copper conforming to ASTM B 8, Class B, for sizes No. 6 AWG and larger, and shall be solid-bare copper conforming to ASTM B 1 for sizes No. 8 and smaller. Cable sheaths, cable shields, conduit, and equipment shall be grounded with No. 6 AWG, except the feeder exit cable sheaths and cable shields shall be grounded with No. 4/0 AWG.

3.1.14.4 Ground Cable Crossing Expansion Joints

Protect ground cables crossing expansion joints or similar separations in structures and pavements by use of approved devices or methods of installation which provide the necessary slack in the cable across the joint to permit movement. Use stranded or other approved flexible copper cable across such separations.

3.1.14.5 Ground Rod Connections

Connect ground rods to copper ground conductor and weld the connection.

3.1.14.6 Fence Grounding

Fences shall be grounded as indicated on the grounding drawings. Fences shall be grounded with a ground rod at each fixed gate post and at each corner post. Drive ground rods until the top is 12 inches below grade. Attach a No. 2 AWG copper conductor, by exothermic weld to the ground rods and extend underground to the immediate vicinity of fence post. Lace the

conductor vertically through the fence mesh and fasten by three approved bronze compression fittings, one to bond wire to post and the other to bond wire to fence. The barb wire extensions shall be fastened to this ground conductor with approved bronze compression fittings to each strand at each opening point. At the tangent posts the conductor shall be attached tot he posts with grounding pipe connectors as shown on the drawings. Each gate section shall be bonded to its gatepost by a 3/8 by 1/2 inch flexible braided copper strap and ground post clamps. Clamps shall be of the anti-electrolysis type.

3.1.15 Special Conditions

During the construction of duct banks and underground structures located in streets, the streets shall remain open to traffic. Plan and execute the work to meet this condition. At locations where duct banks cross railroad tracks and the work requires closing of the tracks, secure permission from the Contracting Officer for each track closure.

3.1.16 Earthwork for Utilities

Section 02302N, "Excavation, Backfilling, and Compacting for Utilities."

3.1.17 Reconditioning of Surfaces

3.1.17.1 Unpaved Surfaces

Restore to their original elevation and condition unpaved surfaces disturbed during installation of duct or direct burial cable. Preserve sod and topsoil removed during excavation and reinstall after backfilling is completed. Replace sod that is damaged by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding.

3.1.17.2 Paving Repairs

Where trenches, pits, or other excavations are made in existing roadways and other areas of pavement where surface treatment of any kind exists, restore such surface treatment or pavement the same thickness and in the same kind as previously existed, except as otherwise specified, and to match and tie into the adjacent and surrounding existing surfaces.

3.1.18 Certificate of Competency for Cable Splicer/Terminator

Certification of the qualification of the cable splicer/terminator shall be submitted, for approval, 30 days before splices or terminations are to be made in medium voltage (5 kV to 35 kV) cables. The certification shall include the training, and experience of the individual on the specific type and classification of cable to be provided under this contract. The certification shall indicate that the individual has had three or more years recent experience splicing and terminating medium voltage cables. The certification shall also list a minimum of three splices/terminations that have been in operation for more than one year. In addition, the individual may be required to perform a dummy or practice

splice/termination in the presence of the Contracting Officer, before being approved as a qualified cable splicer. If that additional requirement is imposed, the Contractor shall provide short sections of the approved types of cables along with the approved type of splice/termination kit, and detailed manufacturer's instructions for the cable to be spliced. The Contracting Officer reserves the right to require additional proof of competency or to reject the individual and call for certification of an alternate cable splicer.

3.2 FIELD QUALITY CONTROL

As an exception to requirements that may be stated elsewhere in the contract, notify the Contracting Officer 5 working days prior to each test. Furnish labor, equipment, and incidentals required for testing, except that the Government will provide electric power required for the tests. Correct defects in the work provided by the Contractor and repeat tests until the work is in compliance with contract requirements.

3.2.1 Performance of Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations, NFPA 70B, NETA ATS, and referenced ANSI standards. Include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.2.1.1 600 Volt Cable Tests

Perform tests after wiring is completed, connected, and ready for operation, but prior to placing system in service and before any branch circuit breaker is closed.

a. Visual and Mechanical Inspection

(1) Inspect cables for physical damage and proper connection in accordance with contract plans and specifications.

(2) Test cable mechanical connections to manufacturer's recommended values using a calibrated torque wrench. In the absence of manufacturer's data use NETA recommended values.

(3) Check cable color coding for compliance with contract specifications.

b. Electrical Tests

(1) Perform insulation-resistance test on each conductor with respect to ground and adjacent conductor; applied potential shall be 1000 volts DC for 1 minute; minimum insulation-resistance values shall not be less than 2 megohms.

(2) Perform continuity test to insure proper cable connection.

3.2.1.2 Medium Voltage Cables

Perform tests after installation of cable, splices, and terminators and before terminating to equipment.

a. Visual and Mechanical Inspection

(1) Inspect exposed cable sections for physical damage.

(2) Verify that cable is supplied and connected in accordance with contract plans and specifications.

(3) Inspect for proper shield grounding, cable support, and cable termination.

(4) Verify that cable bends are not less than ICEA or manufacturer's minimum allowable bending radius.

(5) Inspect for proper fireproofing.

(6) If cables are terminated through window-type CT's, make an inspection to verify that neutrals and grounds are properly terminated for proper operation of protective devices.

(7) Visually inspect jacket and insulation condition.

(8) Inspect for proper phase identification and arrangement.

b. Electrical Tests

(1) Perform a shield continuity test on each power cable by ohmmeter method. Record ohmic value, resistance values in excess of 10 ohms per 1000 feet of cable must be investigated and justified.

(2) Perform a DC high-potential test on all cables. Adhere to precautions and limits as specified in the applicable NEMA/ICEA Standard for the specific cable. Test procedure shall be as follows, and the results for each cable test shall be recorded as specified herein. Field acceptance test voltage for 15 kV cable shall be 53/65 kV DC.

(a) Current-sensing circuits in test equipment shall measure only the leakage current associated with the cable under test and shall not include internal leakage of the test equipment.

(b) Record wet- and dry-bulb temperatures or relative humidity and temperature.

(c) Test each section of cable individually.

(d) Individually test each conductor with all other conductors grounded; Ground all shields.

(e) Terminations shall be properly corona-suppressed by guard ring, field reduction sphere, or other suitable methods as

necessary.

(f) Ensure that the maximum test voltage does not exceed the limits for terminators specified in IEEE standard 48 or manufacturer's specifications.

(g) Apply the DC high-potential test in at least five equal increments until maximum test voltage is reached. No increment shall exceed the voltage rating of the cable. Record DC leakage current at each step after a constant stabilization time consistent with system charging current.

(h) Raise the conductor to the specified maximum test voltage and hold for fifteen (15) minutes. Record readings of leakage current at 30 seconds and one minute and at one-minute intervals thereafter. Provide a graphic plot of readings with leakage current (X axis) versus voltage (Y axis) at each increment.

(i) Reduce the conductor test potential to zero and measure residual voltage at discrete intervals.

(j) Apply grounds for a time period adequate to drain all insulation stored charge.

(k) When new cables are spliced into existing cables, the DC high-potential test shall be performed on the new cable prior to splicing. After test results are approved for new cable and the splice is completed, an insulation-resistance test and a shield-continuity test shall be performed on the length of new and existing cable including the splice. After a satisfactory insulation-resistance test, a DC high-potential test shall be performed on the completed cable system utilizing a test voltage 75 percent of new cable tested value.

3.2.1.3 Ground Rods

Perform ground resistance tests for ground rods before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Ground resistance shall also be measured for each piece of equipment and medium voltage cable splice to the ground electrode. Use a portable ground testing megger in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground electrode under test.

3.2.2 Approval of Test Results

Medium voltage cable test results shall be approved by SOUTHNAVFACENGCOM (Code 074).

SECTION 16311A

MAIN ELECTRIC SUPPLY STATION AND SUBSTATION
06/03

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C12.11	(1987; R 1993) Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
ANSI C29.1	(1988; R 1996) Electrical Power Insulators - Test Methods
ANSI C29.9	(1983; R 1996) Wet-Process Porcelain Insulators - Apparatus, Post-Type
ANSI C37.06	(1997) AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis - Preferred Ratings and Related Required Capabilities for Switchgear
ANSI C37.32	(1996) High-Voltage Air Switches, Bus Supports, and Switch Accessories - Schedules of Preferred Ratings, Manufacturing Specifications, and Application Guide

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M	(2000) Carbon Structural Steel
ASTM A 123/A 123M	(2000) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2000) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 572/A 572M	(2000) High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 575	(1996) Steel Bars, Carbon, Merchant Quality, M-Grades

ASTM A 576	(1990b; R 1995el) Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM A 633/A 633M	(2000) Normalized High-Strength Low-Alloy Structural Steel Plates
ASTM B 8	(1999) Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B 117	(1997) Operating Salt Spray (Fog) Apparatus
ASTM B 188	(1996) Seamless Copper Bus Pipe and Tube
ASTM B 231/B 231M	(1999) Concentric-Lay-Stranded Aluminum 1350 Conductors
ASTM D 923	(1997) Sampling Electrical Insulating Liquids
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 4059	(1996) Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography

ASME INTERNATIONAL (ASME)

ASME B31.3	(1999) Process Piping
ASME BPVC SEC IX	(1998) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2000) Structural Welding Code - Steel

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code (IEEE)
IEEE C37.2	(1996) Electrical Power System Device Function Numbers and Contact Designations
IEEE C37.04	(1999; C37.04g; C37.04i) Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
IEEE C37.081	(1981; C37.081a; R 1988) Guide for Synthetic Fault Testing of AC High-Voltage Circuit Breakers Rated on a Symmetrical

	Current Basis
IEEE C37.09	(1999) Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
IEEE C37.20.2	(1993; C37.20.2b) Metal-Clad and Station-Type Cubicle Switchgear
IEEE C37.30	(1997)Requirements for High-Voltage Air Switches
IEEE C37.34	(1994) Test Code for High-Voltage Air Switches
IEEE C37.41	(1994; C37.41c) Design Tests for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories
IEEE C37.90	(1989; R 1994) Relays and Relay Systems Associated with Electric Power Apparatus
IEEE C37.90.1	(1989; R 1994) IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
IEEE C37.98	(1987; R 1991) Seismic Testing of Relays
IEEE C57.12.00	(1993) Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.12.01	(1998) Standard General Requirements for Dry-Type Distribution and Power Transformers Including Solid-Cast and/or Resin-Encapsulated Windings
IEEE C57.13	(1993) Instrument Transformers
IEEE C62.1	(1989; R 1994) Surge Arresters for AC Power Circuits
IEEE C62.2	(1987; R 1994) Guide for the Application of Gapped Silicon-Carbide Surge Arresters for Alternating Current Systems
IEEE C62.11	(1999) IEEE Standard Metal-Oxide Surge Arresters for AC Power Circuits
IEEE Std 80	(1997) IEEE Guide for Safety in AC Substation Grounding
IEEE Std 81	(1983) Guide for Measuring Earth

	Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1)
IEEE Std 100	(2000) Dictionary of Electrical and Electronics Terms (IEEE)
IEEE Std 484	(1996) Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications
IEEE Std 485	(1997) Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations
IEEE Std 525	(1992) IEEE Guide for the Design and Installation of Cable Systems in Substations

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA AB 1	(1993) Molded Case Circuit Breakers and Molded Case Switches
NEMA LA 1	(1992) Surge Arresters
NEMA PB 1	(1995) Panelboards
NEMA SG 5	(1995) Power Switchgear Assemblies
NEMA SG 6	(1995) Power Switching Equipment
NEMA WD 1	(1999) General Requirements for Wiring Devices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 6	(1997) Rigid Metal Conduit
UL 50	(1995; Rev thru Nov 1999) Enclosures for Electrical Equipment
UL 67	(1993; Rev thru Oct 1999) Panelboards
UL 467	(1993; R 2001) Grounding and Bonding Equipment

UL 486B	(1997; Rev Jun 1997) Wire Connectors for Use with Aluminum Conductors
UL 489	(1996; Rev thru Dec 1998) Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
UL 1236	(1994; Rev thru Mar 1999) Battery Chargers for Charging Engine-Starter Batteries

1.2 GENERAL REQUIREMENTS

1.2.1 Terminology

Terminology used in this specification is as defined in IEEE Std 100.

1.2.2 System Description

The system shall be configured as specified, and shall include structures, incoming and outgoing lines, transformers, fuses, circuit breakers, switches, switchgear, connectors, and appurtenances to provide a fully functional system.

New structures and equipment will be installed at the current Station 1 Site with approximately 90% of the existing facilities removed. Work at Station 1 will include the installation of the underground feeder exits to the new Capehart and Z Feeder Riser poles. This work includes the conduit, conductor, riser conduit, pole mounting brackets, cable terminations, and surge arrestors. It does not include the connection of the cable to the overhead conductor, crossarms are pole itself..

New switchgear will be installed in Station E replacing one complete bank of obsolete switchgear equipment.

Station H will be expanded with the addition of one new switchgear dual breaker cabinet with one breaker installed on the end of the bus on each side of the bus tie breaker.

The existing feeder breaker switchgear cubicles in Stations A, B, C, D, E, F, G, and H and circuit breakers in Station 2 will be modified by removing the existing relays and the mounting panels and replacing these with new microprocessor based relays and mounting panels. New 7200/120 volt potential transformers will be installed in Stations B and H. Minor rewiring of potential transformers and relocation of existing differential relays is required as indicated on the drawings.

The attached Design Criteria, equipment requirement appendixes and drawings shall be used to supply additional details and requirements for the equipment and structures to be installed.

The work shall be done in the following order:

UPGRADE STATION E - Including replacement of obsolete bus 1 sections and

modification to the existing bus 2 section.

UPGRADE STATION H - Begin after completion of Station E work to allow base personnel to fully utilize station E while H is being upgraded. Work will be done one bus at a time to allow the base to continue to be energized while this station is being upgraded. Includes installation of two new breaker cabinets, new UG feeder conductor/conduits, and new relaying. It also includes modifications to the existing fencing, grounding, and Circuit 1 & 2 cable, conduit and feeder termination structures at Station 1.

STATION 1 REPLACEMENT - After Station H work has been completed and the Circuit 1 and 2 feeders have been upgraded with additional conductors, begin the temporary work as shown on the drawings with the installation of a new bus termination structure for the Progress Energy point of delivery, (This bus installation will need to be done while the existing bus is still energized.) The new UG cables and temporary riser structure for termination structure 1 will be completed and energized before other station work can begin. Once this work is completed the remaining work necessary to complete the station can begin. This work is required to be completed within 60 days from the beginning of temporary structure installation to reenergizaion of completed substation. This work will be scheduled to occur during a lighter loading period at the base as approved by the base contracting officer and must be completed within that 60 day work schedule window.

RELAY INSTALLATIONS - The installation of the new relays and mounting panels at the other stations does not require Stations E, H or 1 to be completed and can be scheduled with the base contracting officer.

1.2.3 Service Conditions

Items provided under this section shall be specifically suitable for the following service conditions.

a. Altitude 104 feet

b. Ambient Temperature 63 degrees F
   Maximum Temperature 104 degrees F
   Minimum Temperature -2 degrees F

c. Frequency 60 Hz

d. Isokeraunic level 47 thunderstorm-days per year

e. Maximum rainfall 10.5 inches per 24h

f. Relative humidity 82 % average 7:00 am

g. Wind velocity 140 mph fastest-mile, 50 year recurrence

h. NESC loading district Medium

i. Maximum ice loading 0.25 inches (50 yr recurrence) with 30mph 3

sec gust

1.2.4 Incoming and Outgoing Circuit Compliance

Aerial and underground circuits shall comply with the requirements of Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings: G

General Installation Requirements;
Detail Drawings;
Detail drawings consisting of equipment drawings, illustrations, schedules, instructions, diagrams, and other information necessary to define the installation shall be submitted. All drawings shall be submitted in both a printed form and as an Autocad drawing file release 14 or newer. Detail drawings shall show the ratings of items and systems and how the components of an item and system are assembled, function together, and how they will be installed on the project. Data and drawings for component parts of an item or system shall be coordinated and submitted as a unit. Data and drawings shall be coordinated and included in a single submission. Multiple submissions for the same equipment or system are not acceptable except where prior approval has been obtained from the Contracting Officer. In such cases, a list of data to be submitted later shall be included with the first submission. Detail drawings shall show physical arrangement, construction details, connections, finishes, materials used in fabrication, provisions for conduit or busway entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, and equipment weight. Drawings shall be drawn to scale and/or dimensioned. Optional items shall be clearly identified as included or excluded. Detail drawings shall as a minimum include:

a. Station bus structures, temporary support structures, underground feeder termination structures, and integral equipment.(Station 1)

b. Switchgear. (Station E & H)

c. Battery system including calculations for the battery and charger. (Station 1 & E)

d. Breaker/Cubicle Relay mounting panel wiring diagrams and layouts. (Stations 1, 2, A, B, C, D, E, F, G, and H)

e. Station single line electrical diagrams including primary,

metering, sensing and relaying, control wiring, and control logic. (Stations 1, 2, A, B, C, D, E, F, G, and H)

Structural drawings shall be prepared to show the structural or physical features of major items of station equipment and components of equipment or equipment assemblies and structures, including foundations or other types of supports for equipment and conductors. Those drawings shall include accurately scaled or dimensioned outline and arrangement or layout drawings to show the physical size of station equipment and component parts of the equipment and the relative arrangement of components and any physical connection of related components. Weights of equipment and components of equipment assemblies shall be provided when required to verify the adequacy of design and proposed construction of foundations or other types of supports. Dynamic forces shall be stated for switching devices when such forces must be considered in the design of support structures. The appropriate detail drawings shall show the provisions for leveling, anchoring, and connecting all items of station equipment during installation, and shall include any recommendations made by the manufacturer of the equipment.

Electrical drawings shall include single-line and three-line diagrams of the station and station equipment, schematics or elementary diagrams of each electrical system; internal wiring and external connection diagrams of each electrical device when published by the manufacturer; wiring diagrams of cabinets, panels, units, or other separate mountings; interconnection diagrams that show the wiring between separate components of assemblies; external connection diagrams that show the termination of wiring routed between separate items of station equipment; internal wiring diagrams of equipment showing wiring as actually provided for this project. External wiring connections shall be clearly identified.

If departures from the contract drawings are deemed necessary by the Contractor, complete details of such departures, including changes in related portions of the project and the reasons therefore, shall be submitted with the detail drawings. Approved departures shall be made at no additional cost to the Government.

As-Built Drawings;

The as-built drawings shall be a record of the construction as installed. The drawings shall include all the information shown on the contract drawings as well as all deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full sized set of prints marked to reflect all deviations, modifications, and changes. The as-built drawings shall be complete and show the location, size, dimensions, part identification, and other information. The drawings will also show the terminations and schematics for all new relays installed in existing equipment. Additional sheets may

be added. The as-built drawings shall be jointly inspected for accuracy and completeness by the Contractor's quality control representative and by the Contracting Officer prior to the submission of each monthly pay estimate. Upon completion of the work, the Contractor shall submit three full sized sets of the marked prints to the Contracting Officer for approval. If upon review, the as-built drawings are found to contain errors and/or omissions, they will be returned to the Contractor for correction. The Contractor shall correct and return the as-built drawings to the Contracting Officer for approval within ten calendar days from the time the drawings are returned to the Contractor. The approved as-built drawings shall be submitted in both a printed form and as an Autocad drawing file release 14 or newer to the Contracting Officer.

SD-03 Product Data

Support Structures; G,

Manufacturer's design analysis and calculations for structures, foundations, anchor bolts, and supports differing from those indicated in the contract drawings, and for prefabricated structures. Calculations shall be made by a registered professional engineer with demonstrated experience in substation structural design in the last three years. The manufacturer shall provide a list of projects complete with points of contact, addresses and telephone numbers.

Battery; G,

New Battery systems will be installed at Station 1 and Station E. Calculations for the battery and associated charger indicating the basis used in defining loads, selecting cell types, and determining the battery ampere-hour capacity and physical size. Calculations shall be provided to determine capacity for the battery charger and be similar to those shown in the Appendix to IEEE Std 485, including explanatory data. Calculations for the battery-charger shall demonstrate that the output voltage and current provided are adequate to comply with the preceding requirements.

Nameplates;

Submit data composed of catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents.

Material and Equipment;

A complete itemized listing of equipment and materials proposed for incorporation into the work shall be submitted. Each entry shall include an item number, the quantity of items proposed, and the name of the manufacturer of each such item.

General Installation Requirements;

As a minimum, the Contractor shall submit installation procedures for station buses and insulators, station structures, transformers, switchgear, battery system, animal mitigation equipment, and prewired relay mounting panels with relays.

Procedures shall include diagrams, instructions, and precautions required to install, adjust, calibrate, and test the devices and equipment.

Onsite Tests; G

A detailed description of the Contractor's proposed procedures for on-site tests.

SD-06 Test Reports

Factory Tests; G

Six copies of the information described below in 8 1/2 x 11 inch binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

a. A list of all equipment used, with calibration certifications.

b. A copy of all measurements taken.

c. The dates of testing.

d. The equipment and values to be verified.

e. The condition specified for the test.

f. The test results, signed and dated.

g. A description of all adjustments made.

Field Testing; G

A detailed description of the Contractor's proposed procedures for on-site tests submitted 20 days prior to testing the installed system. No field test will be performed until the test plan is approved. The test plan shall consist of complete field test procedures including tests to be performed, test equipment required, and tolerance limits.

Field Test Reports;

Six copies of the information described below in 8 1/2 x 11 inch

binders having a minimum of 5 rings from which material may readily be removed and replaced, including a separate section for each test. Sections shall be separated by heavy plastic dividers with tabs.

a. A list of all equipment used, with calibration certifications.

b. A copy of all measurements taken.

c. The dates of testing.

d. The equipment and values verified.

e. The condition specified for the test.

f. The test results, signed and dated.

g. A description of all adjustments made.

h. Final position of controls, and device settings.

SD-07 Certificates

Material and Equipment;

Where materials or equipment are specified to conform to the standards of the Underwriters Laboratories, Inc., (UL) or to be constructed or tested, or both, in accordance with the standards of the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers (IEEE), or the National Electrical Manufacturers Association (NEMA), the Contractor shall submit proof that the items provided under this section of the specifications conform to such requirements. The label of, or listing by, UL will be acceptable evidence that the items conform thereto. Either a certification or a published catalog specification data statement, to the effect that the item is in accordance with the referenced ANSI or IEEE standard, will be acceptable evidence that the item conforms thereto. A similar certification or published catalog specification data statement to the effect that the item is in accordance with the referenced NEMA standard, by a company listed as a member company of NEMA, will be acceptable evidence that the item conforms thereto. In lieu of such certification or published data, the Contractor may submit a certificate from a recognized testing agency equipped and competent to perform such services, stating that the items have been tested and that they conform to the requirements listed, including methods of testing of the specified agencies. Compliance with above-named requirements does not relieve the Contractor from compliance with any other requirements of the specifications.

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals;

Six copies of operation and maintenance manuals, within 7 calendar days following the completion of tests and including assembly, installation, operation and maintenance instructions, spare parts data which provides supplier name, current cost, catalog order number, and a recommended list of spare parts to be stocked. Manuals shall also include data outlining detailed procedures for system startup and operation, and a troubleshooting guide which lists possible operational problems and corrective action to be taken. A brief description of all equipment, basic operating features, and routine maintenance requirements shall also be included. Documents shall be bound in a binder marked or identified on the spine and front cover. A table of contents page shall be included and marked with pertinent contract information and contents of the manual. Tabs shall be provided to separate different types of documents, such as catalog ordering information, drawings, instructions, and spare-parts data. Index sheets shall be provided for each section of the manual when warranted by the quantity of documents included under separate tabs or dividers.

Three additional copies of the instructions manual within 30 days following the approval of the manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements.

1.5 EXTRA MATERIALS

One additional spare fuse or fuse element for each furnished fuse or fuse element shall be delivered to the Contracting Officer when the electrical system is accepted. Two complete sets of all special tools required for maintenance shall be provided, complete with a suitable tool box. Special tools are those that only the manufacturer provides, for special purposes (to access compartments, or operate, adjust, or maintain special parts).

PART 2 PRODUCTS

Products shall conform to the following requirements. Items of the same classification shall be identical including equipment, assemblies, parts, and components. Products for aerial construction shall conform to IEEE C2 for medium loading districts, Grade B construction.

2.1 STANDARD PRODUCT

Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially

duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.2 NAMEPLATES

2.2.1 General

Each major component of this specification shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a nameplate securely attached to the equipment. Nameplates shall be made of noncorrosive metal. As a minimum, nameplates shall be provided for transformers, regulators, circuit breakers, capacitors, meters, switches, switchgear, and grounding resistors.

2.2.2 Liquid-Filled Transformer Nameplates

Transformers shall be provided with Nameplate information in accordance with IEEE C57.12.00. Nameplates shall indicate the number of gallons and composition of liquid-dielectric, and shall be permanently marked with a statement that the transformer dielectric to be supplied is non-polychlorinated biphenyl. If transformer nameplate is not so marked, the Contractor shall furnish manufacturer's certification for each transformer that the dielectric is non-PCB classified, with less than 50 ppm PCB content in accordance with paragraph MISCELLANEOUS Liquid Dielectrics. Certifications shall be related to serial numbers on transformer nameplates. Transformer dielectric exceeding the 50 ppm PCB content or transformers without certification will be considered as PCB insulated and will not be accepted.

2.3 CORROSION PROTECTION

2.3.1 Aluminum Materials

Aluminum shall not be used in contact with earth or concrete. Where aluminum conductors are connected to dissimilar metal, fittings conforming to UL 486B shall be used.

2.3.2 Ferrous Metal Materials

2.3.2.1 Hardware

Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M.

2.3.2.2 Equipment

Equipment and component items, including but not limited to transformer stations and ferrous metal luminaires not hot-dip galvanized or porcelain enamel finished, shall be provided with corrosion-resistant finishes which shall withstand 480 hours of exposure to the salt spray test specified in ASTM B 117 without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch from the test mark. The scribed test mark and test evaluation shall be in accordance with ASTM D 1654 with a rating of not less than 7 in accordance with TABLE 1,

(procedure A). Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard.

2.3.3 Finishing

Painting required for surfaces not otherwise specified and finish painting of items only primed at the factory shall match the existing surfaces in paint type and color.

2.4 MAIN ELECTRICAL SUPPLY SUBSTATION ARRANGEMENT

The main electric supply substations Station 1 and 2 are switching station designs with an open-type bus-and-switch arrangement. The only modifications at Station 2 will be new breaker relay installations with 2 new control cables installed between the main and feeder breakers and SCADA equipment/network installation. Station 1 is being rebuilt with the removal of approximately 90 percent of the existing structures as shown on the temporary facilities drawing and installation of a new steel structure substation with five new circuit breakers and four underground feeder exits. The two existing UG feeder exits leaving the rear of the station will be relocated with new conductor and conduit exiting from the front of the station and terminating on two new underground riser poles. The existing underground feeder termination structures and conduits for circuits 1 and 2, the remote breaker control cabinet, and the 3000 A main circuit breaker are the only existing equipment/facilities to remain in the station. The station will have a new grounding system, additional underground feeder conduits, new steel structures and equipment including potential transformers, station service transformers, battery system, AC and DC panelboards, differential relay cabinet, new control cable trench, and new fencing installed. Additional details can be found in the attached Design Criteria, specifications, and drawings.

The Equipment/Structures to be installed at Station 1 include:

One - 12 kV steel substation bus structure with one main bay, six breaker bays, and 4 inch and 2 inch schedule 80 aluminum tubing, bolted connecters, jumpers and other buswork accessories.

One - 12 kV steel bus termination structure and bus for connection to the Progress Energy Substation. (To be built with temporary underground connections for use during substation construction.

One - 12 kV steel underground termination structure for Circuit 1 for use during temporary construction and removed upon completion of new substation.

Five - 12 kV 1200 ampere vacuum circuit breakers

One - 12 kV 3000 ampere group operated vertical break main breaker bypass switch

Six - 12 kV 1200 ampere group operated vertical break transfer bus switches with quick break type arcing horns

Six - 12 kV 3000 ampere vertical mounted breaker disconnect switches

Thirty Six - 12 kV 1200 ampere vertical mounted breaker disconnect switches

Eighteen - 9 kV station class surge arrestors for feeder exits and main bus connection.

One - 12 kV 25 kVA station service transformer with mounting supports, fused disconnect, current limiting fuse, and secondary AC system including AC Panel.

Three - 12 kV 60:1 potential transformers with mounting supports, fused disconnects, junction box, and conduit/conductor system for relay and metering bus potential.

One - Cable Trench system with conduits extending to equipment as shown on conduit plan drawing

One - Nema type 3R relay cabinet with existing differential relays installed and space for SCADA equipment

One - 125 VDC battery system including DC Panel

One - New ground grid system as detailed on ground plan drawing

One - New substation fence

Other miscellaneous items to be included are anchor bolts, insulators, connectors, terminators, expansion joints, jumpers, steel supports, and other items as detailed in this specification, attachments and the project drawings.

2.4.1 Support Structures

Structures shall be provided as shown to support incoming tubular bus conductor from Progress Energy, underground feeder exits, switches, instrument transformers, and aerial buses. Steel structural items shall conform to Section 05120 STRUCTURAL STEEL. Structures, shall be of the low-profile type. Structures shall utilize H/I-beam support elements or equivalent round or rectangular tubular steel construction. Lattice type supports are not acceptable. Structural steel and miscellaneous items shall comply with ASTM A 36/A 36M, ASTM A 572/A 572M, ASTM A 575, ASTM A 576 or ASTM A 633/A 633M, or equivalent aluminum. General configurations are indicated. Exact dimensions and arrangements may be varied, dependent upon site limitations, to permit use of a manufacturer's standard equipment and structures. The attached substation construction drawings shall be used as guidelines for the new station structures but the contractor is responsible for supplying structures which meet the environmental conditions as well as the applicable construction/design standard. Lightning masts of the length shown, shall be provided on each structure column for lightning protection. Static wire brackets for incoming overhead ground wires from

Progress Energy shall be provided on the incoming dead-end line structure and elsewhere as indicated.

2.4.1.1 Pre-fabricated Structure Design

Structures shall be designed for a maximum tension of 1000 pounds per conductor. Overhead ground or static wires shall be counted as conductors in determining strength requirements. Detail drawings shall show markings of units for placement, location and sizes of attachments, and complete data on fabrications.

2.4.1.2 Structure Finish

Aluminum structures and cabinets shall have a uniform satin finish and shall not be painted. Steel structures shall be hot-dip galvanized in accordance with ASTM A 123/A 123M after drilling is completed and shall not be painted.

2.4.1.3 Structure Foundation Design

Structure foundation design shall be as indicated. If the manufacturer's standard structures differ in dimensions from those shown, foundation design shall be modified to suit the structures provided, at no additional cost to the Government. Maximum earth-bearing pressure shall be calculated at 4000 psf.

2.4.2 Conductors and Bus Materials

Tubular bus conductor furnished shall be rigid 4-inch and 2-inch ASA schedule 80, as indicated on the drawings. The conductor shall be 6063-T6 aluminum alloy seamless pipe manufactured in accordance with ASTM Specification B-241 with a rated ampacity of 3,118 and 1,446 amps respectively. Provisions shall be made for the expansion and contraction of the buses through a temperature change of 100C. Sliding fittings and/or expansion fittings or joints shall be provided where necessary. Bolted substation bus connectors and terminations manufactured by Sefcor, Dossert, or Anderson Electric shall be used. End enclosure plugs shall be furnished for all bus pipes.

Horizontal tubular bus sections of lengths greater than 15 feet shall be furnished with vibration damping cables to be installed inside the tube. Damping cables for the buses will be as follows:

- 4 inch aluminum tube bus 795 kcmil AAC
- 2 inch aluminum tube bus 336 kcmil AAC

Stranded conductors shall be aluminum-conductor-steel-reinforced (ACSR), copper, or high-strength aluminum alloy with sizes as indicated on the drawings, and shall comply with IEEE Std 525. Other bus shapes for electrical conductors may be used if detail drawing submittals indicate equivalent ampacity and strength. Short connections, consisting of bare stranded conductors of equivalent bus ampacity, may be used between incoming line conductors and buses or between buses and equipment. Copper flexible braid or aluminum strap expansion couplers, as required to match

the bus material, shall be installed in bus runs where required to allow for expansion and contraction, and at all connections to transformer bushings. Each equipment jumper and bushing connection shall be protected to minimize outages due to animals by utilizing heat shrinkable tubing which is certified for use as an animal protection devices in utility substations.

2.4.2.1 Apparatus Post Insulators

Apparatus post insulators shall be provided to support conductors, and their mechanical strength shall exceed the ultimate strength of the conductor supported and, where necessary, high-strength or ultra high-strength insulators shall be provided. The insulator ratings are detailed in the attached Design Criteria. Minimum ratings of apparatus post insulators shall be not less than ANSI C29.9 or the Design Criteria. At Station 1 polymeric disks, which are certified for use as animal protection devices in utility substations shall be installed on each substation post insulator and switch insulator.

2.5 STATION 1/2 INCOMING SWITCHING/CIRCUIT INTERRUPTING EQUIPMENT

Incoming line switching equipment shall be of the outdoor weatherproof type. Operating characteristics and ratings of incoming line switching equipment shall be as indicated. The existing main circuit breaker at Station 1 will remain in place as the incoming line switching device with a 3000 amp group operated air break switch installed in the new structure. The temporary structure which is to be built for the incoming bus support shall become part of the new substation and shall be constructed to meet all substation structure requirements.

The existing main circuit breaker at Station 2 will remain in place with the modifications required for installation of the new relays as listed in 2.5.1

2.5.1 Devices and Accessories for Switching/Interrupting Equipment

2.5.1.1 Incoming Line

The main breaker shall be modified by removing the existing relays and relay mounting panel. These shall be replaced with a new matching mounting panel with the following control and monitoring system items installed in the existing instrument and relay cabinet. These devices shall be connecting into the existing control circuits as shown in the drawings.

a. A Schweitzer Engineering Laboratories (SEL) SEL-351S Model # 0351S613A355421. This relay is a protection and breaker Control Relay with operator controls including overcurrent protection and reclosing functionality. This model includes the standard firmware with SEL mirrored bits communications capabilities and load profile, 48/125 VDC power supply, 19 outputs and 14 inputs, horizontal panel mounting, auxiliary Trip/Close Pushbuttons with guards, and standard SEL communications protocol with optional DNP3.00 level 2 slave capabilities.

b. One 10 pole semi-flush mounted test block for the 3 phase current (6 switches-2 per phase for shorting) and potentials (1 per phase and neutral) with an associated 10 position test plug (only need one test plug per station). The current test blades in the switches shall have current transformer short circuiting capability. The test block shall be an ABB FT-1 or equivalent.

c. One 10 pole semi-flush mounted test block for the control circuit SEL-351S input and output connections with an associated 10 position test plug (only need one test plug per station). The test block shall be an ABB FT-1 or equivalent.

2.5.2 Substation Switches

2.5.2.1 Ratings

Ratings at 60 Hz shall be in accordance with ANSI C37.32 and as follows:

Nominal voltage.....12.5 kV

BIL.....110 kV

Rated maximum voltage.....15.5 kV

Main Breaker Bypass Switch

Maximum symmetrical interrupting capacity.....120,000 A

Maximum asymmetrical interrupting capacity.....120,000 A

Rated continuous current.....3,000 A

Transfer Bus Switches/ Breaker Disconnect Switches

Maximum symmetrical interrupting capacity..... 61,000 A

Maximum asymmetrical interrupting capacity..... 61,000 A

Rated continuous current.....1,200 A

2.5.2.2 Standard Devices and Accessories

One set of special tools, as necessary for servicing, shall be provided.

2.5.2.3 Stick (Hook) Operated Switches

Stick (hook) operated line switches shall comply with ANSI C37.32 and shall be a stick-operated, single-pole, single-throw, vertical-break switch suitable for mounting as indicated.

2.5.2.4 Group-Operated Line Switches

Group-operated line switches shall be air-insulated with manual-type operators with provisions for future motor operation. Group-operated line

switches shall comply with ANSI C37.32, IEEE C37.30, IEEE C37.34, and NEMA SG 6, and shall be three-pole, single-throw, provided with a mechanism which opens the three phases simultaneously. Group-operated switches shall be manually operated.

Air-insulated switches shall be of the vertical-break type, with either tilting or rotating insulators, for mounting as indicated. Contact surfaces shall be silver. The switching capability required shall be of the disconnecting type. Switches shall be provided with replaceable contacts, arc horns, and other moving parts which have a limited life expectancy.

Disconnecting and transfer bypass bus switches shall be provided with quick-break arcing horns rated for interrupting transformer exciting currents or line charging currents, dependent upon the application. A permanent warning sign having letters at least 2 inches high and reading as follows: "WARNING - DISCONNECTING SWITCH - DO NOT OPEN UNDER LOAD" shall be mounted on the switch operating mechanism.

The switch operating handle shall be located approximately 3 feet 6 inches above its grounded platform plate. Insulation of the switch operating mechanism shall include both insulated interphase rod sections and the insulated vertical shaft.

2.5.2.5 Grounded Platform Plate

The manually-operated, group-operated switch shall be provided with a grounded platform plate located where the switch operator would stand to manually operate the switch. The plate shall be constructed as shown on the grounding detail drawing The plate shall be laid on finished grade and so secured as shown. Two ground clamps shall be provided on the plate on the side adjacent to the switch operating mechanism. Each clamp shall be connected to the station grounding grid with a No. 4/0 AWG bare copper wire. Separate clamps and a flexible copper braid conductor shall be used to connect the plate to the switch operating handle mechanism. The cross sectional area of the braid shall be equivalent to a No. 4 AWG conductor, minimum.

2.6 SUBSTATION EQUIPMENT

The installations shall be of the switching station type. Station one is constructed as a standard outdoor utility substation, Stations E and H are metal clad switchgear sectionalizing stations. The number and layout of outgoing distribution feeders shall be as shown. Outgoing circuits shall be three-phase three-wire type with an insulated neutral having a voltage rating of 15 kV phase-to-phase. The insulated neutral shall have insulation rated not less than 1000 volts. Outgoing circuit equipment shall be rated for a nominal voltage class of 12.47 kV and shall have a BIL of not less than 110 kV. Outgoing circuits shall leave the stations underground.

2.7 INCOMING/OUTGOING METAL-CLAD SWITCHGEAR (STATION A,B,C,D,E,F,G,& H)

Switchgear shall comply with NEMA SG 5 and IEEE C37.20.2 and shall be of

the outdoor no-aisle type consisting of incoming line main circuit breaker, tie, auxiliary compartments and feeder circuit breaker units. Compartments shall be provided to accommodate specified or indicated auxiliary equipment. The indicated number of active and future circuit breakers and equipped cubicles shall be provided. "Future" circuit breaker means sufficient concrete pad space and duct line stubouts for future sections. The use of two-high circuit breaker units is acceptable if shown. Units denoted as equipped space or future shall consist of items of equipment listed for the basic unit in NEMA SG 5, except the power circuit breaker shall not be provided. Current transformers, instruments, instrument switches, and relays shall be provided for equipped space or future units as shown. Continuous current rating of future units shall be as indicated. Continuous current rating of equipped space units shall match the most common basic breaker unit ampere rating used elsewhere in the associated switchgear unless otherwise indicated. Switchgear shall be vented according to the manufacturer's standard practice. Intake and exhaust openings shall be screened. Switchgear shall have relaying as shown. The control voltage shall be 48 V dc at Station E and 125 V dc at Station H. The new cubicles at Station H shall match the existing equipment in physical and electrical bus design.

STATION E EQUIPMENT:

Five - 15kV full height vacuum circuit breaker cubicles with vacuum circuit breakers and current transformers

One - 15kV full height transition bus cubicle

One - Full height two compartment auxiliary cubicle with 7200/120 v potential transformers for relaying/metering, and a 15 kVA control potential transformer.

One - Full height double wide auxiliary cubicle with new 48 VDC battery system, and AC transfer switch.

Other items to be done include installation of new cable/conduit and relays in existing equipment.

STATION H EQUIPMENT:

Two - 15kV full height two compartment vacuum circuit breaker cubicles with vacuum circuit breakers and current transformers installed in the lower compartments, the upper compartment will be a future breaker positions with current transformers installed and shorted ready for breaker installation.

Other items to be completed include expansion of existing fence, ground grid, foundation, installation of new cable/conduit and relays in existing cubicles, and relocation of the existing auxiliary cubicle. Additional relays and current transformers will be installed in the existing circuit breakers including the tie breaker along with two new bus differential relays. Also the bus voltage transformers will be replaced.

ALL STATIONS

Revised protective relaying systems utilizing SEL-351S protective relays with new door panels.

2.7.1 Ratings

Main buses shall be designed to electrically match the buses which will remain in place in the existing facilities at Stations E & H.

three-phase four-wire with a continuous current rating of 1200/2000 amperes rms at Station E and H respectively. The neutral bus shall be rated for 600 amperes, continuous. Switchgear ratings at 60 Hz shall be in accordance with ANSI C37.06 and as follows:

Maximum voltage.....15.5 kV

Nominal voltage class.....12.47 kV

BIL.....95 kV

Maximum symmetrical interrupting current.....18,000 A (500MVA)

3-second short-time current.....23,000 A

Continuous current.....as shown

2.7.2 Circuit Breakers

Circuit breakers shall comply with IEEE C37.04 and ANSI C37.06 and shall consist of items listed for such units in NEMA SG 5. Where indicated, bus or lug connections to mount field-installed, slip-on, medium-voltage cable terminations for cable entering from below shall be provided. Circuit breakers shall be of the vacuum drawout type having electrically charged, stored-energy mechanisms which are mechanically and electrically trip free. A means for manual charging of each trip mechanism shall be provided. Circuit breakers of the same ampere rating shall be interchangeable, both mechanically and electrically. In addition to any contacts used or shown, each circuit breaker shall be provided with four spare auxiliary, two normally open and two normally closed, wired to interconnection terminals. If auxiliary relays are used to provide additional contacts, such relays shall not be of the latching type. Interconnection terminal blocks shall be wired to permit remote open and close operations of each circuit breaker and for other required exterior connections or connections between switchgear sections.

2.7.2.1 Vacuum Circuit Interrupters

Vacuum interrupters shall be hermetically-sealed in a high vacuum to protect contacts from moisture and contamination. Circuit breakers shall have provisions for maintenance slow closing of contacts and have a readily accessible contact wear indicator. Tripping time shall not exceed 5 cycles.

2.7.3 Buses

Copper bus only shall be used and will comply with ASTM B 188. Bolted or pressure joints for main and ground buses, interconnections, and external connections to equipment shall be of the silver-to-silver or the silver-to-tin high-pressure type. Bolted connections shall have a minimum of two bolts, except for the ground bus where one bolt will suffice. Each nut on any bolted connection shall be secured with a belleville washer or other locking means torqued in accordance with manufacturer's recommendations. Bus supporting elements shall be bolted to switchgear enclosures and shall comply with IEEE C37.20.2.

2.7.3.1 Main Buses

Main buses and connections shall have at least the same short-circuit current rating as circuit breakers. Station H bus must match existing bus design and construction without the need for transition cabinets.

2.7.3.2 Ground Buses

Uninsulated copper ground buses, not less than 2 inches x 1/4 inch in cross-sectional area, shall be provided for the full length of a switchgear lineup. Ground buses of aluminum are not acceptable. The short-circuit current rating of the ground bus shall be at least equal to the short circuit current rating of the primary bus. Compression indent type cable lugs shall be provided at each end of a ground bus for connection of No. 4/0 AWG copper ground cables.

2.7.3.3 Control Buses

The new section in Station E will need a control bus which will also tie into the existing section. The new cabinets in Station H shall continue the existing control bus design. Control buses shall be provided as necessary to supply power to control devices. For double-ended buses, both buses shall be supplied from one low-voltage panelboard and each bus shall be served by different branch circuit breakers. The low-voltage panelboard shall be served from an automatic transfer switch, which, in turn, shall be served from two control power transformers (CPT). One CPT shall be connected via fuses ahead of each main circuit breaker. Each CPT, fuse, transfer device, panelboard, and wiring system shall be sized to handle 125 percent of the total load of both buses. Station E will also need a new CPT and automatic transfer switch. The "Normal" and "Backup" sources shall be as indicated. Upon the loss of the "Normal" source, transfer to the "Backup" source shall be instantaneous. Retransfer back to the "Normal" source shall be automatic after a 60 second time delay once the "Normal" source is restored. An alarm shall be provided to indicate a transfer operation. Insulated wire buses shall be wired to interface terminal blocks for connection between switchgear units and exterior components. Wire bus shall not be less than No. 8 AWG, nor less than required to serve the complete switchgear lineup plus 25 percent spare capacity.

2.7.4 Control Power Transformers (Station E)

Control power transformers shall comply with IEEE C57.12.01, shall be of

the ventilated dry type, and shall provide 240/120-volt, single-phase electric power for station ac control power requirements. The transformer primary voltage rating shall be 7.2 kV and the transformer capacity shall be as indicated. The BIL rating shall equal or exceed the BIL rating of the switchgear. Transformer current-limiting primary fuses shall be drawout type and shall be interlocked with a secondary molded case circuit breaker provided as a part of the transformer installation. Molded case circuit breakers shall comply with NEMA AB 1. It shall not be possible to open the primary fuse compartment unless this secondary circuit breaker is in the open position. Construction shall be of the drawout type for either the complete assembly or for primary fuses only, according to the manufacturer's standard. Mechanical interlocks shall prevent removal of primary fuses, unless the associated assembly is in a drawout or disconnected position. Transformer compartments shall have hinged doors.

2.7.5 SUBSTATION AND SWITCHGEAR PROTECTIVE RELAYS

2.7.5.1 General

Microprocessor-based protective relays shall be provided as shown and shall be of a type specifically designed for use on power switchgear or associated electric power apparatus. Protective relays shall conform to IEEE C37.90. Relays and auxiliaries shall be suitable for operation with the instrument transformer ratios and connections provided. The existing feeder breaker cabinets in Station E and H, feeder/main breaker cabinets in Stations 2, A, B, C, D, F, and G, and main breaker in Station 2 will be modified by replacing the existing door panels and installing new relays as shown on the drawings. The relays will be programmed and tested by the contractor as part of the installation process. The relay programming will be reviewed and approved by the contracting officer.

2.7.5.2 Construction

Relays shall be of the semi-flush, rectangular, back-connected, dustproof, switchboard type. The new microprocessor relays shall be installed with test blocks which allow the relays to be removed without opening current transformer secondary circuits, disturbing external circuits, or requiring disconnection of any relay leads other than wiring between the relays and test switches. Necessary test devices shall be incorporated within each relay and shall provide a means for testing either from an external source of electric power or from associated instrument transformers. Each relay shall be provided with an operation indicator and an external target reset device. Relays shall have necessary auxiliaries for proper operation. Relays and auxiliaries shall be suitable for operation with the instrument transformer ratios and connections provided. In existing breakers new door panels shall be manufactured matching the existing door panels in design and color. The relays shall be wired and installed in these panels prior to arrival in the field. Field installation shall require only the connection of the door wiring to the internal switchgear circuits.

2.7.5.3 Ratings

Relays shall be the manufacturer's standard items of equipment with appropriate ranges for time dial, tap, and other settings. Relay device

numbers shall correspond to the function names and descriptions of IEEE C37.2.

2.7.5.4 Breaker Protection Relays

Breaker Protection relays shall be as follows:

Breaker Protection relays for main and feeder circuit breakers shall be three-phase, microprocessor-based type relays manufactured by Schweitzer Engineering Laboratories (SEL) SEL-351S Model # 0351S613A355421. This relay is a protection and breaker Control Relay with operator controls including overcurrent protection and reclosing functionality. This model includes the standard firmware with SEL mirrored bits communications capabilities and load profile, 48/125 VDC power supply, 19 outputs and 14 inputs, horizontal panel mounting, auxiliary Trip/Close Pushbuttons with guards, and standard SEL communications protocol with optional DNP3.00 level 2 slave capabilities. This relay is to be used throughout the base electrical system for all feeder and main circuit breakers. Tie breaker relaying will not be modified.

The relays will be installed and programmed to operate as directional and/or nondirectional overcurrent relays, reclosing relays for the overhead lines, Substation SCADA equipment, breaker failure devices for each bus (main relays will trip bus for breaker failures), relay failure protection devices, and trip coil monitor devices.

2.7.5.5 Bus Differential and Lockout Relays

The existing bus differential relays in Stations 2, A, B, C, D, E, F, and G will continue to be used with the existing bus lockout relays connected into the new circuit breaker control circuits as indicated. The existing bus differential relays in Station 1 will be reused and installed along with the existing bus lockout relays in the new relay cabinet and wired into the breaker control circuits as indicated.

Station H bus differential relays device 87B, shall be Schweitzer Engineering Laboratories SEL-587Z - Model # 0587Z0X325322XX relays. This relay is a high impedance differential relay including the following: standard firmware, 5 outputs and 2 inputs, 2 high energy MOV's, horizontal panel mounting, and standard SEL communications protocol with Modbus RTU protocol capabilities. The lockout relay, device 86B, shall be of a type which, when used in conjunction with the 87B relay, trips and locks out the indicated circuit breaker. It shall be a hand reset type device. These new bus differential relays will need current and input/output test blocks installed as indicated.

2.7.6 Test Blocks and Accessories

Test blocks and their associated testing accessories shall be provided for testing of instruments and protective relays that require periodic testing or calibration in-place, but which are not equipped with integral testing features. Test blocks with covers shall be mounted as indicated, and shall be provided with a nameplate engraved to identify individual current or potential test blocks, or a combination current/potential test block, as

applicable. Combination test blocks shall not exceed 10 poles. Current test blocks shall be the short-circuiting type. Test devices shall be provided for insertion into the associated test block to permit application of the proper current or potential source for testing and calibration. Test devices shall be rated not less than 20 amperes and 125 volts dc.

2.7.7 Breaker Relay Mounting Panel

The existing relay mounting panels will be removed with new panels installed for installation of the new relaying as shown on the drawings. These panels will be constructed as a direct replacement and match the hinge, lock, paint, and design of the existing panels. These panels will be constructed off site with the relays and wiring preinstalled ready for connection into the existing control circuits. All wiring modifed, relocated or added for these modifications shall have permanent labeling attached.

2.7.7.1 Panel Wiring

The insulation class of all instrument transformer secondary wiring added or modified shall be coordinated with the voltage conditions it may be expected to encounter and shall in no case be less than 600 volts. The control and instrument transformer secondary wiring shall be oil-, water-, and flame-resistant with polarity, phase, and tap identification provided. Any closing and trip coil leads, instrument transformer secondary leads, solenoid valve leads, and similar wiring modified or added shall be securely anchored to the coils. Wire sizes for control wiring and instrument transformer secondary leads shall be coordinated with the inherent current requirements and voltage drop limitations of the breaker. Wire shall be stranded copper and in no case shall be smaller than No. 14 AWG. The wire ends shall be permanently fitted with pressure-type connectors before attachment to terminal studs. Splices shall be avoided wherever practicable, but, if required, they shall be brazed or made by permanently fitted pressure-type connectors.

2.7.7.2 Terminal Blocks

Terminal blocks shall be installed in the cabinets (if not present) to facilitate terminating the wiring from the new door panels. These terminal blocks shall be supplied for any wiring, which shall be installed or reconnected in the field. A shorting type terminal block shall be installed for each set of current transformers. Terminal blocks shall be grouped in the control cabinet for easy accessibility unrestricted by interference from structural members and instruments. Terminal blocks shall not be mounted on compartments containing cables or buses operating at voltages above 600 volts. Sufficient space shall be provided on each side of each terminal block to allow an orderly arrangement of all leads to be terminated on the block. Arrangement of circuits on terminal blocks shall be such that all connections for one circuit plus any spare conductors will be on adjacent terminals. These terminal points shall be furnished with all screws and lockwashers.
Terminal blocks, including those for external wiring connections, shall be molded heavy-duty phenolic compound of sufficient size to accommodate

easily terminals for No. 10 AWG and smaller stranded copper wire and shall meet the withstand voltages of ANSI/IEEE C37.09. The metallic parts of terminals for control and instrument transformer wiring shall be nonferrous and corrosion-resistant. All terminals of control wires and instrument transformer circuits shall be identified in a substantial manner. This identification shall be the same as that shown on the wiring drawings.

2.7.8 Specific Unit Requirements

In addition to the basic circuit breaker unit requirement listed in NEMA SG 5, each individual unit or section shall contain other devices as required for the application. The following requirements are not to be considered complete in every detail and miscellaneous equipment and devices necessary for correct operation, as indicated or specified, shall be provided as necessary. Protective relays, meters, instruments, and control and instrument switches, shall be mounted on a swinging panel located behind the exterior door of no-aisle switchgear or the breaker control cabinet for outdoor circuit breakers. Substation equipment to be installed in the metal-clad switchgear shall be located where indicated.

2.7.8.1 Auxiliary Compartments

Control and instrument transformers and panelboards shall be provided and housed in compartments, and shall supply control power and instrument voltage to each bus section of the switchgear lineup and remote devices as required. Compartments shall be provided with a hinged door. Any interconnection wiring and conduit needed to connect the switchgear lineup or other devices requiring control power or instrument voltage shall be provided and indicated on the detail drawings. Equipment items shall include the following:

a. Station E Three phase - ground connected potential transformers. Reconnect the existing potential transformers from the line side of incoming circuit 2 to bus 2.

   Station H Replace the two sets of two phase - phase connected potential transformers with two sets of three phase - ground connected potential transformers as shown.

b. Station E One control power transformer.

c. Station E One low-voltage alternating-current panelboards and 1 low-voltage direct-current panelboards with main and branch circuits as shown.

2.7.8.2 Bus Tie Unit

The existing units at Station E and H shall be electrically interlocked with the new relays and bus as indicated.

2.7.8.3 Feeder Units

Units shall be provided for the protection of incoming main and outgoing

feeder circuits and shall include the following:

a. Six bushing multi-ratio current transformers (three on each side of breaker). Station H will need three additional current transformers on the existing breakers installed as indicated.

b. One breaker protection and control relay, SEL-351S.

c. 10 pole secondary current and potential test blocks with associated test devices, quantity as shown.

d. 10 pole control test blocks with associated test devices, quantity as shown.

e. Duplex receptacle and light switch (one per cubicle.Receptacles and receptacle plates shall be ivory in color. Receptacles shall be the two-pole, three-wire, grounded type rated at 15 amperes and 125 volts, NEMA WD 1 configuration 5-15R.

2.7.9 Miscellaneous Items

2.7.9.1 Lighting and Appliance Branch Circuit Panelboards

Lighting and appliance branch-circuit panelboards for the protection of the indicated low-voltage circuits shall be located as specified or indicated and shall conform to the existing base requirements. Ratings of panelboard mains shall be compatible with the supply voltage to the panelboard. Circuit breakers in a direct-current panelboard shall be rated for a minimum of 48 volts dc operation in Station E.

2.7.10 Accessories

Accessories identified in NEMA SG 5 shall be provided for the inspection, testing, maintenance, and repair of circuit breakers, and shall include one set of any special tools, as necessary to repair and maintain circuit breakers and major switchgear components at station E. The new cubicles and breakers at Station H shall be designed to used the existing special tools. Maintenance and testing accessories shall include, but are not limited to the following:

a. Portable gear motor for electric-power positioning of circuit breakers, if required by the breaker design.

b. Secondary test coupler for testing of drawout circuit breakers in the test position.

c. Hand crank for positioning of circuit breakers.

d. Transfer truck, for movement of circuit breaker units.

e. Test cabinet for closing and tripping of circuit breakers by electrical control operations.

f. Lifting and transfer device for two-high circuit breaker units.

2.7.11 Finish Color

Finish color of the switchgear shall comply with the requirements for cabinets specified in paragraph CABINETS AND ENCLOSURES.

2.8 INSTRUMENT TRANSFORMERS

2.8.1 General

Instrument transformers shall comply with ANSI C12.11 and IEEE C57.13. Instrument transformers shall be configured for mounting in/on the device to which they are applied. Polarity marks on instrument transformers shall be visually evident and shown on drawings.

2.8.2 Current Transformers

Unless otherwise indicated, bar, wound, or window-type transformers are acceptable; and except for window-type units installed over insulated buses, transformers shall have a BIL rating consistent with the rated BIL of the associated switchgear or electric power apparatus bushings, buses or conductors. Current transformers shall have the indicated ratios. The continuous thermal-current rating factor shall be not less than 1.5. Other thermal and mechanical ratings of current transformers and their primary leads shall be coordinated with the design of the circuit breaker and shall be not less than the momentary rating of the associated circuit breaker. Circuit protectors shall be provided across secondary leads of the current transformers to prevent the accidental open-circuiting of the transformers while energized. Each terminal of each current transformer shall be connected to a short-circuiting terminal block in the circuit interrupting mechanism cabinet, and in the associated instrument and relay cabinets. Single-ratio units, used for metering and relaying, shall have a metering accuracy class rating of 0.3 B 0.5. Single-ratio or multi ratio units, used only for relaying, shall have a relaying accuracy class rating of C400.

2.8.3 Voltage Transformers

Voltage transformers shall have indicated ratios. Units shall have an accuracy class rating of 0.3 at W, X, M, Y burdens.

Voltage transformers used in switchgear shall be of the drawout type having current-limiting fuses in both primary and secondary circuits. Mechanical interlocks shall prevent removal of fuses, unless the associated voltage transformer is in a drawout position. Voltage transformer compartments shall have hinged doors.

Voltage transformers used in station 1 shall be designed for outdoor use, single bushing 60:1 units with a minimum thermal rating of 1500 VA and BIL of 110 kV. These voltage transformers will have current-limiting fuses and fused disconnects in the primary circuits. Voltage transformer shall be suitable for mounting and conduit installation as shown on the drawings.

2.9 AUXILIARY SUBSTATION EQUIPMENT

2.9.1 Station Service Equipment

2.9.1.1 Fused Cutouts

Fused Cutouts shall be 15kV, 100 ampere, 110 kV Bil, minimum 16,000 ampere interrupting current rated devices with mounting brackets and parallel groove connectors for 6-4/0 copper or aluminum conductor, meeting or exceeding all current applicable NEMA/ANSI standards. 2 sets of fusible links sized as indicated shall be supplied with the second set to be used as spares.

2.9.1.2 Current Limiting Fuses

Current Limiting Fuses shall have a 50 kA interrupting current, sized for a 7.2 kV ph-gnd system, with a minimum interruption capability of 4 kA.The fuses shall be configured for installation on the primary side of the fused cutouts and shall meet or exceed all current applicable NEMA/ANSI standards.

2.9.1.3 Station Service Transformer

The Station Service Transformer shall be a 25 kVA single-phase, 7,200/12,470 Grd Y-120/240 volts pole-type, distribution transformer with basic impulse levels (BIL)of 95 kV - Primary, 30 kV - Secondary and ±2-2½ % taps. The transformer shall also meet or exceed all current applicable NEMA/ANSI standards.

2.9.1.4 AC Station Service Panelboard

The Station Service AC Panel shall be an outdoor NEMA type 3R enclosed 100 ampere, 240/120Vac, single phase, three-wire with a solid neutral bus, main breaker panel. Branch Circuit Breakers shall be bolt-on type furnished and installed in the quantity, current rating, and pole arrangements as shown in drawings. The panel shall also meet or exceed all current applicable UL/NEMA/ANSI standards for this installation.

2.9.2 Station Battery Systems (Stations 1 & E)

The station battery installation shall include a battery, battery racks, a battery charger, DC panel and protective equipment. The station battery installation shall be housed in the metal-clad switchgear in Station E and in a new enclosure containing the batteries mounted in racks, DC battery charger and disconnect switch in Station 1.

2.9.2.1 Battery

The battery shall consist of the required number of lead-selenium cells interconnected with proper connectors provided by the battery manufacturer to provide a nominal battery rating of 48 (Station E) and 125 (Station 1) volts. Station E batteries shall be VLRA type recombinstation lead acid batteries such as SLA batteries manufactured by Alcad. Rubber or plastic numerals, of at least 1 inch in height, shall be provided by the battery manufacturer for field attachment to permit proper cell identification. The battery shall have an ampere-hour capacity equal to at least 125 percent of the station's direct-current requirements including normal

continuous loads plus intermittent loads. Normal continuous load capacity shall be adequate for an 8-hour period. Intermittent load capacity shall be adequate so that at least three openings and three closings of each of the station's associated circuit breakers can occur in an 8-hour period with no more than three circuit breaker units simultaneously operating. Battery circuits shall be ungrounded. Batteries shall have a 20-year minimum life and a 5-year no cost replacement warranty.

2.9.2.2 Battery Racks

Battery racks shall have welded steel frames and rails finished with two coats of paint of a color matching the battery charger enclosure. Racks shall be no more than two tiers high and top tiers shall be low enough to permit maintenance to be done by personnel standing at floor level. Rails shall have a top covering of plastic or rubber at least 1/16 inch thick. Paint, rubber, and plastic shall resist corrosion and action of the electrolyte. The installation shall be provided with a portable hydrometer syringe and thermometer. Where recommended by the manufacturer, the installation shall include a cell lifter.

2.9.2.3 Battery Charger

The battery charger shall comply with UL 1236 and shall be a constant voltage, filtered, voltage-regulated, fully automatic type rated for full-float charging of the associated battery. The battery charger shall be convection cooled and suitable for operation on electric power supplied from the associated low-voltage alternating-current panelboard, shall have adequate capacity to fully recharge the associated depleted battery in not more than 8 hours while supplying normal direct-current loads, and shall have an efficiency of not less than 90 percent. The battery charger shall have input and output circuit breakers which automatically disconnect the battery charger when faults occur. The battery charger shall have an output ammeter and voltmeter, and equalizing-float selector switch, and an equalizing timer with a range of 0 to 24 hours. The battery charger enclosure shall be painted as specified for indoor cabinets in paragraph CABINETS AND ENCLOSURES and shall be provided with wall mounting brackets or shall be free-standing as required by its size and weight. A relay for sensing loss of alternating-current input, and an adjustable relay for sensing that the battery charger output voltage has fallen to a pre-set level, shall be installed on the battery charger to actuate the associated annunciator circuits. DC ground detector LED lights shall be provided.

2.9.2.4 Protective Equipment

Protective equipment required by IEEE Std 484 shall be provided and installed in a free-standing cabinet mounted where indicated or directed. The cabinet shall conform to paragraph CABINETS AND ENCLOSURES. Water facilities required shall be of the portable type consisting of one 5 gallon tank and one 1 quart basin. The tank shall have a removable screw top and a spigot. The basin shall be suitable for rinsing eyes or skin in case of acid spillage.

2.9.2.5 DC Panelboard

The DC Panels shall be an outdoor NEMA type 3R enclosure for Station 1 and an indoor NEMA type 1 enclosure rated for, 125/250VDC, single phase, three-wire service. The main lug interiors shall be a 225A main lug rated top-connected, two lugs per phase, wire range from #6 AWG to 350 MCM. Branch Circuit Breakers shall be bolt-on type furnished and installed in the quantity, current rating, and pole arrangements as shown in drawings. The panel shall also meet or exceed all current applicable UL/NEMA/ANSI standards for DC installation.

2.9.2.6 DC Disconnect Switch

A 200 amp fused disconnect switch shall be installed in the battery enclosure as the main disconnecting device for the battery system. It shall be wired as shown in the attached drawings.

2.9.3 Illumination

Luminaires, ballasts, lamps, mounting brackets and control devices required for general area lighting, shall match the existing floodlighting used in Station 1.

2.10 CABINETS AND ENCLOSURES

Cabinets and enclosures shall comply with NEMA 250 and shall be of galvanized steel, shall be provided with hinged doors, and shall be suitable for indoor or outdoor installation as indicated. Where locations are not indicated, cabinets shall be suitable for outdoor installation. Thickness of metal and outdoor construction shall be in accordance with UL 50. An indoor cabinet exterior shall have one finish coat and an outdoor cabinet exterior shall have two finish coats. Finish colors shall be manufacturer's standard dark gray or sky gray for outdoor cabinets and light gray for indoor cabinets, unless otherwise specified. The finish color of outdoor equipment shall be the same unless otherwise approved. Finish coats shall be applied over a prepared substrate. Each cabinet shall be a freestanding type or may be supported by attachment to an enclosure fence or a switchgear interior wall where located adjacent thereto. A concrete pad shall be provided to support any outdoor cabinet whose base extends to within 3 inches of grade level and pads shall extend at least 4 inches below grade.

2.11 Station 1 Cabinet/Enclosures

2.11.1 Existing Remote Control Breaker Cabinet

The existing cabinet will continue to be utilized with the breaker labels changed as needed to match the names and locations of the breakers. The existing indicating lights will be replaced with LED indication lights designed for utility substation usage. The breaker control switches will be configured in the breaker control circuits as shown on the drawings.

2.11.2 New Relay Cabinet

The new relay cabinet will be installed as a NEMA Type 3R/12 enclosure suitable for outdoor installation in a salt water environment. It shall be

configured with a lockable double door opening with an internally hinged swinging panel suitable for supporting relay/metering/communications equipment. It shall be supported on a structure with two support legs as shown on the drawings or as a free-standing enclosure. The enclosure and door shall be constructed of minimum 12 gauge steel sheet and be of all welded construction with exterior welds ground smooth. The wiring and wiring devices installed in this cabinet shall be of the same type of construction as required for the circuit breaker control cabinets in Station 1.

2.11.3 Potential Transformer Junction Box

The potential transformer junction box will be a NEMA Type 3R/12 enclosure suitable for outdoor installation in a salt water environment. It shall be configured with a hinged lockable door opening with an internally mounted back panel with the fuses, fuseblocks, terminal blocks, and a copper neutral bus bar installed as shown on the drawings. It shall be mounted on a substation support leg as indicated. The enclosure and door shall be constructed of minimum 12 gauge steel sheet and be of all welded construction with exterior welds ground smooth.

2.12 MISCELLANEOUS

2.12.1 Duplex Receptacles

Duplex receptacles shall be ivory in color and provided where shown. Receptacles exposed to the weather shall be equipped with weatherproof covers or installed in weatherproof box with a hinged door or cover. Receptacles shall be of the ground fault circuit interrupter type, or the receptacles and receptacle circuits shall be protected by a ground fault circuit interrupter type of circuit breaker. Unless otherwise shown, receptacles shall conform to the NEMA WD 1 configuration 5-15R rated at 125 volts, 15 amperes and shall be the two-pole, three-wire grounding type. Wiring for outdoor receptacle circuits shall be not less than No. 12 AWG in size and suitable for installation in wet locations.

2.12.2 Low-Voltage Power Circuit Breakers

2.12.2.1 Molded-Case Circuit Breakers

NEMA AB 1 and UL 489.

2.12.3 Wiring

Wiring between separate items of station equipment shall conform to the requirements of Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION. Solid wiring may be used for convenience outlets, heating elements, and lighting circuits. Otherwise, the minimum class of stranding shall be Class C. Class K stranding shall be used for wiring between items of equipment mounted on swinging panels or doors and items mounted on fixed panels or parts of fixed assemblies. The insulation type shall be the type SIS unless otherwise specified, indicated, or proposed and approved for use. The minimum wire gauge shall be No. 14 AWG, except No. 18 AWG may be used for circuits that use one ampere or less. Circuits rated less than

115 volts ac or 125 volts dc may be wired with wiring rated 300 volts-to-ground. Otherwise, all wiring shall be rated for 600 volts ac and 250 volts dc Current transformer circuit wiring shall be not less than No. 10 AWG. Wiring for Close and Trip circuits shall be not less than No. 9 AWG. Wire markers shall be affixed to each end of wires nodified, relocated or added, and shall contain wire number or designations shown on contract or detail drawings, or as otherwise approved. Wire numbers shall also be permanently marked on terminal block marking strips where wires are connected. Only insulated-barrel, crimp-type, ring lugs shall be used.

2.12.4 Single-Line Electrical Diagram

A single-line electrical diagram of the station shall be provided. The diagram shall be enclosed between matte-surface thermoplastic sheets buttoned or otherwise suitably fastened together to allow easy access to the diagram for making any future changes. The diagram shall be suitable for outdoor mounting and shall be approximately 14 x 21 inches unless another size is approved. The diagram shall be attached with temperature- and moisture-resistant, pressure-sensitive adhesive or with other suitable means to the indicated location at the metal-clad switchgear lineup, except when otherwise shown or directed.

2.12.5 Liquid Dielectrics

Liquid dielectrics for transformers, capacitors, reclosers, and other liquid-filled electrical equipment shall be non-polychlorinated biphenyl (PCB) mineral-oil or less-flammable liquid as specified. Nonflammable fluids shall not be used. Tetrachloroethylene (perchloroethylene) and 1, 2, 4 Trichlorobenzene (TCB) fluid shall not be used. Liquid dielectrics in retrofitted equipment shall be certified by the manufacturer as having less than 50 parts-per-million (ppm) PCB content. In lieu of the manufacturer's certification, the Contractor may submit a test sample of the dielectric in accordance with ASTM D 923 and have tests performed per ASTM D 4059at a testing facility approved by the Contracting Officer. Equipment with test results indicating PCB level exceeding 50 ppm shall be replaced.

2.12.6 Danger Signs

One danger sign inscribed "DANGER-HIGH VOLTAGE" shall be permanently and securely mounted approximately 5 feet above finished grade on each outward side of the fence enclosure. Fasteners shall be of stainless steel. Signs shall be of metal and shall have letters of at least 3 inches in height. Voltage warning signs shall comply with IEEE C2.

2.12.7 Concentric-Lay-Stranded Conductors

Copper conductors shall comply with ASTM B 8 for soft drawn copper. Equivalent aluminum conductors shall comply with ASTM B 231/B 231M.

2.12.8 Conduits, Rigid Metal

Conduits shall comply with UL 6.

2.12.9 Hardware

Ferrous metal threaded items shall comply with ASTM A 153/A 153M and miscellaneous nonthreaded items shall comply with ASTM A 123/A 123M. Other equivalent protective treatment, as required by ASTM A 123/A 123M or ASTM A 153/A 153M, or ferrous metals designed to meet ASTM Standards covering corrosion-resisting steel, will be permitted if approved in writing.

2.12.10 Padlocks

Padlocks shall be supplied by base personnel.

2.12.11 Panelboards, Circuit-Breaker Type

Panelboards shall comply with NEMA PB 1, UL 50 and UL 67.

2.13 GROUNDING AND BONDING

2.13.1 Driven Ground Rods

Ground rods shall be as described in the grounding drawings conforming to the applicable UL/ANSI/IEEE standards.

2.13.2 Grounding Conductors

Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as the phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

2.14 SURGE ARRESTERS

Surge arresters shall comply with NEMA LA 1, IEEE C62.1, IEEE C62.2, and IEEE C62.11, and shall be provided as indicated. Arresters shall be station class, rated as shown. Arresters shall be equipped with mounting brackets for the indicated installations. Arresters shall be of the metal-oxide varistor type suitable for outdoor installations.

2.15 FACTORY TESTS

Factory tests shall be performed, as follows, in accordance with the applicable publications and with other requirements of these specifications. The Contracting Officer shall be notified at least 10 days before the equipment is ready for testing. The Contracting Officer reserves the right to witness the tests.

a. High-Voltage Circuit Breakers: Manufacturer's standard tests in accordance with IEEE C37.09 and IEEE C37.081.

b. High-Voltage Air Switches: Manufacturer's standard tests in accordance with IEEE C37.34 and IEEE C37.41.

c. Protective Relays: Seismic tests in accordance with IEEE C37.98. Surge withstand tests in accordance with IEEE C37.90.1.

d. Relaying Current Transformers: Manufacturer's standard tests in accordance with IEEE C57.13.

e. Instrument Current Transformers: Manufacturer's standard tests in accordance with IEEE C57.13.

f. High-Voltage Fuses: Manufacturer's standard tests in accordance with IEEE C37.41.

g. Electrical Power Insulators: Manufacturer's standard tests in accordance with ANSI C29.1.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions. Circuits installed in conduits or underground and splices and terminations for medium-voltage cable shall conform to the requirements of Section 16302N UNDERGROUND TRANSMISSION AND DISTRIBUTION.

3.1.1 Conformance to Codes

The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2.

3.1.2 Verification of Dimensions

The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall notify the Contracting Officer of any discrepancy before performing any work.

3.1.3 Concrete Foundations

3.1.3.1 Structure Foundation Installation

Each column shall be bolted to a concrete foundation by at least four bolts spaced to transmit structure stresses to the foundation. Diameters and lengths of foundation bolts shall be as recommended by the structure manufacturer. Bolts shall be embedded in concrete in a manner to develop their full strength. Anchor bolts shall be accurately set in foundations using templates supplied by the structure manufacturer. When concrete has cured, structure baseplates shall be leveled and grouted in place. Columns shall then be set on baseplates, leveled on foundations, and secured with holding nuts. Concrete work and grouting shall comply with the requirements of Section 03300N CAST-IN-PLACE CONCRETE.

3.1.3.2 Concrete Pads

Concrete pads for pad-mounted electrical equipment shall be constructed as indicated. Tops of concrete pads shall be level and shall project four

inches above finished grade and sloped to drain. Conduits for primary, secondary, and grounding conductors shall be set in place prior to placing of concrete pads. Concrete work shall comply with the requirements of Section 03300N CAST-IN-PLACE CONCRETE. If the equipment primary compartment is not of sufficient height to allow the installation of the medium-voltage terminators, load break elbows or switches, the Contractor shall provide adequate space by providing a rectangular hole in the concrete pad below the primary compartment and/or a factory prefabricated steel adjustment ring around the entire perimeter of the base of the equipment. Steel rings shall be factory manufactured to fit the base of the equipment of which they support and shall be factory painted to match the equipment enclosure. Steel base rings shall be constructed using the same or greater thickness of steel as the equipment being supported. Concrete pads to support pad mounted electrical equipment shall be reinforced with steel reinforcing rods as indicated in the drawings. Where grounding electrode conductors are installed through concrete pads, PVC conduit sleeves shall be installed through the concrete to provide physical protection. When the installation is complete, the Contractor shall seal all conduit and other entries into the equipment housing with an approved sealing compound. Seals shall be of sufficient strength and durability to protect all energized live parts of the equipment from rodents, insects, and foreign matter.

3.1.4 Fencing

The existing chain link fence will be removed . The station shall be enclosed by a new chain-link fence as shown with three drive gates. Fencing is specified in Section 02821N CHAIN-LINK FENCE and shall be grounded in accordance with paragraph GROUNDING.

3.1.5 Surface Treatment

Horizontal spaces between concrete foundations or pads and fences shall be excavated to minimum depth of six inches below finished gradelines, shall be graded to level surfaces, and filled with well-compacted clean coarse gravel or crushed stone of 1/2 to 1-1/2 inches in size up to finished gradelines.

3.1.6 Spare Accessory Storage

A cabinet shall be provided for storage of equipment accessories as necessary, including spare fuses, fuse tongs, switch sticks, and other tools and located where indicated. Shelves or other appropriate supporting methods shall provide an individual space for each type of item stored.

3.1.7 Fire Extinguisher Storage

An outdoor cabinet for housing a Government-provided, hand-operated, self-expellent, carbon dioxide fire extinguisher of 10 to 15 pounds capacity for Class C fires shall be provided and located as approved. The cabinet shall have a glass cover door and be painted red.

3.1.8 Field Welding

Procedures and welders shall be qualified in accordance with AWS D1.1/D1.1M for structural welding and ASME BPVC SEC IX for welding of equipment. Welding procedures qualified by others, and welders and welding operators qualified by a previously qualified employer may be accepted as permitted by ASME B31.3. The Contracting Officer shall be notified 24 hours in advance of tests and the tests shall be performed at the work site if practical. The Contracting Officer shall be provided with a copy of qualifying procedures and a list of names and identification symbols of qualified welders and welding operators. The welder or welding operator shall apply his assigned symbol near each weld he makes as a permanent record. Gas-metal arc welding shall be performed by welders certified to perform gas-metal arc welding.

3.1.9 Connections to Utility Lines

The Contractor shall coordinate the work with the Contracting Officer and shall provide final connections to the utility electric lines.

3.1.10 Disposal of Liquid Dielectrics

PCB contaminated dielectrics must be marked as PCB and transported to and incinerated by an approved EPA waste disposal facility. The Contractor shall furnish certification of proper disposal. Contaminated dielectric shall not be diluted to lower the contamination level.

3.2 EQUIPMENT INSTALLATION

3.2.1 Equipment Finishes

Equipment shall be carefully installed so as not to scratch finishes. After installation, finished surfaces shall be inspected and scratches touched up with a finish provided by the manufacturer especially for this purpose.

3.2.2 Supports

Enclosures and enclosure supports shall be installed in accordance with manufacturer's instructions. Supports shall consist of anchored channels leveled and then embedded in the concrete foundation. Channels, anchors, shims, or other leveling items shall be installed in accordance with the recommendations of the equipment manufacturer.

3.2.3 Switchgear Leveling

After leveling items are correctly installed, switchgear lineups shall be out-of-plumb by not more than 1/4 inch for the entire length and width. Insertion or withdrawal of removable elements shall be easily accomplished, and component devices shall operate properly after the switchgear assembly is completely installed.

3.2.4 Incoming Line Surge Arresters

Surge arresters of the station type shall be provided on each phase of each incoming line circuit, and mounted on station structures as shown.

3.3 ELECTRICAL BUS CONNECTIONS

All connections to aluminum bus shall be cleaned and coated with an inhibiter in accordance with manufacturer's recommended methods. All bolted connections shall be torqued to the correct tightness. The Contractor shall establish a checklist to insure that bolted connections have been properly coated and correctly torqued. All welded connections on aluminum buswork shall be by the gas metal-arc welding process. The shield inert gas shall be argon. The welder shall be certified for gas metal-arc welding.

3.4 GROUNDING

A grounding grid, consisting of the indicated configuration of bare copper conductors and driven ground rods shall be installed as shown on the drawings. Grounding grid shall comply with IEEE Std 80. Equipment frames of metal-enclosed equipment, medium-voltage cable terminations, chain-link fencing, metal-structures, and other noncurrent-carrying metal items shall be connected to the ground grid as shown. At least two connections shall be provided from a switchgear ground bus, a circuit breaker enclosure, and a grounded iron platform plate to the ground grid. Fences shall be grounded at each fixed gate post, each corner post, and at intermediate posts as indicated. Each gate section shall be bonded to its gate posts with a 1/8 x 1 inch flexible braided copper strap and ground post clamps. Fence ground clamps shall be of a type that inhibits corrosion between metal parts. Outriggers shall be grounded as shown.

3.4.1 Grounding Electrodes

Grounding electrodes shall be as follows:

a. Driven rod electrodes - Unless otherwise indicated, ground rods shall be driven into the earth until the tops of the rods are approximately one foot below finished grade.

b. Grid grounding electrodes - A grid grounding electrode shall be installed as shown consisting of bare copper conductors installed 18 inches, plus or minus 3 inches, below the finished top of soil grade. Grid conductors shall be bonded to all rod electrodes, and to all other intersecting grid conductors. Grid conductors shall be sized as shown.

3.4.2 Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process or with bolted solderless connectors, in compliance with UL 467, and those below grade shall be made by the fusion-welding process. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

3.4.3 Grounding and Bonding Conductors

Grounding and bonding conductors include all conductors used to bond transformer enclosures, equipment frames and structural members to the grounding grid. Grounding and bonding conductors shall be sized as shown. After being located to provide maximum physical protection, exposed grounding conductors shall be securely attached to structural supports at not more than two foot intervals with suitable fasteners. Bends greater than 45 degrees in ground conductors are not permitted. Routing of ground conductors through concrete should be avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor, and the opening shall be sealed with a suitable compound after installation.

3.4.4 Surge Arrester Grounding

Surge arresters and neutrals shall be bonded directly to the grounding grid with a bare copper conductor, minimum size as shown. Lead lengths shall be kept as short as practicable with no kinks or sharp bends.

3.5 FIELD TESTING

3.5.1 General

Field testing shall be performed in the presence of the Contracting Officer. The Contractor shall notify the Contracting Officer 10 days prior to conducting tests. The Contractor shall furnish all materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform all tests and inspections recommended by the manufacturer unless specifically waived by the Contracting Officer. The Contractor shall maintain a written record of all tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. All field test reports will be signed and dated by the Contractor.

3.5.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.5.3 Ground-Resistance Tests

The resistance of the grounding grid shall be measured using the fall-of-potential method defined in IEEE Std 81. Soil resistivity in the area of the grid shall be measured concurrently with the grid measurements. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.

a. Single rod electrode - 25 ohms.

3.5.4 Ground-Grid Connection Inspection

All below-grade ground-grid connections will be visually inspected by the Contracting Officer before backfilling. The Contractor shall notify the Contracting Officer 16 hours before the site is ready for inspection.

3.5.5 Circuit Interrupter Switchgear Tests

The following field tests shall be performed on circuit interrupters.

a. Insulation resistance test phase-to-phase.

b. Insulation resistance test phase-to-ground.

c. Closed contact resistance test.

d. Power factor test.

e. High-potential test.

f. Manual and electrical operation of the switchgear.

3.5.6 Protective Relays

Protective relays shall be visually and mechanically inspected, adjusted, tested, and calibrated in accordance with the manufacturer's published instructions. Tests shall include pick-up, timing, contact action, restraint, and other aspects necessary to insure proper calibration and operation. Relay settings shall be implemented in accordance with the coordination study and the attached overcurrent settings. The contractor is responsible for programming and testing all relays verifying the breaker operational functions of the relays as well as the communication functions with the new SCADA system. Special functions to be programmed in the relays include Breaker Failure and Relay Failure operations based on the SEL advanced distribution training. Relay contacts shall be manually or electrically operated to verify that the proper breakers and alarms initiate. Relaying current transformers shall be field tested in accordance with IEEE C57.13.

3.5.7 Pre-Energization Services

Calibration, testing, adjustment, and placing into service of the installation shall be accomplished by a manufacturer's product field service engineer or independent testing company with a minimum of two years of current product experience. No part of the electrical system shall be energized until all station grounding components have been tested and demonstrated to comply with the specified requirements. The following services shall be performed on the equipment listed below. These services shall be performed subsequent to testing but prior to the initial energization. The equipment shall be inspected to insure that installation is in compliance with the recommendations of the manufacturer and as shown on the detail drawings. Terminations of conductors at station buses and at

major equipment shall be inspected to ensure the adequacy of connections. Bare and insulated conductors between such terminations shall be inspected to detect possible damage caused during installation. If factory tests were not performed on completed assemblies, tests shall be performed after the installation of completed assemblies. Components shall be inspected for damage during installation or shipment and to verify that packaging materials have been removed. Components capable of being both manually and electrically operated shall be operated manually prior to the first electrical operation. Components capable of being calibrated, adjusted, and tested shall be calibrated, adjusted, and tested in accordance with the instructions of the equipment manufacturer. Items for which such services shall be provided include, but are not limited to, are the following:

Battery, station.

Breakers, circuit.

Bus, metal-enclosed.

Buses, station aerial.

Regulator, step-voltage.

Substation, primary unit.

Substation, primary unit, articulated.

Switches, disconnect without power fuses.

Switches, air-break.

Switchgear, metal-clad.

Switchgear, metal-enclosed interrupter.

Transformers, substation.

3.5.8 Operating Tests

After the installation is completed, and at such time as the Contracting Officer may direct, the Contractor shall conduct operating tests for approval. The equipment shall be demonstrated to operate in accordance with the requirements herein. An operating test report shall be submitted in accordance with paragraph TEST REPORTS.

3.6 MANUFACTURER'S FIELD SERVICE

3.6.1 Onsite Training

The Contractor shall conduct a training course for the operating staff as designated by the Contracting Officer. The training period shall consist of a total of 8 hours of normal working time and shall start after the system is functionally completed but prior to final acceptance tests. The course instruction shall cover pertinent points involved in operating,

starting, stopping, servicing the equipment, as well as all major elements of the operation and maintenance manuals. Additionally, the course instructions shall demonstrate all routine maintenance operations. A VHS format video tape of the entire training session shall be submitted.

3.6.2 Installation Engineer

After delivery of the equipment, the Contractor shall furnish one or more field engineers, regularly employed by the equipment manufacturer to supervise the installation of the equipment, assist in the performance of the onsite tests, initial operation, and instruct personnel as to the operational and maintenance features of the equipment.

3.7 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation material or operation have been corrected.

-- End of Section --

ATTACHMENT 2
SUBSTATION 1 CIRCUIT BREAKERS

1. DESCRIPTION

1.1 GENERAL

Each bidder shall submit complete and definitive information on his offering in sufficient detail to permit a complete analysis of the breaker section of the bid.

The requirements for information contained in this section are basic requirements. Additional information shall be provided as requested by the Contracting Officer.

The blank data sheets included in this section shall be completely filled in where required. The data listed therein shall not relieve the Contractor of his responsibility for meeting the requirements of the detailed specifications.

1.2 PROPOSAL DATA

12.47 KV CIRCUIT BREAKER (QTY 5)

12.47 kV OUTDOOR CIRCUIT BREAKER

Manufacturer _____

Catalog number and type _____

Interrupting medium _____

Ratings and capabilities:

Maximum voltage, kV _____

Voltage range factor _____

Low-frequency withstand voltage, kV rms _____

Full-wave impulse withstand voltage, kV crest _____

Continuous current, amperes	
Closing and latching current, kA rms	
Short time carrying capability, kA rms	
Short-circuit current, kA rms	
Max. symmetrical interrupting capability, kA rms	
Capacitance switching current, amperes	
Overhead line	
Isolated current	
Rated duty cycle	
Contact opening time, cycles	
Closing time, ms	

Min. reclosing time, cycles	_____
Number of interruptions before interrupter maintenance or replacement is required	_____
At continuous current rating	_____
At full interrupting rating	_____
Operating mechanism:	
Type	_____
Charging current, amperes at 125 vdc	_____
Number of close-open operations that can be performed starting in normal state assuming loss of charging power	_____
Trip/close coil current, amperes at 125 vdc	_____
Space heater load, watts	_____
Dimensions:	

Base width x depth, in	_____
Bushing phase to phase spacing, in	_____
Terminal to terminal spacing (same phase), in	_____
Height to terminal, in	_____
Height for bushing removal, in	_____
Total weight, lbs	_____
If not shipped completely assembled, describe field assemble	_____

_____

_____

_____

Warranty period	_____

1.3 DELIVERY

This equipment shall be delivered to MCAS Cherry Point, Havelock, North Carolina.

1.4 SCHEDULE

Time is a basic consideration in this proposal. The Contractor shall schedule submittal of drawings and engineering data as in the specifications. Equipment delivery shall be as agreed upon at the time of the acceptance of the bid.

1.5 IDENTIFICATION

All correspondence, shipping notices, shop drawings, specifications, engineering data, and other documents pertaining to the equipment and materials furnished under these specifications shall be identified by the Purchaser's name, the contract number, the UTEC project number, and the name of the item of equipment or material.

1.6 SHIPPING REQUIREMENTS

All materials shall be suitably protected to prevent damage and loss during shipment. Special care shall be exercised in loading the members for shipment to assure that overburdened loads will not deform members and that wearing of the galvanized surfaces will not occur during shipment.

Steel structures shall be shipped assembled where shipping conditions permit.

Each bidder shall furnish with his proposals, under the Section PROPOSAL DATA, a list of the structure items that will require field assembly and describe the shipping sections. All small items shall be bagged, identified and shipped in boxes or crates. The contents of all boxes and crates shall be identified with a packing slip.

1.7 CODES AND STANDARDS

Except where specifically stated otherwise, all equipment furnished under these specifications shall conform to the latest applicable standards of ASTM, NEMA, NESC, ANSI, IEEE, NEC, and EEI as to rating, tests, construction and operation. Any conflict between standards shall be referred to the Engineer who will determine which standard shall govern.

These specifications are intended to impose requirements the same as, or more stringent than, the applicable standards and shall be so interpreted. In case of conflict between these specifications and applicable standards where the more stringent requirement is not clear, the Engineer shall be consulted for an interpretation.

1.8 CORRECTION OF MANUFACTURING ERRORS

Equipment and materials shall be complete in all respects within the limits herein outlined. All manufacturing errors or omissions that are required to be corrected in the field shall be done by the manufacturer or his duly authorized representative and at the Contractor's expense.

2. ENGINEERING DATA

2.1 GENERAL

This section covers the requirements for manufacturer's drawings, instruction manuals and other engineering data, which the Contractor shall submit to the Contracting Agent for design information and review as detailed in the specifications.

3. 12.47 KV POWER CIRCUIT BREAKER

3.1 GENERAL

This specification and appendix describes the functions, performance, quality and certain construction details of five (5) 12.47 kV outdoor circuit breakers to be used for the feeder circuits at the MCAS Cherry Point Delivery #1 Substation. The outdoor circuit breakers shall be furnished complete with all accessories ready for installation, connection, and immediate service.

The outdoor circuit breakers shall be suitable for outdoor operation and shall be three (3) pole, single throw, designed and constructed for operation on a 3 phase, 60 Hz system at an ambient temperature of 40 ºC. The interrupting medium shall be a vacuum interrupting design. The breakers shall not require oil for either interrupting medium or for insulation purposes.

Each breaker shall consist of an outdoor frame-mounted dead tank high voltage circuit breaker having weatherproof steel mechanism housing and control cabinet.

3.2 PERFORMANCE RATINGS

Circuit breakers shall be rated as indicated in Table 3-1. The circuit breaker shall meet all its ratings as defined in ANSI/IEEE C37.09-1979, NEMA SG-4, and as listed in ANSI D37.09-1979.

Table 3-1, Circuit Breaker Ratings

Nominal voltage class	15.5 kV
Rated continuous current at 60 Hz	1200 amperes rms
Maximum symmetrical interrupting capability	20,000 amperes rms or higher
Interrupting time	3 cycles
Interrupting medium	Vacuum
Bushing data:	ANSI C76.2:
Basic impulse insulation level	110 kV
Current transformer data:	

Location	Ampere ratio	Quantity per bushing	Accuracy class
1, 3, 5	1200:5	1	C400
2, 4, 6	1200:5	1	C400

Reclosing duty cycle	OCO–15 sec–CO

3.2.1 CURRENT-CARRYING PERFORMANCE IN SERVICE

The resistance of current-carrying circuits from terminal to terminal shall conform to the requirements of 5.10.3.3.2 of ANSI/IEEE C37.04-1979 and of Table 9 of ANSI C37.06-1979. After the contacts have been serviced during normal maintenance, the contact resistance from terminal to terminal shall not exceed 200 percent of the maximum value given by the manufacturer for the circuit breaker when new.

3.3 OPERATING MECHANISM

The operating mechanism, shunt trip mechanism, and necessary auxiliary operating devices shall be provided in a weatherproof, dust resistant enclosure. The operating mechanism shall include all auxiliary devices and other accessories required for the type of operating mechanism furnished.

Each mechanism shall be trip-free in all respects. The mechanism shall include all internal wiring and terminal blocks.

The Contractor will install one 120 vac auxiliary power circuit and one 125 volt dc control power circuit to each circuit breaker. Two (2) molded case circuit breakers or enclosed fuse pullouts per breaker shall be provided by the manufacturer; one for the control circuit and one for the auxiliary power circuit. Knife switches shall be provided to isolate the control circuits.

A manual-tripping device accessible from outside the breaker operator housing shall be supplied. The manual-tripping device shall set a manual reset permissive control switch (69) to prevent the circuit breaker from being electrically closed.

3.3.1 ENERGY STORAGE SYSTEM

The energy storage of a motor-compressed spring-operated circuit breaker shall be sufficient for an opening-closing-opening operation at rated short-circuit current or at related required capabilities, after which the spring-compressing motor shall not require more than 10 seconds, or as agreed between the Owner and Contractor, to compress the closing spring. The spring-operating mechanism shall have provisions for manually charging the closing springs.

Operating systems for the circuit breakers shall perform as indicated below.

- Means to prevent overcharging of spring(s)
- Means to prevent insufficiently charged spring(s) from attempting a close operation
- Mechanical indication that spring(s) is charged or discharged

3.3.2 SPACE HEATERS

The operating mechanism enclosure shall be provided with space heaters to prevent condensation of moisture within the enclosure. Space heater capacity shall be as required to maintain the enclosure internal temperature above the dew point. The heaters shall be spaced away and thermally insulated from any devices or painted surfaces.

Voltage normally applied to the space heaters will be 120 volts. Space heater voltage ratings shall be 240 volts.

Space heaters shall be controlled by an adjustable thermostat, factory set to close at 85 ºF (ON) and open at 95 ºF (OFF).

The Contractor will install a 3 wire, 120/240 volt, 60 Hz feeder for this service; the Contractor shall provide suitable branch circuit protection.

3.4 BUSHINGS

The circuit breakers shall each be provided with six (6) bushings constructed of high strength wet-process porcelain, with current ratings equal to or greater than the circuit breaker continuous current rating. All bushings shall be threaded stud type with NEMA 4-hole flat spade tinned bronze terminal connectors. All bushings shall be light gray, with a 24.5" minimum creepage distance.

3.5 STRUCTURE

The completely assembled circuit breaker, including linkages and all other parts shall have ample mechanical strength to withstand without damage all stresses incident to operation within the rated short-circuit current or the related required capabilities of the circuit breaker as well as stresses resulting from mounting, moving, or maintaining the circuit breaker in a proper manner.

The operating mechanism and necessary auxiliary devices shall be provided in one weatherproof, dust resistant enclosure, mounted on the breaker frame. The breaker control cabinet shall provide the internal wiring for the breaker system and the interface between the Owner's control and power circuits to the breaker. The control cabinet shall allow sufficient space for termination of Owner-furnished control and power circuits.

All surfaces of outdoor breaker frames, tanks, operating mechanisms, and other parts exposed to possible corrosion shall be weatherproofed and designed to prevent accumulation of moisture. Those surfaces that require painting shall be shotblasted, sandblasted, or chemically cleaned and given at least one coat of primer and two coats of high grade oil resistant enamel. The finish color shall be ANSI 70 gray.

The framework shall be designed to support exposed live parts at a minimal height of twelve feet (12') above grade. It shall also be designed with lifting eyes and lugs for vertically lifting the entire assembly.

3.6 CONTROL AND RELAY ENCLOSURE

A weatherproof, dust resistant enclosure shall be furnished for control circuits, signal circuits, protective relays. Mounting of the control and relay devices on a dead-front panel with a separate access door within the operating mechanism enclosure is acceptable. If a separate enclosure is supplied, it shall be furnished with a space heater meeting the requirements listed in Section 3.3.2.

The enclosure door shall be completely weatherproof and shall have a handle with a triple latching mechanism. Handle/latch mechanism shall be furnished with padlocking provisions. Bolted door covers will not be acceptable. Doors shall have provisions for blocking in the opened position.

If practicable, access to terminal blocks for external wiring and to the back of the relay/control panel shall be provided by a removable cover or door. If such access is not practicable, the control/relay panel shall be hinged to provide access to the back of the panel and terminal blocks.

3.7 INCORPORATED SECONDARY AND CONTROL DEVICES

3.7.1 GENERAL

Auxiliary equipment such as terminal blocks, auxiliary relays, or contactors shall be readily accessible. Auxiliary equipment shall be located in compartments, enclosures, or junction boxes in such arrangement that a serviceman will have direct access to the equipment without removal of barriers, cover plates, or wiring.

All control devices including current transformers and secondary connections shall be designed to withstand without injury the mechanical shocks incident to handling and operations at rated short-circuit current and at related required capabilities of the circuit breaker stipulated in ANSI C37.06.

Current transformers, and control and instrument transformer secondary wiring, where a part of the breaker or its assembly, shall be located or protected by metallic coverings so as to provide adequate shielding from voltages induced by switching surges, from arcing in or around the circuit breaker, and to minimize the possibility of insulation failure introducing line potential on this wiring.

All terminal and control circuit wiring designed for external connection shall be capable of withstanding 1500 volts, 60 Hz, for one minute in accordance with ANSI/IEEE C37.09.

3.7.2 CURRENT TRANSFORMERS

Current transformers shall be provided as specified in accordance with ANSI/IEEE C57.13. Current transformers shall be bushing type with fully distributed windings for relaying service. They shall be five lead multiratio unless indicated otherwise in Section 3.2.

3.7.3 WIRING

The insulation class of all instrument transformers secondary wiring shall be coordinated with the voltage conditions it may be expected to encounter and shall in no case be less than 600 volts.

The control and instrument transformer secondary wiring shall be oil-, water-, and flame-resistant. Polarity, phase, and tap identification shall be provided.

Closing and trip coil leads, instrument transformer secondary leads, solenoid valve leads, and similar wiring shall be securely anchored to the coil.

Wire sizes for control wiring and instrument transformer secondary leads shall be coordinated with the inherent current requirements and voltage drop limitations of the breaker. Wire shall be stranded copper and in no case shall be smaller than No. 14 AWG. The wire ends shall be permanently fitted with pressure-type connectors before attachment to terminal studs. Splices shall be avoided wherever practicable, but, if required, they shall be brazed or made by permanently fitted pressure-type connectors.

3.7.4 TERMINAL BLOCKS

Terminal blocks shall be supplied for wiring, which shall be installed or reconnected by the Contractor. A shorting type terminal block shall be installed for each set of current transformers. Terminal blocks shall be grouped in the control cabinet for easy accessibility unrestricted by interference from structural members and instruments. Terminal blocks shall not be mounted on compartments containing cables or buses operating at voltages above 600 volts.

Sufficient space shall be provided on each side of each terminal block to allow an orderly arrangement of all leads to be terminated on the block. Arrangement of circuits on terminal blocks shall be such that all connections for one circuit plus any spare conductors will be on adjacent terminals. A minimum of 15 percent spare (but no less than 12 points) terminal points shall be provided. These terminal points shall be furnished with all screws and lockwashers.

Terminal blocks, including those for external wiring connections, shall be molded heavy-duty phenolic compound of sufficient size to accommodate easily terminals for No. 10 AWG and smaller stranded copper wire and shall meet the withstand voltages of ANSI/IEEE C37.09.

The metallic parts of terminals for control and instrument transformer wiring shall be nonferrous and corrosion-resistant.

All terminals of control wires and instrument transformer circuits shall be identified in a substantial manner. This identification shall be the same as that shown on the breaker elementary and wiring drawings. Physical arrangement of all wiring terminals shall be identical on all similar circuit breakers and shall be located to provide external circuit connections from a common raceway entrance.

3.7.5 AUXILIARY SWITCHES

Auxiliary switch contacts and bearings shall be made of corrosion-resistant materials, and the other parts shall be treated to resist corrosion. Contact surfaces shall be silver-plated. All unused contacts shall be wired to terminal blocks.

3.7.6 SPACE HEATERS

The control cabinet and auxiliary compartments, if separate from the operating housing, shall be provided with space heaters meeting the requirements of Article 3.3.2.

3.7.7 PROTECTIVE RELAYS & CONTROL SWITCHES

A control switch with red and green indicating LED type lamp to trip the circuit breaker shall be provided. Normal control of the breaker shall be accomplished remotely by others. A SEL-351S overcurrent protective relay is required.

3.8 ACCESSORIES

Standard accessories shall be provided with each breaker. Accessories shall include the following:

- Two auxiliary switches with 5 “a” and 5 “b” contacts each in addition to those required for control of the breaker mechanism.
- Latch checking switch
- One trip-close push-button station wired for local breaker test operation
- Two grounding pads with terminals for attachment to the Owner’s No. 1/0 AWG to 300 kcmil stranded copper cables. The grounding pads shall be on diagonally opposite locations on the frame.
- Operation counter
- Position indicator

- 120 volt duplex receptacle
- Suitable nameplates showing Manufacturer's data, Breaker rating data, Breaker mechanism data and BCT data including all ratios of the bushing current transformers, mounted either on the circuit breaker frame or inside the control cabinet.
- One maintenance-closing device shall be furnished for use with all breakers.

3.9 FACTORY TESTS

3.9.1 DESIGN TESTS

Tests shall be conducted on each design of circuit breaker and on each significant design change in accordance with ANSI/IEEE C37.09.

3.9.2 PRODUCTION TESTS

Regardless of any statements in the standards to the contrary, each breaker shall be completely assembled at the factory. The assembled components, including bushings, shall be those, which will be a permanent part of the breaker, assemble. After each breaker is completely assembled, it shall be subjected to and shall meet all requirements of the production tests as listed and described in ANSI C37.09.

ATTACHMENT 3
SUBSTATION BATTERY SYSTEM

1. DESCRIPTION

This appendix describes the proposal requirements information, technical requirements and shipping instructions for the 48 and 125 VDC substation batteries, battery racks, and chargers for Substation 1 and Sectionalizing Station E, at the Marine Corp Air Station Cherry Point, Havelock, NC.

Both sites will include a 48 or 125 volt DC system at the ratings as listed in this appendix. These batteries will be used to furnish a reliable control energy source to the distribution facilities at each site during normal and emergency conditions. The batteries will be installed outside at Station 1 in a cabinet provided with this project and inside a new switchgear cubicle in Station E with the battery chargers connected in a floating charge configuration.

2. PROPOSAL REQUIREMENTS

The information listed below is required for each substation

- Cost, terms, and lead times for each item
- Battery descriptive literature and drawings showing cell outline and dimensions, unit weight, plate sizes and thickness, battery construction, post/seal cross-section, and post dimensions and connecting holes.
- A completed copy of the attached Proposal Information Form
- Rack descriptive literature and drawings showing dimensions and construction for each battery rack.
- Detailed list of suggested spare parts complete with vendors catalog numbers and prices.
- Charger descriptive literature, charger outline drawing, elementary diagram and undervoltage alarm elementary diagram
- Station 1 battery cabinet outline and internal layout drawing.

This information must be for the exact equipment to be purchased. Typical equipment information will not be acceptable.

3. BATTERY CELLS

3.1 GENERAL

This section covers the general requirements for the battery cells.

3.1.1 GENERAL SPECIFICATIONS

The station E control battery system will be MONOLITE (SLA model) sealed valve regulated lead acid batteries manufactured by Alcad.

STATION 1:

Battery Type: The station 1 control battery will be a low antimony lead-selenium stationary type with individually packaged cells with a nominal cell voltage of two (2) volts, furnished in transparent glass or plastic containers.

Operating Temperature: The batteries shall be designed to operate satisfactorily over an ambient temperature range of –18?to 50?C.

Vent Plugs: Vent Plugs shall be of the ”Flame arrestor” type.

Cell Post: The cell posts shall be constructed of lead with a solid copper insert. Each post shall have two connector holes, one above the other, to provide post/link maintenance without circuit interruption.

GENERAL:

Battery Accessories: The batteries will be shipped with the following accessories:

- Lead plated solid copper intercell connectors to provide not less than ½ inch between cells. Two connectors per intercell connection are required as a set. Two (2) sets per battery are to be supplied.
- Lead coated interrack connectors for the battery.

- Three cable assemblies for intercell connections per each battery system. Two (2) assemblies shall be sized for the length of the inter-step connections of a 2-step battery rack. The third assembly shall be 20 feet long for interrack connection. Each assembly shall use 600 volt flexible tinned copper cables with crimp type lugs on the end of each cable. The completed crimped lug connection shall be sealed by using lead solder. Suitable terminal plates and lugs shall be supplied with each assembly connection. The wire sizes shall be 4/0 cable for Blandford and 1/0 cable for Effingham.

- #316 Stainless steel connector bolts and nuts. This will consist of one (1) bolt, one (1) post connector nut, one (1) lockwasher, and two (2) flat washers per connection.

- Solderless terminal lugs for one cable per polarity sized as recommended by the battery manufacturer.

- Cell lifting facilities.

- Portable Hydrometer (1) per battery

- Hydrometer Holder (1) per battery

- Vent-mounted Thermometer – (1) per battery

- NO-OX-ID grease.

- One set of numerals (one numeral per cell) suitable for permanent attachment to the cells at least 1 inch in height.

- Terminal block for #6 to #2/0 AWG external load cables.

Design Margin: The battery capacity determined by the duty cycles listed for each site shall be increased by fifteen (15) percent in order to provide a design margin for the battery system.

Age Compensation: The battery's rated capacity determined by the duty cycle and design margin for each site shall also be increased by twenty-five (25) percent in order to provide a capacity for the load expected at the end of its service life.

Cell Capacity: The nominal 8 hour, 77°F battery cell capacity final discharge voltage will be 1.75 volts.

Charging: The batteries will be capable of receiving Float voltage charging with recovery of 90 percent of 8 hour capacity in less than 15 hours.

Manufacture Date: The date of manufacture will be within 6 months of the shipping date and will be clearly shown on the battery cells with a permanent label..

Electrolyte Fill Date: The initial electrolyte fill date for the batteries will be within 30 days of the shipping date and clearly shown on the battery cells with a permanent label.

Warranty: Batteries shall have a minimum 15 year warranty.

3.1.2 SUBSTATION BATTERY RATINGS

Amp Hour Rating: The minimum amp hour rating for the cells will be 100 amp hours with the maximum amp hour rating determined by the duty cycle, design margin and age compensation specifications listed below.

Duty Cycle: The battery will be sized to adequately supply the following duty cycle loads for a 8 hour period in accordance with ANSI/IEEE Std 485, IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations, with a final voltage of 1.75 volts per cell at 40°F:

> The battery shall have an ampere-hour capacity equal to at least 125 percent of the station's direct-current requirements including normal continuous loads plus intermittent loads.
>
> Normal continuous load capacity shall be adequate for an 8-hour period.
>
> Intermittent load capacity shall be adequate so that at least three openings and three closings of each of the station's associated circuit breakers can occur in an 8-hour period with no more than three circuit breaker units simultaneously operating.

4. BATTERY RACKS

4.1 GENERAL

1 set of battery racks will be supplied for each substation for the battery cells. The battery racks will be a two-step type not two tier type furnished to fit the available space.

4.2 SPECIFICATIONS

The battery racks will be constructed of steel with bracing to eliminate all sagging or movement after installation of batteries. The racks will be fitted with rubber insulators to prevent the cells from coming in contact with the metal.

The rack will be fully painted before assembly with two coats of electrolyte resistant paint in ANSI-61 light gray color.

The rack design will support the battery in such a way that the cells are easily accessible for maintenance and replacement. Insulated battery hold-downs will also be supplied.

5. CHARGER AND CABINET

5.1 GENERAL

This section describes the indoor chargers with cabinets for supply of dc power. One charger will be supplied for each substation. The chargers will be sized to supply the battery system and duty cycles described above. The cabinet will contain the battery charger and be furnished complete and ready for immediate service.

5.2 SPECIFICATIONS

5.2.1 CABINET

The charger cabinet will be constructed of steel and wall surface mountable of indoor NEMA 1 construction with knockouts for conduit entrances.

Welds on exposed surfaces will be ground smooth.

Finished surfaces will be free of waves, bellies, and other imperfections.

The cabinet exterior will be thoroughly cleaned and primed prior to application of finish paint.

The exterior and interior surfaces will be finished with ANSI 61 light gray enamel.

5.2.2 BATTERY CHARGER

The charger will be a constant voltage type with automatic current limiting.

All chargers shall be Underwriters Laboratories listed and have the UL label attached.

The charger will be operated over an ambient temperature range of 0?to 50? C. They shall be convection cooled.

The charger shall be individually tested prior to packaging and shipping. The vendor shall assure that all equipment is operating normally.

All customer connections shall be wired to terminal blocks sufficiently rated for their application. Terminal blocks shall be screw type suitable for use with crimp-on ring-tongue lugs.

It will be designed and sized according to the duty cycle described above for float charging of the specific batteries installed in the control house.

The minimum charger output shall be determined by the following equation:

$$A = L_c + \frac{1.1*C}{H} \qquad \textit{where:}$$

A = charger dc output amperes

L_c = Total continuous load

C = Total duty cycle ampere-hours

H = Recharge time, 8 hours

The battery chargers will have the following ratings and features.

- Minimum 16 ampere DC output rating for Station 1
- Minimum 16 ampere DC output rating for Station E
- 240 volt, 60 Hz AC input power with surge suppression
- Input AC circuit breaker accessible from the front
- 125 volt (Station 1) - 48 volt (Station E) DC nominal output voltage
- Output DC circuit breaker
- Manual high rate (equalize charge) with reset timer

- Output voltage regulation shall be ± 0.5 % from 0 to 100 % load with simultaneous ±10 % input voltage variation. For any step load change within the range of 20 to 100 percent of the rated output current, the maximum voltage transient shall not exceed ± 0.5 %of the steady-state voltage when the charge is connected to a battery with the ampere-hour rating of at least 4 times the full load current rating of the charger. Recovery time back to the steady-state voltage shall not exceed 200 msec, and all transient disturbances shall disappear within 500 msec.
- Output filtering shall be the battery eliminator type. For all conditions the charge shall be internally filtered so that the output noise is less than 32dBmC using C-message weighting network, and output ripple will not exceed 30mVrms with no battery connected.
- Automatic current limiting protection adjustable for 90-120 percent of the rated output current
- Reverse battery protection
- Adjustable low battery voltage alarm with adjustable time delay and lamp and relay contact output
- 2 percent accuracy DC voltmeter and ammeter mounted on front panel
- AC power indicator
- High rate indicator
- Output voltage range adjustment 80 percent - 120 percent of nominal DC, adjustable from the front of the charger.
- Loss of AC alarm relay with output contact
- Ground detection alarm connected on battery side of DC output with a switch and two indicating lights, one for positive ground and one for negative ground detection.
- Rectifier failure alarm
- Adjustable high-low DC voltage alarm relay, with 0-90 second adjustable time delay
- Adjustable low DC current alarm relay, with 0-90 second adjustable time delay

5.2.3 WARRANTY

All equipment will include a full one-year manufacturers warranty that the equipment will be of good workmanship and quality, free from defects in design, workmanship, and materials and the manufacturer will replace or repair in the field any material found to be defective at the manufacturer's expense.

5.2.4 DOCUMENTATION

Documentation for the battery chargers shall include a cover sheet, factory test report, suggested spare parts list, bill of materials, Cabinet Drawing and Front View, Circuit Schematics and Wiring Diagrams, Instruction Book, and Warranty Information.

The cabinet drawing shall include the following

- Charger model number and purchase order number in the title block
- Show all dimensions of the cabinet and mounting devices
- The front view shall show all components on the front with identification and dimensions.
- Reflect the actual equipment purchased

The Circuit Schematics and Wiring Diagrams shall include the following

- Charger model number and purchase order number in the title block
- Show all dimensions of the cabinet and mounting devices
- The front view shall show all components on the front with identification and dimensions.
- Reflect the actual equipment purchased
- Type and current ratings of all fuses and circuit breakers
- Components shall have device Ids (R1,R2,…,C1,C2,etc.) and ratings (ohm, watts, micro-farads, etc.).
- Drawing shall show the AC input wired for the voltage specified.
- The DC voltage rating and full load DC current shall be shown.
- Interconnections between drawings shall be clearly shown with drawing name and number.
- Block diagrams are not acceptable.

STATION 1
PROPOSAL INFORMATION FORM

1. Item No. _____ Battery Rating _____V_____AH
2. Manufacturer _____ Model No. _____
3. Battery Type _____ Selenium _____% Antimony _____%
4. Number of Cells _____ Number of Cell Units _____
5. Float Charge
   _____Vpc
6. Equalizing Charge
   _____Vpc
7. 8-hour Discharge Rate to 1.75 Vpc at 25 degrees Celsius (77 degrees Fahrenheit) _____Amps
8. 8-hour Discharge Rate to 1.75 Vpc at 0 degrees Celsius (32 degrees Fahrenheit) _____Amps
9. 1-minute Discharge Rate to 1.75 Vpc at 25 degrees Celsius (77 degrees Fahrenheit) _____Amps
10. 1-minute Discharge Rate to 1.75 Vpc at 0 degrees Celsius (32 degrees Fahrenheit) _____Amps
11. 8-hour Ampere-hour Rating at 25 degrees Celsius _____AH
12. 8-hour Ampere-hour Rating at 0 degrees Celsius _____AH
13. Specific Gravity at 25 degrees Celsius _____
14. Cell Container _____
15. Minimum Warranty _____Yrs
16. Life Expectancy at 25 degrees Celsius _____Yrs
17. Life Expectancy at 35 degrees Celsius _____Yrs
18. Cell Dimensions: Height _____Inches, Width _____Inches, Depth ____Inches

19. Plate Dimensions:

    Positive Plate: Height _____Inches, Width _____Inches, Thick _____Inches

    Negative Plate: Height _____Inches, Width _____Inches, Thick _____Inches

20. Sediment Space _____Inches

21. Weight per Cell _____Lbs

22. Lead Plating Thickness on Intercell Connectors _____Inches

23. Torque Setting for Terminal Connections _____

24. Internal Battery Resistance per Cell _____Ohms

BY: _____ DATE: _____

STATION E
PROPOSAL INFORMATION FORM

1. Item No. _____ Battery Rating _____V_____AH
2. Manufacturer _____ Model No. _____
3. Battery Type _____ Selenium _____% Antimony _____%
4. Number of Cells _____ Number of Cell Units _____
5. Float Charge
   _____Vpc
6. Equalizing Charge
   _____Vpc
7. 8-hour Discharge Rate to 1.75 Vpc at 25 degrees Celsius (77 degrees Fahrenheit) _____Amps
8. 8-hour Discharge Rate to 1.75 Vpc at 0 degrees Celsius (32 degrees Fahrenheit) _____Amps
9. 1-minute Discharge Rate to 1.75 Vpc at 25 degrees Celsius (77 degrees Fahrenheit) _____Amps
10. 1-minute Discharge Rate to 1.75 Vpc at 0 degrees Celsius (32 degrees Fahrenheit) _____Amps
20. 8-hour Ampere-hour Rating at 25 degrees Celsius _____AH
21. 8-hour Ampere-hour Rating at 0 degrees Celsius _____AH
22. Specific Gravity at 25 degrees Celsius _____
23. Cell Container _____
24. Minimum Warranty _____Yrs
25. Life Expectancy at 25 degrees Celsius _____Yrs
26. Life Expectancy at 35 degrees Celsius _____Yrs

27. Cell Dimensions: Height _____Inches, Width _____Inches, Depth ____Inches

28. Plate Dimensions:

Positive Plate: Height _____Inches, Width _____Inches, Thick _____Inches

Negative Plate: Height _____Inches, Width _____Inches, Thick _____Inches

25. Sediment Space _____Inches

26. Weight per Cell _____Lbs

27. Lead Plating Thickness on Intercell Connectors _____Inches

28. Torque Setting for Terminal Connections _____

29. Internal Battery Resistance per Cell _____Ohms

BY: _____ DATE: _____

SECTION 16710N

STRUCTURED TELECOMMUNICATIONS CABLING AND PATHWAY SYSTEM
02/02

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.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

TIA-455-21-A	(1988) FOTP-21 - Mating Durability for Fiber Optic Interconnecting Devices
TIA/EIA-568-B.1	(2001; Addendum 2001) Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (ANSI/TIA/EIA-568-B.1)
TIA/EIA-568-B.2	(2001) Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components (ANSI/TIA/EIA-568-B.2)
TIA/EIA-569-A	(1998; Adenda 2000, 2001) Commercial Building Standards for Telecommunications Pathways and Spaces (ANSI/TIA/EIA-569-A)
TIA/EIA-606	(1993) Administration Standard for the Telecommunications Infrastructure of Commercial Buildings (ANSI/TIA/EIA-606)
TIA/EIA-607	(1994) Commercial Building Grounding and Bonding Requirements for Telecommunications (ANSI/TIA/EIA-607)

U.S. FEDERAL COMMUNICATIONS COMMISSION (FCC)

FCC Part 68.5	Establishment of Telephone Premises Wiring Attestation List

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-80-576	(2000) Communication Wire and Cable for Wiring of Premises

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 63.1	(2000) Twisted Pair Premise Voice and Data

	Communications Cables
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	
NFPA 70	(2002) National Electrical Code
UNDERWRITERS LABORATORIES (UL)	
UL 467	(1993; R 2001) Grounding and Bonding Equipment
UL 514C	(1996; R 2001) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL 969	(1995; R 1999) Marking and Labeling Systems
UL 1286	(1999; Bul. 1999, 2000) Office Furnishings
UL 1863	(2000; Bul. 2001) Communication Circuit Accessories

1.2 RELATED REQUIREMENTS

Section 16050N, "Basic Electrical Materials and Methods" apply to this section with additions and modifications specified herein. The premises distribution shall consist of inside-plant horizontal, riser, and backbone cables and connecting hardware to transport telephone and data (including LAN) signals among equipment items in a building.

1.3 DEFINITIONS

1.3.1 Main Distribution Frame (MDF)

A physical structure at a central location for terminating permanent backbone cables to interconnect with service provider (SP) equipment at the activity minimum point of presence. The MDF generally includes vendor specific components to support voice and data circuits, building surge protector assemblies, main cross connect blocks, equipment support frames, and wood backboard (if MDF is wall mounted). Depending upon local site conditions, the MDF and BDF may be identical.

1.3.2 Building Distribution Frame (BDF)

A structure with terminations for connecting backbone, campus, and horizontal cabling. The BDF generally includes a cross connect, equipment support frame, and wooden backboard or terminal cabinet. The BDF shall include building protector assemblies when used for campus backbone or SP cabling.

1.3.3 Intermediate Distribution Frame (IDF)

An intermediate termination point for horizontal wiring and cross connections within telecommunications closets or wiring closets.

1.3.4 Telecommunications Closet

An enclosed space for telecommunications equipment, terminations, and cross-connect wiring for horizontal cabling.

1.4 ENVIRONMENTAL REQUIREMENTS

Connecting hardware shall be rated for operation under ambient conditions of 32 to 140 degrees F and in the range of 0 to 95 percent relative humidity, noncondensing.

1.5 SYSTEM DESCRIPTION

The structured telecommunications cabling and pathway system shall include permanently installed backbone and horizontal cabling, horizontal and backbone pathways, service entrance facilities, work area pathways, telecommunications outlet assemblies, conduit, raceway, and hardware for splicing, terminating, and interconnecting. The horizontal system includes the cabling and pathway between the telecommunications closet and the work area telecommunications outlet. The horizontal system shall be wired in a star topology with the IDF at the center or hub of the star. The backbone cabling and pathway system includes intrabuilding and interbuilding interconnecting cabling, pathway, and terminal hardware to provide connectivity between the MDF's, BDF's, and IDF's. The backbone system shall be wired in a star topology with the MDF at the center or hub of the star.

1.6 SUBMITTALS

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

SD-02 Shop Drawings

Telecommunications drawings; G

Distribution frames; G

SD-03 Product Data

Telecommunications cabling (backbone and horizontal); G

Telecommunications outlet/connector assemblies; G

SD-06 Test Reports

Telecommunications cabling testing; G

SD-07 Certificates

Contractor Qualifications; G

Manufacturer Qualifications; G

SD-10 Operation and Maintenance Data

Telecommunications cabling and pathway system Data Package 5; G

Submit operations and maintenance data as specified herein and as requested by Contracting Officer.

1.7 ADDITIONAL SUBMITTAL REQUIREMENTS

1.7.1 Telecommunications Drawings

Provide registered communications distribution designer (RCDD) approved drawings complete with wiring diagrams and details required to prove that the distribution system shall properly support connectivity from the telecommunications equipment room to telecommunications work area outlets. Show the entrance facility and layout of cabling and pathway runs, cross connect points, MDF, BDF, IDF, grounding system, terminating block arrangements and type. Drawings shall depict final telecommunications cabling configuration, including location, color coding, gage, pair assignment, polarization, and terminating blocks layout at cross connect points and patch panels after telecommunications cable installation. Provide a plastic laminated schematic of the as-installed telecommunications cable system showing cabling, BDF's, IDF's, MDF's, and equipment rooms keyed to floor plans by room number. Mount the laminated schematic near the MDF as directed by the Contracting Officer.

1.7.2 Distribution Frames

Provide shop drawing showing layout of applicable equipment including incoming cable stub or connector blocks, building protector assembly, outgoing cable connector blocks and equipment spaces and racks.

1.7.3 Qualifications

1.7.3.1 Minimum Contractor Qualifications

Prior to installation, submit data of provider's experience and qualifications. All work under this section shall be performed by and all equipment shall be provided by a certified Telecommunications Contractor, hereinafter referred to as the Contractor. The Contractor shall have the following qualifications in Telecommunications Systems installation:

a. Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment.

b. All supervisors and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products.

c. All installers assigned to the installation of this system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installation Technicians or have a minimum of 3 years experience in the installation of the

specified copper and fiber optic cable and components. Include names and locations of two projects successfully completed using copper communications cabling systems. Include written certification from users that systems have performed satisfactorily for not less than 18 months. Include specific experience in installing and testing structured telecommunications distribution systems using Category 5e cabling systems.

1.7.3.2 Minimum Manufacturer Qualifications

The equipment and hardware provided under this contract will be from manufacturers that have a minimum of 3 years experience in producing the types of systems and equipment specified.

1.7.5 Additions to Operation and Maintenance Manuals

In addition to requirements of Data package 5 for the telecommunications cabling and pathway system, include the requirements of paragraph entitled "Telecommunications Drawings."

1.8 DELIVERY AND STORAGE

Provide protection from weather, moisture, dirt, dust, and other contaminants for telecommunications cabling and pathway equipment placed in storage.

PART 2 PRODUCTS

2.1 COMPONENTS

UL or third party certified. Provide a complete system of telecommunications cabling and pathway components using star topology and support structures, pathways, and spaces complete with conduits, pull wires, wireways, cable trays, terminal boxes, outlets, cables, junction boxes, telephone cabinets, and telecommunications closets. Fixed cables and pathway systems for telecommunications systems shall be UL listed or third party independent testing laboratory certified, and shall comply with NFPA 70.

2.2 PATHWAYS (BACKBONE AND HORIZONTAL)

TIA/EIA-569-A. Pathway shall be conduit,cable tray, underfloor duct, access floor, and wireway, installations. Provide grounding and bonding as required by TIA/EIA-607. Cable tray wiring shall comply with NFPA 70.

2.2.1 Work area Pathways

Comply with TIA/EIA-569-A. System furniture pathways shall comply with UL 1286.

2.3 TELECOMMUNICATIONS CABLING

Cabling shall be UL listed for the application and shall comply with TIA/EIA-568-B.1, TIA/EIA-568-B.2. Provide a labeling system for cabling as

required by TIA/EIA-606 and UL 969. Cabling manufactured more than 12 months prior to date of installation shall not be used.

2.3.1 Horizontal Cabling

Comply with NFPA 70, NEMA WC 63.1, ICEA S-80-576 and performance characteristics in TIA/EIA-568-B.1.

2.3.1.1 Horizontal Copper

TIA/EIA-568-B.2, NFPA 70, UTP (unshielded twisted pair), 100 ohm. Provide four each individually twisted pair, 22 AWG conductors, Category 5e plenum (CMP) rated, with a blue PVC jacket. Plenum or riser (CMR) cable may be substituted for general purpose cable.

2.4 TELECOMMUNICATIONS OUTLET BOXES

Standard type 4 inches square by 2 1/8 inches deep. Mount flush in finished walls at height indicated. Depth of boxes shall be large enough to allow manufacturers' recommended conductor bend radii.

2.5 TELECOMMUNICATIONS OUTLET/CONNECTOR ASSEMBLIES

2.5.1 Outlet/Connector Copper

Outlet/connectors shall comply with FCC Part 68.5, TIA/EIA-568-B.1, and TIA/EIA-568-B.2. UTP Outlet/connectors shall be UL 1863 listed, non-keyed, 4-pair, constructed of high impact rated thermoplastic housing and shall be third party verified and shall comply with EIA/TIA Category 5e requirements. Outlet/connectors provided for Category 5e UTP cabling shall meet or exceed the requirements for the cable provided. Outlet/connectors shall be terminated using a 110-style PC board connector, color-coded for both T568A and T568B wiring. UTP outlet/connectors shall comply with TIA-455-21-A for 500 mating cycles.

2.5.2 Cover Plates

Telecommunications cover plates shall comply with UL 514C, and TIA/EIA-568-B.1, TIA/EIA-568-B.2, oversized design constructed of high impact thermoplastic,material. Stenciled lettering for data circuits shall be provided using thermal ink transfer process.

2.6 GROUNDING AND BONDING PRODUCTS

Comply with UL 467, TIA/EIA-607, and NFPA 70. Components shall be identified as required by TIA/EIA-606.

PART 3 EXECUTION

3.1 INSTALLATION

Telecommunications cabling and pathway systems, including the horizontal and backbone cable, pathway systems, telecommunications outlet/connector assemblies, and associated hardware shall be installed in accordance with

TIA/EIA-568-B.1, TIA/EIA-568-B.2, , TIA/EIA-569-A, NFPA 70, and UL standards as applicable. Cabling shall be connected in a star topology network. Metal raceway bases, covers, and dividers shall be bonded and grounded in accordance with TIA/EIA-607. Telecommunications cabling and pathways with copper media shall be installed in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment. The interference ceiling shall not exceed 3.0 volts per meter measured over the usable bandwidth of the telecommunications cabling. Pathways shall be installed in accordance with the following minimum clearance distances of 4 feet from motors, generators, frequency converters, transformers, x-ray equipment or uninterruptible power system, 12 in from power conduits, panelboards, and cable systems, 5 inches from fluorescent or high frequency lighting system fixtures.

3.1.1 Cabling

Install Category 5e UTP telecommunications cabling and pathway system as detailed in TIA/EIA-568-B.1, TIA/EIA-568-B.2. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection (IDC) tool kit for copper cable terminations. Do not untwist Category 5e UTP cables more than one half inch from the point of termination to maintain cable geometry. Provide service loop on each end of the cable, 10 ft. in the telecommunications closet, 12 inches for UTP. Do not exceed manufacturers' cable pull tensions for copper and optical fiber cables. Provide a device to monitor cable pull tensions. Do not exceed 25 pounds pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. For UTP cable bend radii shall not be less than four times the cable diameter.

3.1.1.1 Horizontal Cabling

Install horizontal cabling and pathway as indicated on drawings between telecommunications closet and telecommunications outlet assemblies at workstations.

3.1.2 Pathway Installations

Comply with TIA/EIA-569-A. Conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 6 inches away from parallel runs of electrical power equipment, flues, steam, and hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above accessible ceilings and where conduit is visible after completion of project. Run conduits in crawl spaces and under floor slabs as if exposed. Install no more than two 90 degree bends for a single horizontal cable run.

3.1.3 Cable Tray Installation

Install cable tray components in accordance with TIA/EIA-569-A. Only CMP and OFNP type cable shall be installed in a plenum.

3.1.4 Work Area Outlets

3.1.4.1 Terminations

Terminate UTP cable in accordance with TIA/EIA-568-B.1, TIA/EIA-568-B.2, and wiring configuration as specified.

3.1.4.2 Faceplates

As a minimum, each jack shall be labeled as to its function and a unique number to identify cable link.

3.1.4.3 Cables

Unshielded twisted pair and fiber optic cables shall have a minimum of 6 inches of slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturer's bend radius for each type of cable shall not be exceeded.

3.1.5 Telecommunications Closet Termination

Install termination hardware required for Category 5e system. An insulation displacement tool shall be used for terminating copper cable to insulation displacement connectors.

3.1.6 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings.

3.1.7 Grounding and Bonding

In accordance with TIA/EIA-607, and NFPA 70.

3.2 LABELING

3.2.1 Labels

All labels shall be in accordance with TIA/EIA-606.

3.2.2 Cable

All cables shall be labeled using color labels on both ends with unencoded identifiers per TIA/EIA-606.

3.2.3 Termination Hardware

All workstation outlets and patch panel connections shall be labeled using color coded labels with unencoded identifiers as per TIA/EIA-606.

3.3 TESTING

3.3.1 Telecommunications Cabling Testing

Perform telecommunications cabling inspection, verification, and performance tests in accordance with TIA/EIA-568-B.1, TIA/EIA-568-B.2.

3.3.1.1 Inspection

Visually inspect cabling jacket materials for UL or third party certification markings. Visually inspect UTP and optical fiber jacket materials for UL or third party certification markings. Inspect cabling terminations in telecommunications rooms and at workstations to confirm color code for tip and ring pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1, TIA/EIA-568-B.2. Visually confirm Category 5e marking of outlets, wallplates, outlet/connectors, and patch panels.

3.3.1.2 Verification Tests

UTP backbone copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connected. Perform 100 MHz near end cross talk (NEXT) and attenuation tests for Category 5e systems installations.

3.3.1.3 Performance Tests

a. Category 5e Links. Perform UTP link tests in accordance with TIA/EIA-568-B.1, TIA/EIA-568-B.2. Tests shall include wire map, length, attenuation, NEXT, and propagation delay.

3.3.1.4 Final Verification Tests

Perform verification tests for UTP systems after the complete telecommunications cabling and workstation outlet/connectors are installed. These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and DSN telephone call.

-- End of Section --

SECTION 16713N

FIBER OPTIC (FO) OUTSIDE PLANT (OSP) MEDIA
03/01

PART 1 GENERAL

1.1 REFERENCES

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

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-87-640	(1992) Fiber Optic Outside Plant Communications Cable

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2002) National Electrical Safety Code (IEEE)

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA EIA/TIA-455-B	(1998) Test Procedures for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and other Fiber Optic Components (ANSI)
EIA ANSI/EIA/TIA-455-59A	(1989) Measurement of Fiber Point Defects Using an OTDR
EIA ANSI/EIA/TIA-455-78A-98	(1990; R 1998) Spectral-Attenuation Cutback Measurement for Single-Mode Optical Fibers
EIA EIA/TIA-455-107	(1989) Return Loss for Fiber Optic Components
EIA EIA/TIA-472DAAA	(1993) Detail Specification for All Dielectric Fiber Optic Communications Cable for Outside Plant Use Containing Class 1a 62.5 Um Core Diameter/250 Um Costing Diameter Fiber(s).
EIA EIA/TIA-472D000-A	(1993) Fiber Optic Communications Cable for Outside Plant Use
EIA EIA/TIA-4750000-C	(1996) Generic Specifications for Fiber Optic Connectors (ANSI)

EIA EIA/TIA-526-7	(1998) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
EIA EIA/TIA-526-14-A	(1998) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
EIA EIA/TIA-568-A	(1995) Commercial Building Telecommunications Cabling Standard
EIA ANSI/TIA/EIA-569-A	(1998) Commercial Building Telecommunications Pathways and Spaces
EIA EIA/TIA-590-A	(1997) Standard for Physical Location and Protection of Below Ground Fiber Optic Cable Plant
EIA EIA/TIA-598-A	(1995) Optical Fiber Cable Color Coding
EIA EIA/TIA-604-3	(2000) FOCIS 3 Fiber Optic Connectror Intermateability Standard
EIA EIA/TIA-758	(1999) Customer-owned Outside Plant Telecommunications Cabling Standard, including Addendum No. 1

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-188-176	(1996; 1997) Standardized Profile for Asynchronous Transfer Mode (ATM)
MIL-STD-2042	(1997; Rev A) Fiber Optic Topology Installation Standard Methods for Naval Ships

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA RN 1	(1998) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(1998) Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
NEMA TC 3	(1999) PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA TC 6 & 8	(1990) PVC Plastic Utilities Duct for Underground Installations
NEMA TC 9	(1990) Fittings for PVC Plastic Utilities

Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2002) National Electrical Code

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS REA Bull 1753F-601 (PE-90) Filled Fiber Optic Cables (REA)

1.2 RELATED REQUIREMENTS

Section 16050N, "Basic Electrical Materials and Methods" applies to this section with additions and modifications specified herein.

1.3 SUBMITTALS

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

SD-02 Shop Drawings

Fiber Optic System; G

SD-03 Product Data

Fiber Optic Media Types; G

Fiber Optic Splices Material Data; G

Fiber Optic Terminations and Connectors Material Data; G

Fiber Optic Enclosures; G

SD-06 Test Reports

Fiber Optic Factory Test Plan; G

Fiber Optic Field Tests Plan; G

SD-07 Certificates

Fiber Optic Cable Installer and Splicer Qualifications; G

Manufacturer's qualifications; G

SD-08 Manufacturer's Instructions

Fiber optic system instructions; G

1.4 QUALITY ASSURANCE

1.4.1 Fiber Optic System

Provide drawings for the fiber optic cable and pathway system. Provide single line schematic details of the fiber optic and pathway media, splices, and associated construction materials. Drawings shall be in AUTOCAD.DXF or compatible format. Provide Registered Communications Distribution Designer (RCDD) approved drawings of the fiber optic system. Include drawing details of fiber optic terminations in equipment rooms. System drawings shall show final configuration, including location, fiber pair count, pathway innerduct arrangement, and pathway assignment of outside plant. FO system shall be compatible with MIL-STD-188-176. Pier FO systems shall be designed for copmpatibility with MIL-STD-2042 and NAVSEA drawings.

1.4.2 Fiber Optic Cable Installer and Splicer Qualifications

Technicians installing FO media, splices and performing system tests shall be certified and trained in accordance with an approved manufacturers training program. Technicians shall have a minimum of 3 years FO experience in installing equivalent FO systems. Submit data for approval to the Contracting Officer. Submit FO technician qualifications for approval 30 days before splices are to be made on the cable. Certification shall include the training, and experience of the individual on specific type and classification of FO media to be provided under this contract.

1.4.3 Fiber Optic System Instructions

Provide installation methods and procedures for installing the FO media and pathway system. Include methods and procedures for installing FO media, pathway, splices, and associated hardware. Submit installation procedures and equipment list to the Contracting Officer.

1.4.4 Manufacturer's Qualifications

The FO media manufacturer shall have a minimum of 3 years experience in the manufacturing, assembly, and factory testing of FO media which comply with RUS REA Bull 1753F-601 (PE-90). Manufacturer must provide a list of customers with 3 years of maintenance logs documenting experience with government customers.

1.4.5 Fiber Optic Factory Test Plan

Prepare and provide the government for review a test plan for factory and field tests of the FO media. Provide factory OTDR test data as part of the test report. Provide a list of factory test equipment. Include a FO link performance test plan. Submit the plan at least 30 days prior to tests for government approval. Refer to EIA ANSI/TIA/EIA-569-A for performance measurement criteria. Conduct tests at all operating bandwidths. Provide calculations for optical power budget and bandwidth as required by RUS 7CFR 1755.900 using test method EIA ANSI/EIA/TIA-455-78A-98 or EIA EIA/TIA-455-B. Submit test plans and reports to the government for review and approval.

1.4.6 Fiber Optic Field Tests Plan

Prepare and provide technicians and test equipment for field tests of FO media. Conduct OTDR reel tests at the job site prior to installation. Perform OTDR and end to end tests of all installed media. Conduct tests on single mode fiber as required by EIA EIA/TIA-526-7 for single mode fiber and EIA EIA/TIA-526-14-A for multi mode fiber.

1.5 DELIVERY, STORAGE, AND HANDLING

Ship media on factory reels or factory cartons to job site. Radius of the reel drum shall not be smaller than the minimum bend radius recommended by the manufacturer for the media. Wind cable on the reel so that unwinding can be done without kinking the cable. Two meters of cable at each end of the reel must be readily accessible for testing. Provide a permanent label on each reel showing length, media, identification number, and date of manufacture. Provide water resistant label and ink on the labels. Apply end seals to each end of the media after testing and before terminating to prevent moisture from entering the cable while stored at the job site. Reels with cable shall be suitable for outside storage conditions when temperature ranges from minus 40 degrees C to plus 65 degrees C, with relative humidity from zero to 100 percent. Equipment, other than FO media, delivered and placed in storage shall be stored with protection from weather, humidity and temperature variation, dirt and dust, or other contaminants.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Materials and FO system material shall be the standard products of a manufacturer regularly engaged in the manufacturer of such products and shall be the manufacturer's standard commercially available product.

2.1.1 Fiber Optic Media Types

FO media shall meet all performance requirements of EIA EIA/TIA-568-A and the physical requirements of ICEA S-87-640 and EIA EIA/TIA-598-A.

2.1.1.1 Single Mode Fiber Media.

Provide FO single mode media with outer sheath jacket, strength member, ripcords, water blocking material, core tube, and core fibers as installed in a permanent underground pathway system as shown on the construction drawings. Media shall have all glass, dual window, graded index material with a core diameter of 8.3 microns. Fiber shall be coated with a cladding material which is concentric with the core. Fiber cladding diameter shall be nominal 125 microns. Media shall have a transmission window centered at 1300 and 1550 nanometer wavelengths, attenuation at 1550 nanometers shall be less than 0.5 dB per kilometer. FO media shall comply with EIA EIA/TIA-472DAAA,and EIA EIA/TIA-758.

2.2 FIBER OPTIC SPLICES

Provide FO splices and splicing materials for fusion or mechanical methods at locations shown n the construction drawings. The splice insertion loss shall be less than 0.1 dB mean, (0.3 dB max) when measured in accordance with EIA ANSI/EIA/TIA-455-59A using an Optical Time Domain Reflectometer (OTDR). Splices shall be designed for a return loss of 40.0 db max for single mode fiber when tested in accordance with EIA EIA/TIA-455-107.

2.3 FIBER OPTIC ENCLOSURES

Provide metallic enclosures for fiber optic data transmission equipment. NEMA 250, type 4 enclosure. Enclosures shall protect the spliced fibers from moisture and physical damage. Splice closure shall provide strain relief for the cable and the fibers at splice points. Provide full documentation citing conformance to structural parameters.

2.4 FIBER OPTIC TERMINATIONS AND CONNECTORS

FO connectors shall comply with EIA EIA/TIA-4750000-C and EIA EIA/TIA-604-3.

2.5 FIBER OPTIC PATHWAY SYSTEM

Provide an FO pathway system including raceway conduit, duct system, and maintenance holes and handholes as shown on the drawings. Pathway materials shall comply with EIA ANSI/TIA/EIA-569-A, and the following commercial standards for construction materials, NEMA RN 1 (PVC), NEMA TC 2 (PVC), NEMA TC 3 (PVC), NEMA TC 6 & 8, and NEMA TC 9.

2.5.1 Conduit

Conduit as specified in Section 16050N.

2.6 FACTORY OF QUALITY CONTROL

Conduct factory quality tests of FO media as required by EIA EIA/TIA-472D000-A.

2.7 PREPARATION FOR DELIVERY

Provide 6 1/2 feet pigtails on each end of media accessible for testing. Reel drum shall comply with manufacturers recommended bend radius for the media. Wind media on reel so that unreeling can be done without kinking the media. Attach a permanent waterproof label with indelible text on reel showing the length, media type, bandwidth, attenuation, and date of manufacture.

2.8 FACTORY REEL TEST

Test 100 percent OTDR test of FO media at the factory prior to shipment in accordance with Appendix H of EIA EIA/TIA-568-A. Use EIA EIA/TIA-526-7 for single mode fiber and EIA EIA/TIA-526-14-A Method B for multi mode fiber measurements. Calibrate OTDR to show anomalies of 0.2 dB minimum. Provide digitized or photographic traces to the Contracting Officer.

2.9 MISCELLANEOUS ITEMS

2.9.1 FO Media Tags

Provide stainless steel, 1 5/8 inches in diameter 1/16 inch thick, and circular in shape.

2.9.2 Buried Warning and Identification Tape

Provide color, type and depth of tape as specified in paragraph "BURIED WARNING AND IDENTIFICATION TAPE" in Section FO media must be marked and protected as required by EIA EIA/TIA-590-A.

PART 3 EXECUTION

3.1 INSTALLATION

Install and test the FO media in accordance with contract drawings, specifications, IEEE C2, NFPA 70, and EIA EIA/TIA-590-A. Provide all necessary power, utility services, technicians, test equipment, calibration equipment as required to perform reel and final acceptance tests of the media. All media which fail the factory or reel tests or final acceptance field tests shall be replaced and re-tested at the contractors expense. Splices are not permitted unless shown on the construction drawings. Field test splices within 24 hours after splice installation. Splices shall be tested to demonstrate a maximum 0.2 dB loss. Provide a splice box for each field splice. Provide a minimum of 2 meters for routing and testing media. During splicing operations protect media ends with end caps during splicing operations.

3.1.1 Contractor Damage

Promptly repair indicated utility and communications lines or systems damaged during site preparation and construction. Damages to lines or systems not indicated, which are caused by contractor operations, shall be treated as "Changes" under the terms of the Contract clauses. When Contractor is advised in writing of the location of a non-indicated line or system, such notice shall provide that portion of the line or system with "indicated" status in determining liability for damages. In every event, immediately notify the Contracting Officer of damage.

3.1.2 Direct Burial System

Installation shall be in accordance with EIA EIA/TIA-590-A. Under railroad tracks, paved areas, and roadways install cable in conduit encased in concrete. Slope ducts to drain. Excavate trenches by hand or mechanical trenching equipment. Provide a minimum cable cover of 24 inches below finished grade. Trenches shall be not less than 6 inches wide and in straight lines between cable markers. Do not use cable plows. Bends in trenches shall have a radius of not less than 36 inches. Where two or more cables are laid parallel in the same trench, space laterally at least 3 inches apart. When rock is encountered, remove it to a depth of at least 3 inches below the cable and fill the space with sand or clean earth free

from particles larger than 1/4 inch. Do not unreel and pull cables into the trench from one end. Cable may be unreeled on grade and lifted into position. Provide color, type and depth of warning tape as specified in paragraphs entitled "BURIED WARNING AND IDENTIFICATION TAPE" in Section (02315, "Excavation and Fill" and (02302N, "Excavating, backfilling, and compacting for Utilities").

3.1.2.1 Media Placement

a. Separate FO media crossing other cables or metal piping from the other cables or pipe by not less than 3 inches of well tamped earth. Do not install FO media under or above traffic signal loops.

b. Media shall be in one continuous length without splices except where splices are shown on the drawings.

c. Do not allow bends in media which exceed the manufacturers minimum recommended radii. Do not bend media to a radius less than 10 times the outside diameter of the media.

d. Leave a horizontal slack of approximately 3 feet in the ground on each end of cable runs, on each side of connection boxes, and at points where connections are brought above ground. Where cable is brought above ground, leave additional slack to make necessary connections.

3.1.2.2 Identification Slabs (Markers)

Provide a marker at each change of direction of the cable, over the ends of ducts or conduits which are installed under paved areas and roadways and over each splice. Identification markers shall be of concrete, approximately 20 inches square by 150 mm 6 inches thick and stake mounted warnings meeting the requirements of REA.

3.1.3 Underground Duct

Construct underground duct as specified in Section 16302N, "Underground Transmission and Distribution." Encase in concrete any ducts under roads, paved areas, or railroad tracks.

3.1.3.1 Connections to Existing Maintenance Holes and Handholes

For duct line connections to existing structures, break the structure wall out to the dimensions required and preserve the steel in the structure wall. Cut the steel and the duct line envelope.

3.1.3.2 Connections to Concrete Pads

For duct line connections to concrete pads, break an opening in the pad out to the dimensions required and preserve the steel in the pad. Cut the steel and extend it out to tie into the reinforcing of the duct line envelope. Chip out the opening in the pad to form a key for the duct line envelope.

3.1.3.3 Connections to Existing Ducts

Where connections to existing duct lines are indicated, excavate the lines to the maximum depth required. Cut off lines and remove loose concrete from the conduits before new concrete encased ducts are installed. Provide reinforced concrete collar, poured monolithically with the new duct line to take the shear at the joint of the duct lines.

3.1.4 Reconditioning of Surfaces

3.1.4.1 Unpaved Surface Treatment

Restore unpaved surfaces disturbed during the installation of duct or direct burial cable to their original elevation and condition. Carefully preserve existing sod and topsoil and replace after the back-filling is completed. Replace damaged sod with sod of quality equal to that removed. Where the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding.

3.1.4.2 Paving Repairs

Where trenches, pits, or other excavations are made in existing roadways and in other areas of pavement where surface treatment of any kind exists, restore such surface treatment or pavement to the same thickness and to the same kind as previously existed. Surface treatment or pavement shall also match and tie into the adjacent and surrounding existing surfaces.

3.1.5 Cable Pulling

Test duct lines with a mandrel and swab out to remove foreign material before the pulling of FO media. Avoid damage to cables in setting up pulling apparatus or in placing tools or hardware. Do not step on media when entering or leaving the maintenance holes. Do not place media in ducts other than those shown without prior written approval of the Contracting Officer. Roll cable reels in the direction indicated by the arrows painted on the reel flanges. Set up media reels on the same side of the maintenance hole as the pathway section in which the media is to be placed. Level the reel and bring into proper alignment with the pathway section so that the media pays off from the top of the reel in a long smooth bend into the duct without twisting. Under no circumstances shall the media be paid off from the bottom of the reel. Check the equipment set up prior to beginning the media cable pulling to avoid an interruption once pulling has started. Use a cable feeder guide of suitable dimensions between media reel and face of duct to protect media and guide cable into the duct as it is paid off the reel. As media is paid off the reel, lubricate and inspect media for sheath defects. When defects are noticed, stop pulling operations and notify the Contracting Officer to determine required corrective action. Stop media pulling if reel binds or does not pay off freely. Rectify cause of binding before resuming pulling operations. Provide media lubricants recommended by the cable

manufacturer. Provide 3.3 feet of spare media in all manholes and enclosures for final termination and testing.

3.1.5.1 FO Media Tensions

Install FO media as shown on construction drawings. Provide devices to monitor media tension during installation. Do not exceed manufacturers recommended maximum FO tensions and bending radii during installation.

3.1.5.2 Pulling Eyes

Equip media 1- 1/4 inches in diameter and larger with cable manufacturer's factory installed pulling-in eyes. Provide media with diameter smaller than 1-1/4 inches with heat shrinkable type and caps or seals on cable ends when using cable pulling grips. Rings to prevent grip from slipping shall not be beaten into the cable sheath. Use a swivel grip of 3/4 inch links between pulling-in eyes or grips and pulling strand.

3.1.5.3 Installation of Media in Maintenance Holes, Handholes, and Vaults

Do not install media utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances, and support media on brackets and cable insulators at a maximum of 4 feet. In existing maintenance holes, hand holes, and vaults where new ducts are to be terminated, or where new media are to be installed, modify the existing installation of media, cable supports, and grounding as required with cables arranged and supported as specified for new media.

3.1.6 Grounding

Ground exposed non current carrying metallic parts of telephone equipment, media sheaths, media splices, and terminals.

3.1.7 Housekeeping

The Contractor will be responsible for cleaning up work area and maintaining the work area in orderly condition.

3.2 FIELD QUALITY CONTROL

Provide the Contracting Officer 10 working days notice prior to each reel and final acceptance test. Provide labor, equipment, and incidentals required for testing. Correct defective material and workmanship disclosed as the results of the tests. Furnish a signed copy of the test results to the Contracting Officer within 3 working days after the tests for each segment of construction are completed. Perform testing as construction progresses and do not wait until all construction is complete before starting field tests.

3.2.1 Field Reel Tests

Perform the following tests on FO media at the job site before it is removed from the cable reel. For cables with factory installed pulling

eyes, these tests shall be performed at the factory and certified test results shall accompany the media. Perform OTDR tests with media on reels and compare factory and field test data.

3.2.1.1 Reel Test Results

Provide results of reel tests to the Contracting Officer at least 5 working days before installation is to commence. Results shall indicate reel number of the media, manufacturer, type and number of fiber tested, and recorded readings. When reel tests indicate that the media does not comply with factory reel test results remove the media from the job site and replace with compliant media.

3.2.2 Final Acceptance Tests

Perform end-to-end tests including power meter light source and OTDR tests. Perform OTDR measurements as required by Appendix -H of EEIA EIA/TIA-568-A. Single mode fiber shall be tested in accordance with EIA EIA/TIA-526-7 (Optical Power Loss). Multi mode fiber shall be tested in accordance with EIA EIA/TIA-526-14-A (Optical Power Loss).

3.2.2.1 Test Results

Provide results of final acceptance tests (attenuation tests, OTDR traces, etc.), to the Contracting Officer at least 5 working days after completion of tests.

-- End of Section --

SECTION 16768A

FIBER OPTIC DATA TRANSMISSION SYSTEM
08/94

PART 1 GENERAL

1.1 REFERENCES

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

THE NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 15	Radio Frequency Devices

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA ANSI/TIA/EIA-455-13A	(1996) FOTP-13 Visual and Mechanical Inspection of Fiber Optic Components, Devices, and Assemblies
EIA ANSI/EIA/TIA-455-25B	(1996) FOTP-25 Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies
EIA ANSI/EIA/TIA-455-30B	(1991) FOTP-30 Frequency Domain Measurement of Multimode Optical Fiber Information Transmission Capacity
EIA ANSI/TIA/EIA-455-41A	(1993) FOTP-41 Compressive Loading Resistance of Fiber Optic Cables
EIA ANSI/EIA/TIA-455-46A	(1990) FOTP-46 Spectral Attenuation Measurement for Long-Length, Graded-Index Optical Fibers
EIA ANSI/EIA/TIA-455-47B	(1992) FOTP-47 Output Far Field Radiation Pattern Measurement
EIA ANSI/EIA/TIA-455-58A	(1990) FOTP-58 Core Diameter Measurement of Graded-Index Optical Fibers
EIA ANSI/EIA/TIA-455-59	(1989) FOTP-59 Measurement of Fiber Point Defects Using an OTDR
EIA ANSI/EIA/TIA-455-61	(1989) FOTP-61 Measurement of Fiber or Cable Attenuation Using an OTDR
EIA ANSI/EIA-455-81A-91	(1992) FOTP-81 Compound Flow (Drip) Test for Filled Fiber Optic Cable

EIA ANSI/EIA/TIA-455-82B	(1992) FOTP-82 Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable
EIA-455-88	(1987) FOTP-88 Fiber Optic Cable Bend Test
EIA ANSI/EIA-455-91	(1986; R 1996) FOTP-91 Fiber Optic Cable Twist-Bend Test
EIA ANSI/TIA/EIA-455-104A	(1993) FOTP-104 Fiber Optic Cable Cyclic Flexing Test
EIA ANSI/EIA/TIA-455-170	(1989) FOTP-170 Cable Cutoff Wavelength of Single-Mode Fiber by Transmitted Power
EIA ANSI/EIA-455-171	(1987) FOTP-171 Attenuation by Substitution Measurement - for Short-Length Multimode Graded-Index and Single-Mode Optical Fiber Cable Assemblies
EIA ANSI/TIA/EIA-455-177A	(1992) FOTP-177 Numerical Aperture Measurement of Graded-Index Optical Fibers
EIA ANSI/TIA/EIA-606	(1993) Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

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

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250	(1997) Enclosures for Electrical Equipment (1000 Volts Maximum)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 910	(1998) Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air
UL 1666	(1997; R Jan 1999) Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts

1.2 SUBMITTALS

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

SD-02 Shop Drawings

Installation; G,

Detail drawings including a complete list of equipment and material, including manufacturer's descriptive and technical literature, performance charts and curves, catalog cuts, and installation instructions. Detail drawings shall contain complete wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and will properly function with its associated systems. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including clearance for maintenance and operations. System drawings shall show final configuration, including location, type and termination of inside fiber optics and showing the location, duct and innerduct arrangement, or fiber assignment of outside plant. The ac power consumption and heat dissipation shall be shown under both normal and maximum operating conditions.

SD-03 Product Data

Spare Parts;

Data lists of spare parts, tools, and test equipment for each different item of material and equipment specified, after approval of detail drawings not later than 2 months prior to the date of beneficial occupancy. The data shall include a list of parts and supplies, with current unit prices and source of supply, and a list of the parts recommended by the manufacturer to be replaced after 3 years of service.

Manufacturer's Instructions; G,

Where installation procedures, or any part thereof, are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be submitted prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received and approved.

Test Procedures and Report; G,

Test plans shall define tests required to ensure that the system meets technical, operational, and performance specifications. The test plans shall define milestones for the tests, equipment, personnel, facilities, and supplies required. The test plans shall identify the capabilities and functions to be tested.

SD-06 Test Reports

Test Procedures and Report;

Test reports, in booklet form showing field tests performed to adjust each component and field tests performed to prove compliance with the specified performance criteria, upon completion and testing of the installed system.

SD-07 Certificates

Fiber Optics (FO) Data Transmission System (DTS);

Manufacturer's certificate indicating compliance with transmission and reliability requirements. Where equipment or materials are specified to conform to the standards or publications and requirements of CFR, ANSI, NFPA, EIA, or UL, certificates attesting that the items furnished under this section of the specification conform to the specified requirements.

SD-10 Operation and Maintenance Data

System Maintenance Course;

Six copies of operating instructions outlining the step-by-step procedures required for system operation including description of each subsystem in its operating mode. Instructions shall include the manufacturer's name, service manual, parts list, and a brief description of equipment, components, and their basic operating features. Six copies of the maintenance instructions listing regular maintenance procedures, possible system failures, a troubleshooting guide for repairs, and simplified diagrams for the system as installed. A video describing operating and maintenance instructions may be included.

1.3 SYSTEM DESCRIPTION

1.3.1 General

A fiber optics (FO) data transmission system (DTS) shall be provided. The data transmission system shall consist of fiber optic transmission media, transmitter and receiver modules, FO modems, transceiver modules, repeaters, power line surge protection and terminal devices (such as connectors, patch panels and breakout boxes). The data transmission system shall interconnect system components as shown. Computing devices, as defined in 47 CFR 15, shall be certified to comply with the requirements for Class B computing devices and labeled as set forth in 47 CFR 15.

The Optical System shall proivde communications for the SCADA system described in section 13451 and in Attachment 4. The opical system shall use the OC-3 system as described in Attachment 5. These spefications in Section 16768A are subliminary to Attachment 4 and 5. In the case of conflicting requirments of the same type between the sections, the more

rigerous of the two shall rule. In the case of mutally exclusive requiremnets, Attachment 4 or 5 shal rule.

1.3.2 Environmental Requirements

Equipment and cable to be utilized indoors shall be rated for continuous operation under ambient environmental conditions of 35 to 120 degrees F dry bulb and 10 to 95 percent relative humidity, noncondensing. Equipment shall be rated for continuous operation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified or normally encountered for the installed location. Fiber optic cable for outdoor installation shall be rated for minus 40 to plus 176 degrees F.

1.3.3 Electrical Requirements

The equipment shall operate from a voltage source as shown, plus or minus 10 percent.

1.3.4 Input Line Surge Protection

Inputs and outputs shall be protected against surges induced on wiring including wiring installed outdoors. Communications equipment shall be protected against surges induced on any communications circuit. Cables and conductors (except fiber optics which serve as communications circuits from consoles to field equipment) and between field equipment, shall have surge protection circuits installed at each end. Protection shall be furnished at equipment, and additional triple electrode gas surge protectors rated for the application on each wire line circuit shall be installed within 3 feet of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two waveforms:

a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.

b. An 8 microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.

1.3.5 Power Line Surge Protection

Equipment connected to ac circuits shall be protected from power line surges. Equipment shall meet the requirements of IEEE C62.41. Fuses shall not be used for surge protection.

1.4 DELIVERY OF TECHNICAL DATA

Computer software and technical data (including technical data which relates to computer software), which are specifically identified in this specification shall be delivered strictly in accordance with the CONTRACT CLAUSES, SPECIAL CONTRACT REQUIREMENTS, and in accordance with the Contract Data Requirements List (CDRL), DD Form 1423, which is attached to and thereby made a part of this contract. All data delivered shall be

identified by reference to the particular specification paragraph against which it is furnished. If the DTM system is being installed in conjunction with another system such as an intrusion detection system, electronic entry control system, closed circuit television system, energy monitoring and control system, or utility monitoring and control system, the Technical Data Packages shall be submitted as part of the Technical Data Package for Section 13451 and Attachment 4 and Attachment 5.

1.4.1 Group I Technical Data Package

1.4.1.1 System Drawings

The package shall include the following:

a. Communications system block diagram.

b. FO receivers, transmitters, transceivers, and FO modem installation, block diagrams, and wiring diagrams.

c. FO receivers, transmitters, transceivers, and FO modem physical layout and schematics.

d. Details of interfaces with other systems.

e. Details of connections to power sources, including grounding.

f. Details of surge protection device installations.

g. Details of cable splicing and connector installations.

h. Details of aerial cable and messenger installation on poles, cable entrance to buildings, and termination inside enclosures.

i. Details of underground cable installation, cable entrance into buildings, and terminations inside enclosures.

1.4.1.2 Equipment Data

A complete data package shall be delivered for all material, including field and system equipment.

1.4.1.3 Data Transmission System Description and Analyses

The data package shall include complete system description, and analyses and calculations used in sizing equipment required by these specifications. Descriptions and calculations shall show how the equipment will operate as a system to meet the specified performance. The data package shall include the following:

b. Digital transmitter and receiver communication speed and protocol description.

d. Data transmission system expansion capability and method of

implementation.

e. FO system signal-to-noise ratio calculation for each communication link.

f. Flux-budget and gain margin calculation for each link.

1.4.1.4 System Overall Reliability Calculations

The data package shall include manufacturers' reliability data and calculations required to show compliance with the specified reliability. The calculations shall be based on the configuration as shown.

1.4.1.5 Certifications

Specified manufacturer's certifications shall be included with the data package.

1.4.2 Group II Technical Data Package

The Contractor shall verify that site conditions are in agreement with the design package. The Contractor shall submit a report to the Government documenting changes to the site, or conditions that affect performance of the system to be installed. For those changes or conditions which affect system installation or performance, specification sheets shall be provided (with the report), or written functional requirements to support the findings, and a cost estimate to correct the deficiency. The Contractor shall not correct any deficiency without written permission from the Government.

PART 2 PRODUCTS

2.1 TRANSCEIVERS FOR LAN APPLICATIONS

Transceivers for FO LAN applications shall be active units, compatible with the LAN cards, modems and repeaters used in the system. Indicators provided shall be for power, collision detection, receive, transmit, and status. Power for transceivers shall be derived from the AUI port of LAN equipment or from a dedicated power supply. Transceiver loss characteristics shall be less than 1.0 db. Connectors shall be low loss and compatible with LAN equipment. Circuitry shall be included so when a device is disconnected, other devices on the LAN continue to operate without any disruption.

2.2 ENCLOSURES

Enclosures shall conform to the requirements of NEMA 250 for the types specified. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damaged surfaces shall be repaired and refinished using original type finish.

2.2.1 Interior

Enclosures installed indoors shall meet the requirements of Type 12 or as

shown.

2.2.2 Exterior

Enclosures installed outdoors shall meet the requirements of Type 4X non-metallic.

2.3 OPTICAL FIBERS

2.3.1 General

Optical fibers shall be coated with a suitable material to preserve the intrinsic strength of the glass. The outside diameter of the glass-cladded fiber shall be nominally 125 microns, and shall be concentric with the fiber core. Optical fibers shall meet EIA ANSI/EIA/TIA-455-46A, and EIA ANSI/TIA/EIA-455-177A.

2.3.2 62.5 Micron Multimode Fibers

Conductors shall be multimode, graded index, solid glass waveguides with a nominal core diameter of 62.5 microns. The fiber shall have transmission windows centered at 850 and 1330 nanometer wavelengths. The numerical aperture for each fiber shall be a minimum of 0.275. The attenuation at 850 nanometers shall be 4.0 dB/Km or less. The attenuation at 1330 nanometers shall be 1.5 dB/Km or less. The minimum bandwidth shall be 160 MHz-Km at 850 nanometers and 400 MHz-Km at 1300 nanometers. FO cable shall be certified to meet EIA ANSI/EIA/TIA-455-30B and EIA ANSI/EIA/TIA-455-58A.

2.3.3 8.3 Micron Single Mode Fibers

Conductors shall be single-mode, graded index, solid glass waveguides with a nominal core diameter of 8.3 microns. The fiber shall have a transmission window centered at 1330 nanometer wavelength. The numerical aperture for each optical fiber shall be a minimum of 0.10. The attenuation at 1330 nanometers shall be 0.5 dB/Km or less. The fibers shall be certified to meet EIA ANSI/EIA/TIA-455-170.

2.4 CROSS-CONNECTS

2.4.1 Patch Panels

Patch panels shall be a complete system of components by a single manufacturer, and shall provide termination, splice storage, routing, radius limiting, cable fastening, storage, and cross-connection. Patch panel connectors and couplers shall be the same type and configuration as used elsewhere in the system. Panels shall be as shown.

2.4.2 Patch Cords

Patch cords shall be cable assemblies consisting of flexible optical fiber cable with connectors of the same type as used elsewhere in the system. Optical fiber shall be the same type as used elsewhere in the system. Patch cords shall be complete assemblies from manufacturer's standard products.

2.5 CABLE CONSTRUCTION

2.5.1 General

The cable shall contain a minimum of two fiber optic conductors for each full duplex circuit. The number of fibers in each cable shall be as shown. Each fiber shall be protected by a protective tube. Cables shall have a jacketed strength member, and an exterior jacket. Cable and fiber protective covering shall be free from holes, splits, blisters, and other imperfections. The covering shall be flame retardant, moisture resistant, non-nutrient to fungus, ultraviolet light resistant as specified and nontoxic. Mechanical stress present in cable shall not be transmitted to the optical fibers. Strength members shall be non-metallic and shall be an integral part of the cable construction. The combined strength of all the strength members shall be sufficient to support the stress of installation and to protect the cable in service. The exterior cables shall have a minimum storage temperature range of minus 40 to plus 167 degrees F. Interior cables shall have a minimum storage temperature of plus 14 to plus 167 degrees F. All cables furnished shall meet the requirement of NFPA 70. Fire resistant characteristics of cables shall conform to Article 770, Sections 49, 50, and 51. A flooding compound shall be applied into the interior of the fiber tubes, into the interstitial spaces between the tubes, to the core covering, and between the core covering and jacket of all cable to be installed aerially, underground, and in locations susceptible to moisture. Flooded cables shall comply with EIA ANSI/EIA-455-81A-91 and EIA ANSI/EIA/TIA-455-82B. Cables shall be from the same manufacturer, of the same cable type, and of the same size. Each fiber and protective coverings shall be continuous with no factory splices. Fiber optic cable assemblies, including jacketing and fibers, shall be certified by the manufacturer to have a minimum life of 30 years. Plenum cable shall meet UL 910, and riser cable shall meet UL 1666. FO cable shall be certified to meet the following: EIA ANSI/TIA/EIA-455-13A, EIA ANSI/EIA/TIA-455-25B, EIA ANSI/TIA/EIA-455-41A, EIA ANSI/EIA/TIA-455-47B, EIA ANSI/EIA/TIA-455-59, EIA ANSI/EIA/TIA-455-61, EIA-455-88, EIA ANSI/EIA-455-91, EIA ANSI/TIA/EIA-455-104A, and EIA ANSI/EIA-455-171.

2.5.2 Exterior Cable

2.5.2.1 Duct Cable

The optical fibers shall be surrounded by a tube buffer, shall be contained in a channel or otherwise loosely packaged to provide clearance between the fibers and inside of the container, and shall be extruded from a material having a coefficient of friction sufficiently low to allow the fiber free movement.

a. The cable outer jacket shall be medium density polyethylene material with orange pigment added for ease of identification.

b. Tensile strength: Cables shall withstand an installation tensile load of not less than 608 pounds and not less than 135 pounds continuous tensile load.

c. Impact and Crush resistance: The cables shall withstand an impact of 1.7lbs/in as a minimum, and shall have a crush resistance of 317 pounds per square inch as a minimum.

2.5.3 Interior Cable

a. Loose buffer tube cable construction shall be such that the optical fibers shall be surrounded by a tube buffer, shall be contained in a channel or otherwise loosely packaged to provide clearance between the fibers and the inside of the container to allow for thermal expansions without constraining the fiber. The protective container shall be extruded from a material having a coefficient of friction sufficiently low to allow the fiber free movement. The cable outer jacket shall be flame retardant polyvinyl chloride (PVC) or fluorocopolymer (FCP), which complies with NFPA 70 for OFNP applications. Tensile strength, impact resistance, and crush resistance shall not exceed manufacturers recommendations.

b. Tight buffer tube cable construction shall be extrusion of plastic over each cladded fiber, with an outer jacket of flame retardant PVC or FCP, which complies with NFPA 70 for OFNR requirements for riser cables and vertical shaft installations. Optical fibers shall be covered in near contact with an extrusion tube and shall have an intermediate soft buffer to allow for the thermal expansions and minor pressures. Tensile strength, impact resistance, and crush resistance shall not exceed manufacturers recommendations.

c. Plenum Rated Cables: Cable to be installed inside plenums shall additionally meet the requirements of UL 910.

2.5.4 Pigtail Cables

Cable used for connections to equipment shall be flexible fiber pigtail cables having the same physical and operational characteristics as the parent cable. The cable jacket shall be flame retardant PVC or FCP, which complies with NFPA 70 for OFNP applications. Maximum dB loss for pigtail cable shall be 3.5 dB/km at 850 nanometers, and 1.0 dB/km at 1330 nanometers.

2.6 FO CONNECTORS

FO connectors shall be the straight tip, bayonet style, field installable, hot melt, two stage expoxy, self-aligning and centering. FO connectors shall match the fiber core and cladding diameters. The connector coupler shall be stainless steel and the alignment ferrule shall be ceramic. FO equipment and cable shall use the same type connectors. Connector insertion loss shall be nominally 0.3 dB and less than 0.7 dB.

2.7 MECHANICAL SPLICES

Mechanical splices shall be suitable for installation in the field. External power sources shall not be required to complete a splice. Splices

shall be self-aligning for optimum signal coupling. Mechanical splices shall not be used for exterior applications where they may be buried underground or laced to aerial messenger cables. Mechanical splices may be used for interior locations and within enclosures. Splice closures shall protect the spliced fibers from moisture and shall prevent physical damage.

The splice closure shall provide strain relief for the cable and the fibers at the splice points.

2.8 CONDUIT, FITTINGS AND ENCLOSURES

Conduit shall be as specified in Section 16050N, and as shown.

PART 3 EXECUTION

3.1 INSTALLATION

System components and appurtenances shall be installed in accordance with the manufacturer's instructions and as shown. Interconnections, services, and adjustments required for a complete and operable data transmission system shall be provided.

3.1.1 Interior Work

Conduits, tubing and cable trays for interior FO cable interior shall be installed as specified in Section 16050N and as shown. Cable installation and applications shall meet the requirements of NFPA 70, Article 770, Sections 52 and 53. Cables not installed in conduits or wireways shall be properly secured and neat in appearance, and if installed in plenums or other spaces used for environmental air, shall comply with NFPA 70 requirements for this type of installation.

3.1.2 Exterior Underground Cable

Except as otherwise specified, conduits, ducts, and manholes for underground FO cable systems shall be installed as specified in Section 16050N and as shown.

a. Minimum burial depth for cable shall be 30 inches,but not less than the depth of the frost line. Burial depth specified shall take precedence over any requirements specified elsewhere.

b. Where direct burial cable will pass under sidewalks, roads, or other paved areas and no existing conduits or duct banks are available, the cable shall be placed in a 1 inch rigid coated galvanized steel conduit or larger as required to limit conduit fill to 80 percent or less. Conduit may be installed by jacking or trenching, as approved.

c. Buried cables shall be placed below a plastic warning tape buried in the same trench or slot. The tape shall be 12 inches above the cable. The warning tape shall be continuously imprinted with the words "WARNING - COMMUNICATIONS CABLE BELOW" at not more than 48 inch intervals. The plastic tape shall be acid and alkali

resistant polyethylene film, 3 inches wide with a minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 pounds per square inch lengthwise and 1500 pounds per square inch crosswise.

d. For cables installed in ducts and conduit, a cable lubricant compatible with the cable sheathing material shall be used on all cables pulled. Pulling fixtures shall be attached to the cable strength members. If indirect attachments are used, the grip diameter and length shall be matched to the cable diameter and characteristics. If an indirect attachment is used on cables having only central strength members, the pulling forces shall be reduced to ensure that the fibers are not damaged from forces being transmitted to the strength member. During pulling the cable pull line tension shall be continuously monitored using dynamometers or load-cell instruments, and shall not exceed the maximum tension specified by the cable manufacturer. The mechanical stress placed upon the cable during installation shall be such that the cable is not twisted or stretched. A cable feeder guide shall be used between the cable reel and the face of the duct or conduit to protect the cable and guide it into the duct or conduit as it is unspooled from the reel. As the cable is unspooled from the reel, it shall be inspected for jacket defects or damage. The cable shall not be kinked or crushed and the minimum bend radius of the cable shall not be exceeded during installation. Cable shall be hand fed and guided through each manhole and additional lubricant shall be applied at all intermediate manholes. When practicable, the center pulling technique shall be used to lower pulling tension. That is, the cable shall be pulled from the center point of the cable run towards the end termination points. The method may require the cable to be pulled in successive pulls. If the cable is pulled out of a junction box or manhole the cable shall be protected from dirt and moisture by laying the cable on a ground covering.

3.1.3 Service Loops

Each fiber optic cable shall have service loops of not less than 9.8 feet in length at each end.

3.1.4 Splices

No splices will be permitted unless the length of cable being installed exceeds the maximum standard cable length available from a manufacturer or unless fiber optic pigtails are used to connect transmitters, receivers, or other system components for terminations to the fiber. Splices shall be made using the method recommended by the cable manufacturer. Splices shall be housed in a splice enclosure and shall be encapsulated with an epoxy, ultraviolet light cured splice encapsulant or otherwise protected against infiltration of moisture or contaminants. FO splices shall be field tested at the time of splicing. Fusion splices shall have less than 0.2 dB loss.

Mechanical splices shall have less than 0.5 dB loss. There shall be no more than 1 splice per 0.62 mile in any of the FO cables excluding

terminations. Field splices shall be located in cable boxes. Sufficient cable shall be provided in each splicing location to properly rack and splice the cables, and to provide extra cable for additional splices. Cable ends shall be protected with end caps except during actual splicing. During the splicing operations, means shall be provided to protect the unspliced portions of the cable and its fibers from the intrusion of moisture and other foreign matter.

3.1.5 Connectors

Connectors shall be as specified in paragraph FO CONNECTORS. Fibers at each end of the cable shall have jumpers or pigtails installed of not less than 3 feet in length. Fibers at both ends of the cable shall have connectors installed on the jumpers. The mated pair loss, without rotational optimization, shall not exceed 1.5 dB. The pull strength between the connector and the attached fiber shall not be less than 50 pounds.

3.1.6 Identification and Labeling

Identification tags or labels shall be provided for each cable. Markers, tags and labels shall use indelible ink or etching which will not fade in sunlight, or in buried or underground applications. Markers, tags, and labels shall not become brittle or deteriorate for a period of 20 years. Label all termination blocks and panels with cable number or pair identifier for cables in accordance with EIA ANSI/TIA/EIA-606 and as specified. The labeling format shall be identified and a complete record shall be provided to the Government with the final documentation. Each cable shall be identified with type of signal being carried and termination points.

3.1.7 Enclosure Sizing and Cable

Termination enclosures shall be sized to accommodate the FO equipment to be installed. Sizing shall include sufficient space for service loops to be provided and to accommodate a neat, workmanlike layout of equipment and the bend radii of fibers and cables terminated inside the enclosure.

3.1.8 Enclosure Penetrations

Enclosure penetrations shall be from the bottom and shall be sealed with rubber silicone sealant to preclude the entry of water. Conduits rising from underground shall be internally sealed.

3.1.9 Conduit-Enclosure Connections

Conduit-enclosure connections shall be protected by tack welding or brazing the conduit to the enclosure. Tack welding or brazing shall be done in addition to standard conduit-enclosure connection methods as described in NFPA 70. Any damage to the enclosure or its cover's surface protection shall be cleaned and repaired using the same type of surface protection as the original enclosure.

3.2 TESTING

3.2.1 General

The Contractor shall provide personnel, equipment, instrumentation, and supplies necessary to perform testing.

3.2.2 Contractor's Field Test

The Contractor shall verify the complete operation of the data transmission system in conjunction with field testing associated with systems supported by the fiber optic data transmission system as specified in Attachments 4 and 5 prior to formal acceptance testing. Field tests shall include a flux density test. These tests shall be performed on each link and repeated from the opposite end of each link.

3.2.2.1 Optical Time Domain Reflectometer Tests

Optical time domain reflectometer tests shall be performed using the FO test procedures of EIA ANSI/EIA/TIA-455-59. An optical time domain reflectometer test shall be performed on all fibers of the FO cable on the reel prior to installation. The optical time domain reflectometer shall be calibrated to show anomalies of 0.2 dB as a minimum. Photographs of the traces shall be furnished to the Government. An optical time domain reflectometer test shall be performed on all fibers of the FO cable after it is installed. The optical time domain reflectometer shall be calibrated to show anomalies of 0.2 dB as a minimum. If the optical time domain reflectometer test results show anomalies greater than 1 dB, the FO cable segment is unacceptable to the Government. The unsatisfactory segments of cable shall be replaced with a new segment of cable. The new segment of cable shall then be tested to demonstrate acceptability. Photographs of the traces shall be furnished to the Government for each link.

3.2.2.2 Power Attenuation Test

Power attenuation test shall be performed at the light wavelength of the transmitter to be used on the circuit being tested. The flux shall be measured at the FO receiver end and shall be compared to the flux injected at the transmitter end. There shall be a jumper added at each end of the circuit under test so that end connector loss shall be validated. Rotational optimization of the connectors will not be permitted. If the circuit loss exceeds the calculated circuit loss by more than 2 dB, the circuit is unsatisfactory and shall be examined to determine the problem. The Government shall be notified of the problem and what procedures the Contractor proposes to eliminate the problem. The Contractor shall prepare and submit a report documenting the results of the test.

3.2.2.3 Gain Margin Test

The Contractor shall test and verify that each circuit has a gain margin which exceeds the circuit loss by at least 6 dB.

-- End of Section --